

OXFORD



THE MONETARY
SYSTEMS *of the* GREEKS
AND ROMANS

EDITED BY
W. V. HARRIS

THE MONETARY SYSTEMS OF THE
GREEKS AND ROMANS

This page intentionally left blank

The Monetary Systems of the Greeks and Romans

edited by
W. V. Harris

OXFORD
UNIVERSITY PRESS

OXFORD

UNIVERSITY PRESS

Great Clarendon Street, Oxford ox2 6DP

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide in

Oxford New York

Auckland Cape Town Dar es Salaam Hong Kong Karachi

Kuala Lumpur Madrid Melbourne Mexico City Nairobi

New Delhi Shanghai Taipei Toronto

With offices in

Argentina Austria Brazil Chile Czech Republic France Greece

Guatemala Hungary Italy Japan Poland Portugal Singapore

South Korea Switzerland Thailand Turkey Ukraine Vietnam

Oxford is a registered trade mark of Oxford University Press
in the UK and in certain other countries

Published in the United States
by Oxford University Press Inc., New York

© Oxford University Press 2008

The moral rights of the author have been asserted
Database right Oxford University Press (maker)

First published 2008

All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any means,
without the prior permission in writing of Oxford University Press,
or as expressly permitted by law, or under terms agreed with the appropriate
reprographics rights organization. Enquiries concerning reproduction
outside the scope of the above should be sent to the Rights Department,
Oxford University Press, at the address above

You must not circulate this book in any other binding or cover
and you must impose the same condition on any acquirer

British Library Cataloguing in Publication Data
Data available

Library of Congress Cataloging in Publication Data
Data available

Typeset by SPI Publisher Services, Pondicherry, India
Printed in Great Britain
on acid-free paper by
Biddles Ltd., King's Lynn, Norfolk

ISBN 978-0-19-923335-9

1 3 5 7 9 10 8 6 4 2

Preface

IN April 2005, when the Center for the Ancient Mediterranean at Columbia gathered a group of scholars for a conference in Fayerweather Hall (Moses Finley's old stamping ground) on the nature of ancient money, my hope was that we would confront the debate rather than minimizing it for the sake of a false show of scholarly harmony. This volume, while it is not a complete record, will show that scholarly, as distinct from personal, harmony was nowhere to be seen. I do not know whether anyone's mind was changed, but all of us certainly had to mull over positions that we disagreed with. And I believe that most of us learned many things, as I certainly did.

I am most grateful to all the contributors to this volume for their efficient and cordial cooperation. I should particularly like to thank Joe Manning of Stanford for coming to our rescue with a Hellenistic chapter after my organizational capacities had failed to bring a Hellenistic speaker to the conference itself. My paper, 'The Nature of Roman Money', was also written after the conference.

The Center for the Ancient Mediterranean has once again, if I may say so, demonstrated its ability to bring together people from varying disciplines and from diverse parts of the scholarly world, in this case Britain, France, Greece, Israel, and Italy as well as the United States. And we have again brought forth a volume that judiciously mixes the work of the venerable and experienced with that of shining youth.

None of this would have been possible without the continued support of the Fellows of the Center. On this occasion we owe a special debt of thanks to the Arete Foundation and its energetic president Edward E. Cohen, who while possessing the breadth of knowledge of a successful man of affairs has also made crucial contributions to the history of classical Athens—and continues that activity in Ch. 4.

Books such as this do not come into being without the hard work of a number of people behind the scenes. Erin Thompson continues to manage the Center for the Ancient Mediterranean, as she so efficiently did in April 2005. Andrew Ollett, Irene Sanpietro, and in

particular Jason Governale all carried out important tasks in the last stages of editing. I most sincerely thank all four.

If I had written this entire book myself, I would have dedicated it to the memory of Moses Finley. In recent years his view of the ancient economy has frequently been a target, partly, one might say, in consequence of his own enlightened teaching which directed young ancient historians towards the social sciences, thereby encouraging a number of us to pursue lines of thought that eventually led us to diverge from the true doctrines. Those of us who knew him can console ourselves for his absence by imagining how robustly and how wittily he would have responded. My guess is that he would not have conceded very much.

W.V.H.

New York
May 2006

Contents

<i>List of Figures</i>	ix
<i>List of Abbreviations</i>	x
<i>Notes on Contributors</i>	xii
Introduction	1
<i>W. V. Harris</i>	
1. The Monetary Use of Weighed Bullion in Archaic Greece	12
<i>John H. Kroll</i>	
2. What Was Money in Ancient Greece?	38
<i>David M. Schaps</i>	
3. Money and Tragedy	49
<i>Richard Seaford</i>	
4. The Elasticity of the Money-Supply at Athens	66
<i>Edward E. Cohen</i>	
5. Coinage as 'Code' in Ptolemaic Egypt	84
<i>J. G. Manning</i>	
6. The Demand for Money in the Late Roman Republic	112
<i>David B. Hollander</i>	
7. Money and Prices in the Early Roman Empire	137
<i>David Kessler and Peter Temin</i>	
8. The Function of Gold Coinage in the Monetary Economy of the Roman Empire	160
<i>Elio Lo Cascio</i>	
9. The Nature of Roman Money	174
<i>W. V. Harris</i>	
10. The Use and Survival of Coins and of Gold and Silver in the Vesuvian Cities	208
<i>Jean Andreau</i>	
11. Money and Credit in Roman Egypt	226
<i>Peter van Minnen</i>	

12. The Monetization of the Roman Frontier Provinces <i>Constantina Katsari</i>	242
13. The Divergent Evolution of Coinage in Eastern and Western Eurasia <i>Walter Scheidel</i>	267
<i>References</i>	287
<i>Index</i>	323

Figures

1.1. Silver ingot, 570.8 g. Paestum Museum. Enlarged to actual size from J. G. Pedley, <i>Paestum: Greeks and Romans in South Italy</i> (London, 1990), fig. 25.	25
1.2. Silver plaque, 17.06 g. Paestum Museum. Reduced to actual size from A. M. Ardivino, <i>ArchCl</i> 32 (1980), pl. 17.	26
1.3. Silver ingot, 111.54 g. Paestum Museum. Enlarged to actual size from A. M. Ardivino, <i>RIN</i> 93 (1993), 288.	27
1.4. Silver ingot fragment, 57.5 g, from Sambiasi 1960 hoard, <i>IGCH</i> (1872). Archaeological Museum of Reggio Calabria, inv. 2335. Actual size. Museum photo.	29
1.5. Silver ingot fragment, now lost, from Taranto 1911 hoard, <i>IGCH</i> (1874). Size and weight unrecorded. Reproduced from E. Babelon, <i>RN</i> (1912), 32.	33
7.1. Plot of distance and Roman distance discount.	144
7.2. Relationship between distance and Roman distance discount.	148
11.1. The flow of money between Egypt and the Empire.	239
12.1. Coins from Dacia: excavations.	248
12.2. Pannonia Superior: excavations.	249
12.3. Pannonia Inferior: excavations.	250
12.4. Moesia Inferior: excavations.	251

Abbreviations

The abbreviated titles of literary sources are not included in the following list; in case of difficulty see LSJ, *The Oxford Latin Dictionary*, or *The Oxford Classical Dictionary*. For papyrological publications ('P. ...', 'Pap. ...', etc.) see J. F. Oates et al., *Checklist of Editions of Greek, Latin, Demotic, and Coptic Papyri, Ostraca and Tablets* (5th edn., Oakville, Conn., 2001).

AIIN	<i>Annali dell' Istituto Italiano di Numismatica</i>
AJA	<i>American Journal of Archaeology</i>
AJN	<i>American Journal of Numismatics</i>
AMN	<i>Acta Musei Napocensis</i>
ArchCl	<i>Archeologia Classica</i>
BAR-IS	British Archaeological Reports, International Series
BGU	<i>Aegyptische Urkunden aus den (Königlichen) Museen zu Berlin. Griechische Urkunden.</i>
CAH	<i>Cambridge Ancient History</i>
Ch.L.A.	<i>Chartae Latinae Antiquiores</i>
CIL	<i>Corpus Inscriptionum Latinarum</i>
CJ	<i>Codex Iustiniani</i>
CM	E. Lo Cascio (ed.), <i>Credito e moneta nel mondo romano</i> (Bari, 2003)
Crawford, RRC	M. H. Crawford, <i>Roman Republican Coinage</i> (Cambridge, 1974)
Dig.	<i>Digesta</i>
Duncan-Jones, MG	R. P. Duncan-Jones, <i>Money and Government in the Roman Empire</i> (Cambridge, 1994)
FGrH	F. Jacoby (ed.), <i>Die Fragmente der griechischen Historiker</i>
Finley, AE	M. I. Finley, <i>The Ancient Economy</i> , 2nd edn. (Cambridge, 1985)
FIRA	<i>Fontes Iuris Romani Anteiusiniani</i>
IDR	<i>Inscriptiones Daciae Romanae</i>

IG	<i>Inscriptiones Graecae</i>
IGCH	M. Thompson, O. Mørkholm, and C. M. Kraay (eds.), <i>An Inventory of Greek Coins Hoards</i> (New York, 1973)
IGSK	<i>Die Inschriften der griechischen Städte Kleinasiens</i>
ILS	H. Dessau (ed.), <i>Inscriptiones Latinae Selectae</i>
Jeffery, LSAG ²	L. H. Jeffery, <i>Local Scripts of Archaic Greece</i> (2nd edn., revised by A. W. Johnston, Oxford, 1990)
JHS	<i>Journal of Hellenic Studies</i>
JRA	<i>Journal of Roman Archaeology</i>
JRS	<i>Journal of Roman Studies</i>
LSJ	H. Liddell, R. Scott, and H. S. Jones (eds.), <i>A Greek–English Lexicon</i>
MBAH	<i>Münstersche Beiträge zur antiken Handelsgeschichte</i>
NC	<i>Numismatic Chronicle</i>
PPF	J. Andreau, P. Briant, and R. Descat (eds.), <i>Prix et formation des prix dans les économies antiques: Entretiens d'archéologie et d'histoire</i> (Saint-Bertrand-de-Comminges, 1997)
RIN	<i>Rivista italiana di numismatica</i>
RN	<i>Revue numismatique</i>
RSP	<i>Rivista di studi pompeiani</i>
SB	<i>Sammelbuch griechischer Urkunden aus Aegypten</i>
Schaps, IC	D. M. Schaps, <i>The Invention of Coinage and the Monetization of Ancient Greece</i> (Ann Arbor, 2004)
SCIVA	<i>Studii și Cercetări de Istorie Veche și Arheologie</i>
Seaford, MEG	R. Seaford, <i>Money and the Early Greek Mind</i> (Cambridge, 2004)
SEG	<i>Supplementum Epigraphicum Graecum</i>
SNG	<i>Sylloge Nummorum Graecorum</i>
TPSulp	G. Camodeca, <i>Tabulae Pompeianae Sulpiciorum</i> (Rome, 1999)

Notes on Contributors

JEAN ANDREAU has taught since 1979 at the École des Hautes Études en Sciences Sociales in Paris. He won the Silver Medal of the Centre National de la Recherche Scientifique in 1990 and since that year has been a fellow of Churchill College, Cambridge. His best-known publications are *Les Affaires de Monsieur Iucundus* (1974), *La Vie financière dans le monde romain* (1987), and *Banking and Business in the Roman World* (1999).

EDWARD E. COHEN is Professor of Ancient History and Classical Studies (adjunct) at the University of Pennsylvania. He has been chairman of the board of several banks and bank-holding companies, and currently serves as chief executive officer of Atlas America, Inc., a producer and distributor of natural gas. Among his books are *The Athenian Nation* (2000) and *Athenian Economy and Society: A Banking Perspective* (1992). He was a co-editor of *Money, Labour and Land: Approaches to the Economies of Ancient Greece* (2002).

W. V. HARRIS is Shepherd Professor of History at Columbia University and director of the university's Center for the Ancient Mediterranean, which he helped to start in 2000. He previously edited *Rethinking the Mediterranean* for Oxford (2005), and is currently working on a book about Greek and Roman ideas about dreaming.

DAVID B. HOLLANDER is assistant professor of History at Iowa State University. He received his Ph.D. from Columbia University in 2002, and his revised dissertation, *Money in the Late Roman Republic*, has now appeared as vol. 29 in the series *Columbia Studies in the Classical Tradition* (2007).

CONSTANTINA KATSARI is a lecturer in Ancient History at the University of Leicester. She earned her Ph.D. at University College London in 2001 with a dissertation entitled *The Monetary Economy of the Eastern Mediterranean: From Trajan to Gallienus*. She is the author of several articles on the monetary economy of the Roman Empire and the co-editor of *Patterns in the Economy of Roman Asia Minor* (2005).

DAVID KESSLER wrote his senior honours thesis at Harvard (where he graduated in 2004, *summa cum laude*) on grain markets in the Roman Empire, working with Peter Temin. After spending two years working for the New York management consultants McKinsey & Co., he has returned to Harvard to study law.

JOHN H. KROLL, who recently retired as professor of Classics at the University of Texas at Austin, has written widely on Greek, chiefly Athenian, numismatics and epigraphy. His monographs include *Athenian Bronze Allotment Plates* (1972) and *The Athenian Agora*, xxvi. *The Greek Coins* (1993). He is currently the second vice-president of the American Numismatic Society.

ELIO LO CASCIO is professor of Roman History at the University of Rome 'La Sapienza'. His publications include *Il princeps e il suo impero. Studi di storia amministrativa e finanziaria romana* (2000) and the edited volumes *Roma imperiale. Una metropoli antica* (2000), *Production and Public Powers in Antiquity* (2000, with D. W. Rathbone), and *Credito e moneta nel mondo romano* (2003).

J. G. MANNING is an associate professor in the Department of Classics at Stanford University. His research interests lie in the economic and legal history of Egypt as well as the history of the Egyptian state. He edited *The Hauswaldt Papyri: A Third Century B.C. Family Dossier from Edfu* (1997), and is the author of *Land and Power in Ptolemaic Egypt* (2003).

PETER VAN MINNEN, who is an associate professor of Classics and Ancient History at the University of Cincinnati, specializes in papyrology and the social and economic history of Graeco-Roman Egypt. He is the editor of the *Bulletin of the American Society of Papyrologists*.

DAVID M. SCHAPS is associate professor of Classical Studies at Bar-Ilan University. His most recent book is *The Invention of Coinage and the Monetization of Ancient Greece* (2004).

WALTER SCHEIDEL is Professor of Classics at Stanford University. His research focuses on ancient social and economic history, historical demography, and comparative and interdisciplinary world history. He is the author of *Measuring Sex, Age and Death in the Roman Empire* (1996) and *Death on the Nile: Disease and the Demography of Roman Egypt* (2001) and the co-editor of *The Cambridge Economic History of the Greco-Roman World* (forthcoming).

RICHARD SEAFORD is professor of Greek in the University of Exeter. His publications include *Reciprocity and Ritual: Homer and Tragedy in the Developing City-State* (Oxford, 1994), and *Money and the Early Greek Mind: Homer, Philosophy, Tragedy* (2004), as well as commentaries on Euripides' *Cyclops* and *Bacchae*, and numerous articles on Greek literature, religion, and society from Homer to the New Testament.

PETER TEMIN is the Elisha Gray II Professor of Economics at MIT, where he has taught since 1965. Most of his research has been about modern economies, as in *Engines of Enterprise: An Economic History of New England* (2000), but in recent years he has published extensively on the Roman economy, as in 'A Market Economy in the Early Roman Empire', *JRS* 91 (2001), 169–81, and 'The Economy of the Early Roman Empire', *Journal of Economic Perspectives* 20 (2006), 133–51.

Introduction

W. V. Harris

For decades the history of money in the classical world was a fairly quiet field. It was almost universally supposed to be synonymous with the study of numismatics, and the most debated questions concerned coinage—why it came into being in the first place, when it spread to the various regions, when and by how much it was debased, whether it was possible to calculate the quantity of it that was produced or in circulation in this period or that.

One might be tempted to say that what has shaken up the study of Greek and Roman money since the beginning of the 1990s has been the intrusion of non-numismatists, in particular of scholars with wider interests in economic or cultural history. But what has happened has been more complicated than that. In the first place, the labels are reductive, and some of those scholars who have ample experience as numismatists would undoubtedly define themselves as ancient historians. And some of those who have widened the debate during these years, Christopher Howgego for instance, have been numismatists *de métier*.

It is clearly true, however, that important new work on various historical problems—in particular on the possibility of sustained economic growth¹ in the ancient world² and on inflation in the

¹ For some discussion of the use of this concept in ancient contexts see P. Millett, 'Productive to Some Purpose? The Problem of Ancient Economic Growth', in D. Mattingly and J. Salmon (eds.), *Economies beyond Agriculture in the Classical World* (London, 2001), 17–48.

² Once for all, I apologize for writing 'ancient' in place of 'Greek and Roman'. There is no intention to minimize the interest of the monetary history of other ancient states in any part of the world.

later Roman Empire—have attracted the attention of a larger circle of historians. And in the same period, a certain revival of the interest of economists in economic history, which was at one time in definite retreat in a number of countries, has included a degree of inquisitiveness about relatively sophisticated pre-modern economies, including that of the Roman Empire (Marcello de Cecco led the way). This is all the more welcome, since there are still ancient historians who are loyal to the notion that because ancient economies were different from ours they can study antiquity in isolation.

Economists are also at risk. A recent and well-regarded work entitled *The Nature of Money* takes a historical view of the subject, stretching back to classical times. Good. It is also a work of exceptional lucidity. But the author's first paragraph on the Romans contains four serious errors,³ and so it goes on. It is not all his fault, perhaps—Roman history has its share of technicalities and obscure terminology. The author himself laments 'the division of intellectual labour' that has affected the study of money.⁴ The answer is, I suppose, more dialogue.

The contributors to this volume—a cross-section, it may be said, of those who interest themselves in Greek and Roman money⁵—were given a free hand to write about the topics of their choice. My sole suggestion was that they might tell us whether, once coinage had been introduced in the Greek and Roman worlds and had become a common means of exchange, there was also non-coinage money, and if so whether it mattered much.

Not that the editor can lay claim to neutrality. The reader will see that some of the contributors are firmly of the opinion that an understanding of the ancient economy absolutely requires classicists to emerge

³ G. Ingham, *The Nature of Money* (Cambridge, 2004), 101. 'The Roman economy was driven by the state's activity.' 'There is evidence to suggest that more coins were issued than were needed for immediate purposes, in order to stimulate production and exchange.' 'During the first phase of imperial expansion [he seems to mean the Julio-Claudian era, though this was not of course the first phase of imperial expansion], expenditure released *far more* coins into the provinces... than were collected back in taxation' [my italics]. He takes from R. W. Goldsmith the claim that 'all imperial trade "was conducted entirely on a cash basis"'; this opinion has admittedly had many supporters. Classicists and others too will be surprised to read that 'in all Indo-European languages, words for "debt" are synonymous with those for "sin" or "guilt"' (90).

⁴ Ibid. 9.

⁵ This can only, of course, be true in an approximate sense.

from their cocoons and pay attention to both economic theory and the economic history of other eras, and that is my opinion. Others disagree.

My colleagues made use of their freedom, and the various topics they covered, some of them familiar, others much less so, may be broken down as follows (I do not, be it noted, describe their conclusions except in a most telegraphic fashion—each chapter speaks for itself).

1. THE USE OF BULLION AS MONEY

Kroll (Ch.1) seeks to establish that the inhabitants of a number of Greek cities in Asia and in Magna Graecia, and the Athenians too, used bullion as money both before the introduction of coinage and even afterwards. There can be no doubt that precious metals served as stores of value, but Kroll goes further, referring to bullion as a 'transactional medium'. On the Roman side, I argue (Ch. 9) that bullion was very seldom used for making payments during high classical times, except in emergencies and across the borders of the Roman Empire.⁶ Andreau (Ch. 10) shows in meticulous detail that the first part of this statement was very probably true of the first-century cities next to Vesuvius.

2. REASONS FOR THE SPREAD OF COINAGE

The reason or reasons why the Lydians invented coinage and the archaic Greeks enthusiastically adopted the invention (to facilitate payments by or to the state? to facilitate exchange?) have been canvassed almost to the point of exhaustion.⁷ Kroll (Ch. 1) favours

⁶ Thereby contradicting Hollander (Ch. 6), among others.

⁷ For a brief but up-to-date and illuminating discussion see Seaford, *MEG* 131–6. In my view, we need further discussion of the kind of 'government' that made these minting decisions. S. von Reden seems to be looking in the right direction when she writes that coinage developed 'in the public political economy of those who held power in the archaic *poleis*' ('Money in the Ancient Economy: A Survey of Recent Research', *Klio* 84 (2002), 141–74 at 153).

what we may call the Holloway–Wallace solution,⁸ based on the variable quantities of gold and silver to be found in natural deposits of electrum, and the consequent usefulness to the Lydians and Ionians of guaranteeing the value of payments made by means of pieces of electrum—which leaves the enthusiasm of the Greeks outside Ionia unaccounted for. The evidentiary basis for the discussion has changed somewhat in recent times, with the realization that the earliest Greek coinage included a large quantity of minute silver coins (down to a range around 0.21 g.),⁹ but it may be more profitable now to consider other regions and periods.

Hellenistic Egypt, because of the relative abundance of the evidence, is an instructive case of state initiative: Manning (Ch. 5) argues that the Ptolemaic government's intention, when it vastly increased the quantity of coinage in circulation, was to facilitate taxation and payments into the state banks.

3. CREDIT-MONEY

It has been one of the main arguments of Finley and his followers against the possibility of economic growth in antiquity that an economy in which the money supply was effectively limited by the state's supply of coinable metals and in particular of gold and silver was thereby, in most periods, prevented from growing.¹⁰ We might in fact put this question the other way round: would it not argue for a remarkable *lack* of both ingenuity and mutual trust if the well-to-do in, say, fourth-century Athens, in the larger Hellenistic cities, and in Late Republican Rome had *not* devised some form of credit-money? Schaps (Ch. 2), concentrating on the Greeks, reduces the phenomenon

⁸ R. R. Holloway, 'La ricerca attuale sull'origine della moneta', *RIN* 80 (1978), 7–14; R. W. Wallace, 'The Origin of Electrum Coinage', *AJA* 91 (1987), 385–97 (the latter develops but differs from the former). Kroll supplies further bibliography.

⁹ Seaford, *MEG* 135. For further evidence see J. H. Kagan, 'Small Change and the Beginning of Coinage at Abdera', in *Agoranomia: Studies in Money and Exchange Presented to John H. Kroll* (New York, 2006), 49–60.

¹⁰ Finley, *AE* 196: 'there can be no doubt that the [money] supply was often inadequate for the ongoing needs of the society, let alone for the prospects of economic growth.'

as much as he is able to. While he (interestingly) admits that Greek credit-money in fact existed, he contends that there was little of it, or at least it was ‘on a scale much more modest than that known to us’ [sc. now] (a formulation with which we might all agree).

The opposing case is mainly in the hands of Cohen (Ch. 4) for Athens, and in mine for Rome (Ch. 9). Fourth-century Athens was full of lending and borrowing, including a perhaps surprising amount of financing provided by sellers large and small. Bank lending too was ‘extensive and varied’, and Cohen explains succinctly—essential reading, in my view, for all who are interested in ancient money—how such lending added to Athens’ money supply. As for my chapter, its most original aspect is that I attempt to define the conditions in which Roman credit can properly be looked upon as money (for not all of it was money).

4. MONEY SUPPLY

Closely related to the previous problem is the question of the elasticity of the money supply. Cohen’s arguments are intended to show that the money supply of Athens in the fourth century BC ‘was in fact strikingly elastic’, since it was ‘substantially’ increased both through credit provided by merchants and through non-coinage money created by bankers. From the first century BC if not earlier, the same applied (so I claim) to the Roman Mediterranean. Some scholars have even hazarded estimates of the volume of credit-money that the Roman economy created; to my mind, however, the most important question here is not the sheer volume of credit-money but the availability of capital (see Ch. 9).

5. PRICES AND GROWTH

And closely related to the question of money supply is the matter of economic growth in the Roman Empire. Hollander (Ch. 6) tries a new approach, via people’s propensity to keep their assets in coin,

which he thinks increased in the unstable conditions of the Late Republic. Using the work of A. C. Pigou, he shows how this factor was related to prices, to the money supply, and to the total output of the economy. We cannot, of course, give secure values to any of these factors, but Hollander's model has at least the advantage of offering for the first time a reasonably plausible explanation of why the probably quite rapid increase in the money supply in the Late Republic was not accompanied by rapid inflation. The difficulty in the argument, in my opinion (see again Ch. 9), is that if we are going to apply the concept 'money supply' to the Roman world, we must take into account the ample supply of credit-money.

6. MONEY, ATHENIAN TRAGEDY, AND TYRANTS

The monetization of a community's economy is always likely to have had effects far beyond the economy itself. No one has shown this more vividly than Richard Seaford, above all in his book *Money and the Early Greek Mind*. The contribution he offers here (Ch.3) will seem tangential to some, while to others it will well exemplify the way we ought to write the cultural history of money. Seaford suggested earlier that monetization was a 'crucial factor in the genesis and in the preoccupations' of Athenian tragedy. This paper connects the monetization of Athens both to the development of festivals under the tyrants and to the form and content of tragedy. The isolation of the tragic tyrant, according to this view, expresses the 'autonomous power conferred by money on the individual who possesses it'.

7. THE EXTENT OF MONETIZATION

This is a venerable problem but still an essential one.¹¹ Andreau (Ch. 10) confirms how thoroughly early imperial Italy was monetized. But it is

¹¹ The attentive reader will notice that the contributors use this term in somewhat different senses (see the index); I have not attempted to impose a single definition.

Egypt, with its rich documentation, that is self-evidently the place where the matter can be put to the most thorough tests. For the Hellenistic period, Manning (Ch. 5) concludes that while monetization spread to some of the Egyptian population, it was quite variable according to social class and according to location. For the Roman period, van Minnen (Ch. 11) argues for an increasing monetization of the agrarian economy between the first and the third centuries AD, followed by a 'significant reduction' in monetization after the inflation of 275, with a gradual re-monetization of the agrarian economy asserting itself from the fourth century onwards after the introduction of the *solidus*.

But it is Katsari (Ch. 12) who takes on the most difficult aspect of this problem, the monetization of the frontier provinces. Can we trust the numismatic evidence? What it seems to show, according to Katsari's rather minute analysis of the finds in the Balkans and in Asia Minor and Syria, is that the monetization of these parts of the Roman Empire depended mainly on levels of urbanization and on the extent of trading activities, while the role of the army, though not negligible, was indirect (urbanization was itself partly a result of the presence of the military).

8. UNIFIED MONETARY INTEGRATION ACROSS THE ROMAN MEDITERRANEAN

The 'integration' of the ancient economy or economies is hard to define and harder still to measure.¹² The question, as Kessler and Temin rightly say (Ch. 7), is not a simple 'either or', whether the Roman Empire was a single monetary area and an efficient market *or* was entirely made up of separate local markets. The question is whether the Roman economy was closer to one end of the spectrum or the other. Well, let us find out. Kessler and Temin argue resolutely that there was market integration across the whole Mediterranean

¹² Harris, 'Between Archaic and Modern: Problems in Roman Economic History', in Harris (ed.), *The Inscribed Economy: Production and Distribution in the Roman Empire in the Light of instrumentum domesticum* (Ann Arbor, 1993), 11–29 at 18–20. See further C. J. Howgego, 'Coin Circulation and the Integration of the Roman Economy', *JRA* 7 (1994), 5–21 at 9–10.

in the Late Republic and early Empire, basing their case on a re-examination of known wheat prices. These prices are terribly few, but they seem to reveal that wheat cost less the greater the distance from Rome, which may reasonably be seen as the great centre of demand. Regression analysis shows that it is highly unlikely that this pattern is due to chance. Such a pattern was much favoured by the fact that the Roman Mediterranean was in effect a single currency zone.¹³

9. THE CHOICE OF METALS: GOLD, SILVER, OR BRONZE?

The decisions of ancient states to use this metal or that for their coinage, and the economic consequences of these decisions, are often problematic. Scheidel (Ch. 13), in a chapter of extraordinary range, sets out to explain the contrast between the ‘Aegean’ model of coinage (in which precious-metal coinage is dominant), a model which was to spread throughout the ancient world and ultimately over most of the globe, and the traditional Chinese model (in which base metals dominated the coinage system). This involves weighing against each other the sheer availability of metal resources, the different kinds of military service that characterized the ancient Mediterranean and ancient China, political considerations, and finally path dependence¹⁴ (aka mindless conservatism).

Early Rome used bronze money, then around 300 BC added silver coins—it is not altogether clear why, especially as Rome at that point controlled no silver mines. Some 250 years later, under Caesar, the Roman state began the systematic manufacture of gold coinage too—and again it is not entirely clear why it happened at this exact time (the state had long had access to sufficient gold). (In both cases,

¹³ This is at least congruent with the well-known centralization of minting in the high Roman Empire: ‘one or two mints (Rome, and for part of the 1st c. A.D., Lugdunum) provided virtually all the gold coinage... a silver coinage which came increasingly to dominate first the west and then the east, and, from early in the Principate, a base metal coinage for the western half of the empire’ (Howgego, 6).

¹⁴ For this concept see R. Garud and P. Karnøe (eds.), *Path Dependence and Creation* (Mahwah, NJ, 2001).

prestige is, of course, the obvious answer.) What we might expect to be clearer is what the inhabitants of the Roman Empire actually did with their gold coinage. Lo Cascio (Ch. 8) shows that the answer is quite complex. Making use of Duncan-Jones's demonstration that gold coins show markedly less weight loss than silver coins,¹⁵ he concludes that the former were often used as a slowly circulating store of value. But he also argues, primarily on the basis of the literary evidence, Apuleius especially, that gold coins were widely used to make actual payments.¹⁶ He then reconstructs the story of how the third-century monetary system collapsed, to be succeeded by the new system founded on the regular use of the gold *solidus* and its fractions.

Andreau (Ch. 10) performs the invaluable service of bringing together and analysing the evidence as to how these two kinds of coins were used in the Vesuvian cities, having first pointed out the various traps that await the incautious user of this evidence. His style is to avoid both hypothetical statistics and sweeping claims. Instead he proceeds as much as possible house-by-house, a technique that is now becoming more and more practicable; and he compares the evidence from the Vesuvian cities with the evidence from other sites. The result, as Andreau says, is somewhat negative. On the one hand, we may say that Pompeii and Herculaneum could scarcely have been more thoroughly monetized; on the other hand, some scholars will undoubtedly find it puzzling that rich houses have not yielded greater quantities of coins.

10. MONEY HISTORICIZED IN A ROMAN PROVINCE

Finally, van Minnen (Ch. 11), offers the most diachronic analysis in the whole book, fitting together the development of monetization, price changes, investment, and taxation in Roman Egypt from the first century to the sixth (thus, together with Lo Cascio, he provides this volume's contribution to the study of the late-antique economy). He also manages to consider how various changes affected different kinds of people, in particular big landowners, farmer owners, tenants, and

¹⁵ *MG* 191.

¹⁶ I will admit that I read the evidence of Apuleius differently.

ordinary town-dwellers. This is the kind of analysis, conceptually sophisticated but diachronic and human, that we wish we could carry out for the Roman Empire in general, and indeed a great deal of it is instructive for the world outside Egypt. It is good to be reminded that monetary history includes real effects: ‘after 275, they [the ordinary inhabitants of the cities in Roman Egypt] died in large numbers’.

What else might we profitably have discussed? Every reader will have views. Further Hellenistic chapters would certainly have helped. But I will merely mention one issue, a matter—as it seems to me—of considerable importance and difficulty.

That issue is fiduciarity. The subject of fiduciary coinage appears from time to time in this volume (Schaps, Cohen, Harris), but is not dealt with systematically. No one, I think, would any longer agree with Finley’s claim that ancient states ‘never created fiduciary money in any form’.¹⁷ The fullest discussion known to me is Seaford’s,¹⁸ which shows that in a certain sense Greeks produced fiduciary coinage from the very beginning. But one of the problems is definition. Clearly there is a big difference between coinage that has been slightly debased but is assumed by most of its users to be made of a particular precious metal and coinage that has a conventional value, its users not caring at all what its bullion value might be. And how can a historian detect fiduciary coinage in any case? I suspect that most Roman silver coinage was fiduciary from the time of the Second Punic War crisis until AD 275, but it remains to be seen whether, with our scanty information about the prices of gold and silver, this can be proved. The only price of gold given in Scheidel’s Roman price catalogue¹⁹—Caesar’s plundering in Gaul drove him to offer gold at a lower-than-usual price, 3,000 sesterces a pound, according to Suetonius, *DJ* 54, a scarcely trustworthy source on such a point²⁰—might

¹⁷ *AE* 141.

¹⁸ *MEG* 136–46. For other recent comments see A. Bresson, ‘Coinage and Money Supply in the Hellenistic Age’, in Z. H. Archibald, J. K. Davies, and V. Gabrielsen, *Making, Moving and Managing: The New World of Ancient Economies, 323–31 BC* (Oxford, 2005), 44–72 at 65, and J. H. Kagan, ‘Small Change’ [n. 9], 53–4.

¹⁹ <<http://www.stanford.edu/~scheidel/NumIntro.htm>>, accessed 7 June 2007.

²⁰ Cf. Crawford, *RRC* 626 n. 1. But the passage favours the notion that, in Hadrian’s time at least, the gold-market was quite well integrated empire-wide (‘per Italiam provinciasque divenderet’).

suggest that the fiduciary value of the *denarius* at that time was negligible.²¹

At the end of an interesting chapter entitled ‘Ancient and Modern: The Invention of the Ancient Economy’, Neville Morley expounds a dichotomy between those whom he labels ‘formalists’, who hold that ‘economic principles . . . provide a better understanding of how the economy actually worked than the limited concepts of the historical participants’ and other historians who ‘insist on the primacy of what are sometimes termed the actors’ categories’. To study ancient money, ‘in purely economic terms’, he goes on, ‘may be intellectually convenient, but it completely misses all the other dimensions, all the other meanings . . . most of which were far more important [*sic*] to the ancients than the purely economic’.²² This dichotomy is to be rejected, for, as I hope that this book shows, we simply do not have to choose between economic analysis and understanding the mentalities of the Greeks and Romans. Read the chapters in this book that make most use of modern economics: their authors are at least as attentive to the concepts and behavioural patterns of the ancients as the others. There is no dilemma here. It would be profoundly silly to try to write history without modern concepts, and Morley’s own book is packed with them, quite properly. Of course we always have to be on guard against anachronistic judgements, just like other historians. The real enemies are received ideas and ignorance, in this case ignorance of the history and theory of money.

The purpose of this volume is in any case to stimulate debate about the nature of ancient money in general. Each author puts forward his or her point of view, more or less provocative as the case may be. Best of all, let us admit it, is to convince the informed scholarly public; next best is to elicit well-argued criticism.

²¹ Suetonius’ figure means that Caesar was willing to part with about 322.8 g of gold (see Duncan-Jones, *MG* 213, for the Roman pound) for about 2,895 g of silver coins (see Crawford, *RRC* 594 for the weight of the *denarius*), a gold : silver ratio of 8.97. At a notionally normal ratio of 12 : 1 (*ibid.* 626) he would have been able to obtain 3,873.6 g of silver coins, about 1,000 *denarii*. So if such coins were valued at their bullion value, the glut had (supposedly) brought about a discount of almost exactly 25 per cent.

²² N. Morley, *Theories, Models and Concepts in Ancient History* (London, 2004), 48–9. He does not specify which dimensions and meanings.

The Monetary Use of Weighed Bullion in Archaic Greece

John H. Kroll

That metal bullion weighed out on the balance normally served as an antecedent, if not in many cases a prerequisite, for the introduction of coinages in the ancient Mediterranean world is not a new idea. The principle was recognized at least as early as Aristotle, who explains at *Politics* 1257a how metals came to be used for monetary exchange. At first men simply determined the value of the metal by size and weight; but later they impressed a stamp on the metal, as an attestation of the amount, in order to ‘save men the trouble of determining the value on each occasion’.¹

Roman antiquarians knew that their coinage, too, was preceded by a long period in which bullion, in this case bronze bullion, *aes rude*, was weighed out in monetary transactions.² Bullion hoards and

An embryonic version of this paper was presented at a conference on ‘Money and Culture in the Greek World’ at the University of Exeter in 1999. I owe a special debt of gratitude to the organizer, Richard Seaford, for the opportunity to participate, and to several colleagues in attendance whose suggestions and criticisms encouraged me to expand my interest in silver bullion. The personnel at several museums generously provided access to the bullion and related materials in their collections; for this I thank Andrew Meadows at the British Museum, Henry Kim at the Ashmolean Museum, Halil Özek, director, and curator Gülbahar Celik-Baran of the Istanbul Archaeological Museum, and Peter van Alfen at the American Numismatic Society. John Pedley, Ute Wartenberg, and Lisa Kallet contributed in other important ways. I am grateful finally to William Harris for the impetus to pull this material together for the 2005 conference at Columbia.

¹ *The Politics of Aristotle*, trans. E. Barker (Oxford, 1946).

² Pliny, *NH* 33. 13, with the related passages of Livy, Varro, Festus, Gaius, et al. quoted in R. Thomsen, *Early Roman Coinage* (Copenhagen, 1957–61), i. 22–5.

votive deposits, many of them huge, dating down to the third century BC, when Rome began to cast bulky pre-weighed coins of bronze, have been recovered widely throughout Italy.³ Moreover, from written sources we learn that such primitive bronze money of amorphous lumps and cast bars was employed by the Romans in all manner of payments, from paying fines—literally, *weighing* fines (*pendere poenas*) like the 300 *asses* imposed in the Twelve Tables for breaking the bones of a free man⁴—to the process of *mancipatio*, the solemn procedure for selling property by bronze and scale (*per aes et libram*) that involved the weighing out of bronze by the *libripens*, ‘the suspender of the scales’, before witnesses. Citizens used it to pay their property tax or *tributum* to the state treasury, the *aerarium*.⁵ Finally, the state used it in its payment of the *stipendium militare*, the ‘weighed heap’ of bronze for military service.⁶

Near the middle of the fourth century BC, lending and borrowing at interest with this bronze money led to a debt crisis so potentially explosive that the state had to pass a series of laws to limit the rate of interest.⁷ Clearly monetization of the Roman economy had advanced quite far before the advent of coinage, so much so that in his survey of early Rome, Tim Cornell could observe with great plausibility that ‘[i]n economic terms, the introduction of coinage [was] not of great significance in itself.’⁸

A similar picture emerges with regard to the bullion currency of Mesopotamia and the Levant, especially during the height of the Neo-Assyrian and the Neo-Babylonian Empires in the seventh and early sixth centuries. Here the bullion was of silver, in the form normally of chopped ingots, broken jewellery, and cut-up silver plate, as known

³ Thomsen, *ibid.* iii. 200–12; E. C. Ercolani, ‘Repertorio dei ritrovamenti di pani di rame. Contributo allo studio delle fasi premonetali in Italia’, *RIN* 77 (1975), 7–47.

⁴ M. H. Crawford (ed.), *Roman Statutes* (London, 1996), ii. 579, no. I.14. I.15 and 16 are two other laws from the XII Tables that specify penalties in bronze *asses*.

⁵ Livy 4. 60. 6.

⁶ Other terms in the Latin financial vocabulary from the era when bronze money had to be weighed out include *expensa*, *impedium* (interest), *dependere* (to pay out), and *dispensator* (financial official), *aestimare*. See Thomsen, *Early Roman Coinage* [n. 2], iii. 200–1.

⁷ Livy 6. 35. 4; 7. 16. 1; 7. 27. 3–4, with S. P. Oakley, *A Commentary on Livy, Books VI–X* (Oxford, 1997–8), i. 659–61.

⁸ T. J. Cornell, *The Beginnings of Rome* (London, 1995), 397.

from well over two dozen recovered hoards.⁹ A monetary context is implied by contemporary documents that specify the use of silver in payments of tribute, for craftsmen's obligations, and for goods such as grain, in addition to the essential role of silver in borrowing and lending at interest. So satisfactory was this traditional type of silver money for the rulers and merchants it served, that the chopping and weighing out of silver was slow to give way to the minting and transacting of silver in the form of coin, even after coinage was becoming well established in the Greek world in the late sixth and early fifth centuries. In the Levant and Egypt coin use and coin production gradually began to take hold in the second half of the fifth and in the fourth centuries BC.¹⁰ In Achaemenid Mesopotamia and Iran, however, coinage did not replace bullion monetarily until Alexander of Macedon and his successors imposed their Greek money and Greek administrative and military personnel on these lands.¹¹ Although this presents a rather different model from Rome in the shift from weighed bullion to coinage, throughout the Near East the importance of bullion as an antecedent to coinage remains as Aristotle described it. In addition to being the earlier silver currency, it readily provided the metal for the Greek coinages that superseded it.

1. SILVER IN SOLON'S LAWS

The proposition that a currency of weighed bullion preceded the introduction of coinage in archaic Greece was advanced by Peter Rhodes over thirty years ago with reference to certain Athenian laws

⁹ Since the magisterial survey of this currency by G. Le Rider, *La Naissance de la monnaie. Pratiques monétaires de l'orient ancien* (Paris, 2001), 1–39, two important studies have appeared that focus primarily on the Levant: S. Gitin and A. Golani, 'The Tel Miqne-Ekron Silver Hoards: The Assyrian and Phoenician Connections', in M. S. Balmuth (ed.), *Hacksilver to Coinage, New Insights into the Monetary History of the Near East and Greece* (New York, 2001), 27–48; and C. M. Thompson, 'Sealed Silver in Iron Age Cisjordan and the "Invention" of Coinage', *Oxford Journal of Archaeology* 22 (2003), 67–107.

¹⁰ Levant: C. M. Kraay, *Archaic and Classical Greek Coins* (Berkeley and Los Angeles, 1976), 287–8. Egypt: J. H. Kroll, 'A Small Find of Silver Bullion from Egypt', *AJN* 2nd ser. 13 (2001), 10–16; P. G. van Alfen, 'Herodotos' "Aryandic" Silver and Bullion Use in Persian-Period Egypt', *AJN* 2nd ser. 14 (2004–5), 7–29.

¹¹ Le Rider, *La Naissance de la monnaie* [n. 9], 169–74.

anciently attributed to Solon that mention fines, prices, state collections and payments, and lending at interest in terms of silver.¹² Plutarch, who lists several of these laws,¹³ cites the First Axon of Solon as the source of the 100-drachma fine for an archon who refused to discharge one of his duties and the Sixteenth Axon for the drachma prices of sacrificial animals. In a more explicit reference to the use of silver as a transactional medium, employed by the seventh- and sixth-century BC Athenian financial officials known as the *naukraroi*, the Aristotelian *Athenaion Politeia* (8. 3) states that these men ‘were appointed to supervise the *eisphorai* and expenditures that were made. Hence in the laws of Solon that are no longer in use it is frequently written that, “the *naukraroi* are to levy...” and “to spend out of the naukraric silver” (ἐκ τοῦ ναυκραρικοῦ ἀργυρίου)’. Having no reliable notion of when Athenian silver coinage began, ancient writers assumed, quite understandably, that these references to drachmas and silver in Solonian legislation referred to coins—and so did all modern scholars until the great revolution in the chronology of early Greek coinage in 1950s, when on empirical grounds the earliest coinage of Athens was down-dated to around the middle of the sixth century.¹⁴ Since this divorced coinage by a generation or two from Solon’s law-giving near the beginning of the century, the mention of monetary silver in these laws was a source of some perplexity until Rhodes cogently suggested that the silver was probably uncoined silver, a view that has since been endorsed by a growing body of commentators.¹⁵

¹² P. J. Rhodes, ‘Solon and the Numismatists’, *NC* 7th ser. 15 (1975), 1–7; *A Commentary on the Aristotelian Athenaion Politeia* (Oxford, 1981), 152–3.

¹³ *Solon* 21. 1, 23. 1–3, 24. 1. See J. H. Kroll, ‘Silver in Solon’s Laws’, in *Studies in Greek Numismatics in Memory of Martin Jessop Price* (London, 1998), 225–7.

¹⁴ C. M. Kraay, ‘The Archaic Owls of Athens: Classification and Chronology’, *NC* 6th ser. 16 (1956), 43–68; with J. H. Kroll and N. M. Waggoner, ‘Dating the Earliest Coins of Athens, Corinth and Aegina’, *AJA* 88 (1984), 326–32. According to Pollux (9. 83), the earliest Athenian coinage was anciently attributed to the early Athenian kings Erechtheus or Lykos. Hence Plutarch (*Theseus* 25. 3) could easily believe that archaic Athenian coins with the device of bull were minted by Theseus.

¹⁵ e.g. M. H. Crawford and D. Whitehead, *Archaic and Classical Greece, A Selection of Ancient Sources in Translation* (Cambridge, 1983), 22; Kroll and Waggoner, ‘Dating the Earliest Coins’ [n. 14], 332–3; F. Cairns, ‘*Chremata dokima*: IG XII, 9, 1273 and 1274 and the Early Coinage of Eretria’, *Zeitschrift für Papyrologie und Epigraphik* 54 (1984), 153; C. Grandjean, ‘À propos de “The Monetization of the Marketplace in Athens”’, in *PPF* 406; Kroll, ‘Silver in Solon’s Laws’ [n. 13], and ‘Observations on Monetary Instruments in Pre-Coinage Greece’, in Balmuth (ed.), *Hacksilber to*

As Rhodes noted, the possession of gold and silver must have been common among rich Athenians at the time of Solon, for in fragment 24 of Solon's poetry, which lists the various forms of wealth, silver and gold are named first, before land and livestock.

Most scholars accept that the *axones* and many of the laws that were known to later Athenians as Solon's really were Solonian. But in the case of an old-fashioned law concerning the charging of interest, which is quoted and attributed to Solon in Lysias 10. 18, the attribution is less important than the fact that the phrase it uses for 'money to be lent' is 'silver to be weighed' (τὸ ἀργύριον στάσιμον εἶναι), thus equating lending with weighing and establishing that the law or at least its terminology goes back to a time when silver was weighed out in the balance.¹⁶ Another relic from this pre-coinage era was the name, well attested in Aristophanes and the orators, for petty usurers or small-time loan sharks, the much despised *obolostatai*. Although ὀβολοστάτης translates as a 'lender of obols', at root the term (as observed in LSJ) denotes a 'weigher' of obols.

Lending at interest, however, is not the only monetary transaction that is associated with the verb ἴστημι in its sense of 'to weigh'. LSJ gives several citations in which it meant 'to pay',¹⁷ a usage that should also go

Coinage [n. 9], 77–81; R. Descat, 'Approche d'une histoire économique de l'or dans le monde grec aux époques archaïque et classique', in B. Cauuet (ed.), *L'Or dans l'antiquité, de la mine à l'objet* (Bordeaux, 1999), 433–6, and 'Monnaie multiple et monnaie frappée en Grèce archaïque', *RN* 157 (2001), 74–6; G. Horsmann, 'Athens Weg zur eigenen Währung: Der Zusammenhang der metrologischen Reform Solons mit der timokratischen', *Historia* 48 (2000), 264–6; H. S. Kim, 'Archaic Coinage as Evidence for the Use of Money', in A. Meadows and K. Shipton (eds.), *Money and Its Uses in the Ancient Greek World* (Oxford, 2001), 13–19; Seaford, *MEG* 90, 93. *Contra*: D. M. Schaps, 'The Conceptual Prehistory of Money and Its Impact on the Greek Economy', in Balmuth (ed.), *Hacksilber to Coinage* [n. 9], 96–100, and Schaps, *IC* 90 n. 4. Although Schaps allows for bullion use in Athenian public finance and external trade, he assumes that iron spits served as the dominant transactional medium and measure of value in the domestic economy of Greek cities down to the introduction of silver coinage. See my review of Schaps in *CR* ns 55 (2005), 344–6.

¹⁶ Kroll, 'Silver in Solon's Laws' [n. 13], 228–9, and LSJ, s.v. στάσιμος, II. 4 ('money out at interest'), which properly should be listed under rubric III ('weighed, weighable'). In disagreement, Schaps ('Conceptual Prehistory of Money' [n. 15], 98) argues that ἀργύριον στάσιμον εἶναι should be translated 'silver to be paid'. But even if this were correct, it still does not affect the essential point that in an early monetary context involving silver, στάσιμον originally referred to weighing.

¹⁷ s.v. A. IV.2 ('weigh out, pay'), with s.v. στάσις, A.II ('weighing, paying').

back before money was counted out in coin. And we will see presently in an archaic text from Ephesus, that ἰσθημι was there used for recording receipts of bullion. In the era before coinage, the term ‘to weigh out’ seems, quite naturally, and literally, to have been used for all manner of currency transactions: receiving payment, making payment, and transferring money on credit. The parallelism with Roman monetary terms derived from *pondere* (above, n. 6) is striking.

In addition to such textual and etymological testimonia that pertain to currency in the Greek world before currency (*nomisma*) became synonymous with coinage, Henry Kim has pointed to the relevance of several early silver hoards in which early coins are commingled with unminted silver.¹⁸ And there are some further considerations and physical evidence that have received curiously little attention in view of their significance for the question at hand. In an interesting contrast to the documentation discussed above, nearly all of which pertains to Athens, the mixed hoards and other evidence come either from the Greek West or from the opposite, eastern side of the Greek world and its Lydian and Carian fringe in western Asia Minor.

2. ELECTRUM, GOLD, AND SILVER BULLION IN WESTERN ASIA MINOR

There is no better place to begin than with the incentive for the very invention of coinage in late seventh-century BC Lydia. Although often regarded as a highly controversial question, the rationale for the invention of coinage may be readily understood from the nature of the metal—electrum gold—from which all earliest coins were made.¹⁹ Why electrum? In the first instance because it was the most abundant precious metal in the region, having been extracted from the Pactolus

¹⁸ Kim, ‘Archaic Coinage as Evidence’ [n. 15], 15.

¹⁹ R. W. Wallace, ‘The Origin of Electrum Coinage’, *AJA* 91 (1987), 385–90, and Le Rider, *La Naissance de la monnaie* [n. 9], 71–98, survey theories for the creation of coinage. For the explanation presented here, see my review of Le Rider in *Schweizerische Numismatische Rundschau* 80 (2001), 201–2, following Wallace, ‘Origin of Electrum Coinage’, and R. R. Holloway, ‘La ricerca attuale sull’origine della moneta’, *RIN* 80 (1978), 7–14.

and other Lydian rivers of the Mt Tmolus watershed in legendary quantities. But secondly, since this naturally occurring placer or stream gold was an alloy whose gold and silver proportions varied in nature, and whose gold content could be, and (as analyses of early electrum coins have revealed²⁰) usually was, diluted by the artificial addition of refined silver, it was poorly suited for monetary exchange. Not only did electrum bullion have to be routinely weighed out, but it had to be assayed visually from streaks on the touchstone to ensure its intrinsic value in every transaction; and while this may not have been too much of an inconvenience for large lumps of the metal, it would have been impossible for making payments in tiny bits of electrum or bags of electrum gold dust. It follows that coinage was initially created to obviate this problem, to enable electrum to function effectively as an exchange medium by transferring its valuation from physically weighing and assaying to the authority of the issuer, who was identified by the authenticating stamp placed on the small pre-weighed ingot. The invention of coinage, in other words, presupposes a preceding period of uncertain duration in which electrum gold was used for exchange in bullion form, a period in which the metal was found to be increasingly unreliable, if not ultimately unacceptable, as negotiable tender. Electrum in the form of coinage not only solved this problem but proved to be remarkably profitable for those who produced it, as they were able to debase the metal with added silver while continuing to value the coins artificially at a high original face value.²¹

Long before silver and pure gold were ever minted into coins, they too had served as monetary metals in the economy of western Asia Minor. Documentation on this point comes from *IGSK Ephesos 1*, the extraordinary opisthographic lead tablet that D. G. Hogarth

²⁰ M. R. Cowell and K. Hyne, 'Scientific Examination of the Lydian Precious Metal Coinages', in A. Ramage and P. Craddock (eds.), *King Croesus's Gold: Excavations at Sardis and the History of Gold Refining* (Cambridge, Mass., 2000), 172.

²¹ Lydian electrum coins are known to have been minted from an alloy of approximately 55 per cent gold and 44 per cent silver (ibid. 172). If, as is highly probable (see most recently N. Cahill and J. H. Kroll, 'New Archaic Coin Finds at Sardis', *AJA* 109 (2005), 612–13), these coins were valued as if they had been made of a naturally occurring electrum alloy of 71–3 per cent gold and 27–9 per cent silver, the issuer would have realized a profit in the area on the order of 15–20 per cent! (Le Rider, *La Naissance de la monnaie* [n. 9], 93–7). For the inconsistent debasement of the electrum coins of Samos, see H. Nicolet-Pierre and J.-N. Barranton, 'Monnaies d'*electrum* archaïques, Le trésor de Samos de 1894 (*IGCH* 1158) conservé à Paris', *RN* 152 (1997), 121–35.

excavated in fragments from the foundations of the archaic Artemesium at Ephesus in 1904/5.²² The earliest surviving monetary account in Greek, the tablet records receipts in gold and silver from several revenue sources. Hogarth believed that the tablet recorded sums collected for the construction of the great 'Croesus' temple, and therefore that it dated to the time of Croesus, around the middle of the sixth century.²³ The tablet was found deep in the foundations of the temple, however, and since it had been folded over without regard to the text, indicating that it was apparently discarded or lost as metal scrap, its inscribing and use ought to date before work on the temple had proceeded very far, if construction had begun at all. The tablet therefore should belong to the earlier part of the sixth century or the later part of the seventh,²⁴ either time being suitable for the forms of the letters.²⁵ Since the inscription thus dates before the time of Croesus, who was responsible for introducing gold and silver coinage in western Asia Minor,²⁶ the gold and silver inventoried in the inscription should therefore be, as Giacomo Manganaro first recognized, gold and silver in the form of bullion.²⁷ I here reproduce the text of the better preserved Side A with Manganaro's persuasive restoration of line 6,²⁸ followed by my translation.

²² D. C. Hogarth, *Excavations at Ephesus, the Archaic Artemisia* (London, 1908), 46, 120–44, pl. 13, with reliable facsimile drawings of the lettering and excellent photographs. Hogarth mistakenly assumed that the tablet was made of silver. I am preparing a new publication of the tablet based on examination of it in the Istanbul Archaeological Museum.

²³ *Ibid.* 139, 142–4.

²⁴ As first recognized from some of Hogarth's statements by G. Manganaro, 'SGDI, IV, 4, n. 49 (DGE, 707) e il bimetallismo monetale di Creso', *Epigraphica* 36 (1974), 57–60. I owe a more precise understanding of the architectural and stratigraphical context of the tablet to Michael Weissl, an acknowledged authority on remains of the Croesus temple and its predecessors; see M. Weissl, 'Grundzüge der Bau- und Schichtenfolge im Artemision von Ephesos', *Jahreshefte des Österreichischen Archäologischen Instituts* 71 (2002), 313–46.

²⁵ For comparable letter-forms on late seventh-century BC Chiot pottery, see J. Boardman, *Excavations in Chios 1952–1955, Greek Emporio* (London, 1967), 243–4, pls. 97–8, nos. 613–15; A. A. Lemos, *Archaic Pottery of Chios* (Oxford, 1991), 7–8, 231, fig. 1, pl. 4, no. 35.

²⁶ For the innovation and its recently confirmed attribution to Croesus, see Cahill and Kroll, 'New Archaic Coin Finds' [n. 21].

²⁷ Manganaro, 'SGDI, IV, 4, n. 49' [n. 24], 69–70.

²⁸ *Ibid.* 62–3. Side B also lists receipts of metal but in lines that are too incomplete or problematic to merit discussion here. Unlike the even mina weights of Side A,

- 1 τεΤαράροντα μνέαι : τὸ πρῶ[τον] ἐστάθ[ησ]αν :: ἐκ τῶν δ[ώρ-]
 2 [ων] χρυσὸ : ἐκ πόλεως ἡνείχ[τθ]ησαν :: ἀργυραὶ πέντε : καὶ εἴροσ(ι) μν[έ-]
 3 [α]ι : εἰν τῷ πρώτῳ χρυσῷ ἡνείχτθησαν : ἐκ ττὸ δόρατος ἕξ μνέαι
 4 ἐστάθ[ησαν] : δέκα δὲ αἱ ἐνθένδε ἐστάθησαν μνέαι χρυσὸ : ἀργύρῳ τρές κα-
 5 [ί] τριήροντα μν[έ]αι ἐνθάδ' ἐστάθησαν : ἀργυραὶ ἐ[κ ττὸ] ναυτι[κῶ. vac.]
 6 [ἐκ ττο]ύτῳ ἑβδομήροντα μνέαι : καθα[ρὸ] χρυσὸ ἐ[γέ]νό[ντο] σὺν ταῖς]
 7 δέκα ἐκ ττὸ ἀλός :

40 minas at first were weighed, from the gifts (tribute?) of gold; they were brought from the polis. 25 silver minas were brought in (with) the first gold. From the spear (i.e. military? revenue) 6 minas (of gold) were weighed. 10 minas of gold from here were weighed. 33 minas of silver were weighed out here, silver f[rom the] marit[ime] (revenue).

[From th]is [there re]sult[ed] 70 minas of pure gold [including the]
 10 from the salt.

The tablet's find-spot implies that it is a record of moneys that were paid into the temple treasury. It is probably one from a long series of such tablets, each recording funds received during a finite period. The revenues came from several sources, the first of them being the polis, presumably Ephesus. A second revenue source, the spear revenue, most likely involved money from some kind of military income—possibly the sale of booty or a dedicated percentage of wages that were paid to Ephesian mercenaries by foreign paymasters.²⁹ A third receipt was of the gold 'from here'; one assumes previously unrecorded gold from the sanctuary. The fourth receipt was of silver 'weighed out here' from the *nautikon* or maritime revenue. This is likely to have been silver collected as harbour taxes, since the main harbour of Ephesus in early times lay next to the sanctuary of Artemis and in fact was known as the 'Sacred Harbour' (Athenaeus 8. 361), which in turn suggests that the sanctuary exercised proprietary control over the harbour and its revenues, as was almost certainly the case with the final revenue source, the

some of the weights on Side B are expressed in fractional units below the mina: *hemimnaion*, *stater(es)*, *hekte*, and *hemihekte*. Although the last three of these were later employed as coin weights, they do not here refer to coins; *pace* J. K. Davies, 'Temples, Credit, and the Circulation of Money', in Meadows and Shipton (eds.), *Money and Its Uses* [n. 15], 121.

²⁹ So C. Talamo, 'Sull'Artemision di Efeso', *Parola del Passato* 39 (1984), 216. Others (e.g. Managaro, 'SGDI, IV, 4, n. 49' [n. 24], 61; Davies, 'Temples, Credit, and Circulation' [n. 28], 121), supposing that the reference is to a natural resource, prefer to understand 'from the timber (revenue)'.

salt. For Strabo (14. 1. 26) mentions the great sacred revenues that the sanctuary of Ephesian Artemis traditionally received from two large nearby lagoons, which were known for their salt-beds or salt-works (*Etymologicum Magnum*, s.v. *Δαίτις*). The salt revenues, presumably rental payments from leasing of these salt-beds, show up again on Side B. From line 6 we learn that in order to obtain a grand total of the revenues the value of the silver was notationally converted into that of refined gold, which the treasury employed as its money of account.

However much is obscure, it is clear that the inscription gives us our earliest glimpse of a functioning economic institution in the post-Mycenaean Greek world and reveals that the revenues the temple collected in gold and silver bullion were as monetized c.600 BC as they would have been in coin-using classical times. Electrum coinage is conspicuous by its absence. Since electrum coins were circulating at this time, Manganaro was probably right to suggest that the treasurers of the Artemesium refused to accept them because they were artificially rather than intrinsically valued.³⁰ Such rejection of overvalued electrum currency was probably widespread among fiscally sophisticated entities in western Anatolia; for what else would have forced Croesus to call in all overvalued Lydian electrum coins and issue an intrinsically valued bimetallic coinage of silver and pure gold in their place?

Thus it appears from the Ephesus inscription and the evidence of surviving coins that metallic money in western Asia Minor evolved through three broad phases. In the initial stage three metals were employed in bullion form: gold, silver, and, probably most abundantly, electrum. In the second phase, the three metals continued to be used, although electrum was employed monetarily in the form of coin. Croesus ushered in the final stage by issuing a bimetallic currency of gold and silver coins that replaced both electrum coinage and, ultimately, weighed gold and silver bullion in payments and exchange.

That unminted silver circulated monetarily before and even after the advent of silver coinage in western Asia Minor is independently implied

³⁰ Manganaro 'SGDI, IV, 4, n. 49' [n. 24], 72–4. Nevertheless, with regard to Side B, line 8, where 40 minas and 8 staters [of gold?] are introduced by the phrase, [ἄν] δ' ἐργα <ζ> ὀ[μ]εθα ('from what we worked'), Manganaro (70–1) made the attractive suggestion that the 'working' may refer to the industrial parting of silver from electrum gold. If so, it follows that the treasury did receive revenue or offerings in electrum, but saw to it that the alloy was separated into its two constituent primary metals for accounting and storage purposes.

by three assemblages, the earliest of which is the late seventh-century foundation deposit from beneath and within the 'Central Basis' of the predecessor to the Croesus Artemisium at Ephesus. Well known for its impressive array of jewellery, ivory statuettes, and other artefacts in precious materials along with twenty-four electrum coins, many of them minuscule, the deposit included four very small round silver 'dumps'.³¹ Three similar dumps of silver were found 'unstratified' outside the Basis, as were a number of electrum coins. Hogarth described the silver pieces as 'globular lumps like rude weights or coins but without stamp' and gave three weights, which when converted from grains to grams are 0.45, 1.10, and 1.16 g.³² It is unclear whether these weights pertained to all seven dumps or whether (as I suspect) Hogarth's record is deficient. Nor can we be sure whether the three recorded weights adhere to a common standard; there is certainly no compelling reason to insist that they did. What seems quite likely is that the dumps, being—like coins—small ingots of precious metal, were regarded and employed as currency.³³ Unlike contemporary electrum coins, however, they bore no mark of an issuing authority because the valuation of their silver was unproblematic and merely required weighing on a scale.³⁴

The second assemblage is a hoard of 983 very small pieces of silver acquired by the Ashmolean Museum in Oxford in the 1930s. Kim has recently published an overview of the hoard with illustrated sample pieces.³⁵ Of the find, 56 per cent by weight consists of small, unminted pieces: fifty hammered disks³⁶ ranging in weight from under 1 g to up to 26 g, with most in the 1–4 g range, and twenty-seven pieces of silver

³¹ On the dating of the Central Basis deposit, see Weissl, 'Grundzüge' [n. 24], 315–19, and other works cited in Cahill and Kroll, 'New Archaic Coin Finds' [n. 21], 613.

³² Hogarth, *Excavations at Ephesus* [n. 22], 119.

³³ So E. S. G. Robinson, 'The Coins from the Ephesian Artemision Reconsidered', *JHS* 71 (1951), 157, 164, and 166.

³⁴ Of the three small globular dumps of silver in the collection of the Istanbul Archaeological Museum, only one can be identified by weight with any of the dumps mentioned but not illustrated by Hogarth. It is 1.10 g, 6 mm in diameter, and roughly spherical. One of the others (0.80 g, 5 mm) is also spherical; the third (0.32 g, 5 mm), with a flat facet is roughly hemispherical. The museum has no record of the provenience or accession date of any of these pieces. For this information and photographs I thank the staff and the director of the Museum, Halil Özek.

³⁵ *Coin Hoards* 1 (1975) no. 3. Kim, 'Archaic Coinage as Evidence' [n. 15], 15, with figs. 1.2–3, and pl. I.1.

³⁶ As in Kim, pl. I.1, nos. 5–7.

scrap chopped from thin ingots or jewellery,³⁷ most of them weighing between 1 and 5 g. These seventy-seven pieces of bullion were shaped or cut without regard to a common weight unit. The remaining 44 per cent of the hoard silver consists of 906 coins with an archaic head of Apollo.³⁸ The Apollo type has led some scholars to attribute the coinage to Colophon.³⁹ Of the coins, 552 are, at 0.21 g, tiny forty-eighths of a Lydian silver stater (or, in Persian nomenclature, of a double siglos); 353 are twenty-fourths (0.42 g), and there is one larger twelfth (0.92 g). The coins and hence the hoard fall somewhere in the last half or third of the sixth century.

Three observations are worth making. First, the fact that the fractional coins are lighter than all but a few of the pieces of silver bullion suggests immediately that they were minted principally to supplement the bullion, which was easily weighed in the balance except for extremely small pieces. If the coins were thus intended to make such difficult weighing in minute increments unnecessary, it would mean that silver coinage in this case was adopted for a reason different from that of Croesus, whose silver and gold coins were created to replace overvalued coinage in electrum. Second, because the coins are, if not from Colophon, then at least from another Greek or Hellenized community of westernmost Asia Minor, we may be reasonably confident that the hoard comes from and should reflect monetary practice in an east Greek or Hellenizing community. As a rule, fractional coins were made for local use and did not travel far from home, certainly not in a large mass like these. Third, it seems accordingly that this deposit attests to a transitional moment—at one particular locality—as late as about the 530s or 520s, when the old type of silver money was conservatively continued in use for larger value transactions even after coins were introduced to facilitate the making of finely calibrated divisions at the lower end of the weight scale.

In addition to the Ephesian and 'Colophonian' deposits containing unminted silver, we must take account of another mixed find of silver bullion and early silver coins that came to light in the mid

³⁷ As *ibid.* nos. 8–10.

³⁸ As *ibid.* nos. 1–4.

³⁹ e.g. K. Konuk, *SNG Turkey I, The Muharrem Kayhan Collection* (Istanbul and Bordeaux, 2002), *ad nos.* 342–54.

1980s,⁴⁰ in this case in Caria, in south-west Asia Minor, reportedly south of Iasos between Mylasa and Cnidus, and therefore not far from the Aegean coast. Over 600 pieces of broken jewellery and other scrap silver were accompanied by about 280 coins, nearly all Lydian silver of Croeseid type (confronting lion and bull foreparts) and Carian silver with the forepart of a lion, in denominations that range from 10 to 11 g staters down to forty-eighths.⁴¹ The find probably dates from the third quarter of the sixth century. Although the numismatic component of the hoard is very different from that of the 'Colophon' find with respect to the variety of coins and the many larger and heavier denominations, the hoard nevertheless provides a further instance of two forms of silver money—old silver bullion and the new money of coined silver—being saved together. As a storage of wealth the deposit cannot prove that the bullion continued to be used by weight as a transactional medium alongside the coins. But if the sixth century was a time of monetary transition and overlap during which an ancient form of currency was being supplemented and gradually replaced by a newer form, the hoard, like the preceding one and other mixed hoards reviewed below, should probably be regarded as a consequence of this transition, which in some quarters was bound to have been more cautious and prolonged than in others.

3. SILVER BULLION IN MAGNA GRAECIA AND SICILY

In contrast to the small dumps, disks, pieces of scrap, and fragments of broken jewellery in the foregoing finds, the extant bullion silver

⁴⁰ *Coin Hoards* 8 (1994), no. 10. Preliminary notices in I. Carradice, 'The "Regal" Coinage of the Persian Empire', in I. Carradice (ed.), *Coinage and Administration in the Athenian and Persian Empires* (Oxford, 1987), 74, 79, 80, Table A.1, pl. X; I. Carradice and M. Price, *Coinage in the Greek World* (London, 1988), 31, 46, 47, Table A.1, pl. 2. Mention of the coins and scrap jewellery on exhibit in Jerusalem in P. Vargas, 'Kaspu ginnu and the Monetary Reform of Darius I', *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 89 (1999), 250; and 'Money in the Ancient Near East Before and After Coinage', *American Society of Oriental Research Newsletter* 49 (1999), no. 3, 15.

⁴¹ The unminted silver and some of the coins are preserved in the Israel Museum in Jerusalem. Ute Wartenburg is preparing publication.

from hoards and sanctuaries in the Greek west occurs for the most part in the more substantial form of whole ingots and thick, chopped chunks of ingots (*Hacksilber*).⁴²

A number of these ingots and pieces bear inscriptions showing that they had been dedicated in sanctuaries. Five are known from Poseidonia (Paestum); another was found at Francavilla Marittima, about 14 km north-west of Sybaris; and a seventh had been dedicated in a sanctuary of Zeus Lykaios in Sicily. The largest of the Poseidonian ingots (Fig. 1.1) is a round disk, 9.3 cm in diameter, about 1 cm thick, and weighing 571 g. Once dedicated in the city's great sanctuary of Hera with its standing Doric temples, it is



Figure 1.1. Silver ingot, 570.8 g. Paestum Museum. Enlarged to actual size from J. G. Pedley, *Paestum: Greeks and Romans in South Italy* (London, 1990), fig. 25.

⁴² In this respect, the hoards resemble the mixed coin and bullion hoards of Egypt and the Levant. On these silver hoards and the typology of the ingots in them (and in West Greek hoards), see Kroll, 'Small Find' [n. 10], 4–10.



Figure 1.2. Silver plaque, 17.06 g. Paestum Museum. Reduced to actual size from A. M. Ardivino, *ArchCl* 32 (1980), pl. 17.

inscribed $\tau\acute{\alpha}\varsigma$ $\eta\acute{\epsilon}\rho\alpha\varsigma$ $\eta\iota\alpha\rho\acute{\omicron}\nu$ $\Phi\rho\acute{\omicron}\nu\phi\iota$ $\tau\acute{\omicron}\xi'$ $\acute{\alpha}\mu\iota\nu$, 'Sacred to Hera; strengthen our bow'.⁴³ The second (Fig. 1.2), a small, thin, square plaque weighing 17.06 g, from the same sanctuary, is more simply inscribed $\tau\acute{\alpha}\varsigma$ $\theta\epsilon\omicron$ $\eta\iota\alpha\rho\acute{\omicron}\nu$ $\acute{\epsilon}\mu\iota$, 'I am sacred to the goddess'.⁴⁴ The third (Fig. 1.3a and b), with a similar text ($\tau\acute{\alpha}\varsigma$ $\theta\epsilon\omicron$ $\acute{\epsilon}\mu\iota$ $\eta\iota\alpha\rho\acute{\omicron}\nu$), is an irregular pancake-type ingot of 111.5 g that was dedicated in an extra-mural sanctuary.⁴⁵ Melted on to its rough, uninscribed side are four coins, of which two are recognizable as early incuse drachmas of Poseidonia with the type of a nude Poseidon striding right; the other two coins, now mere typeless disks, had apparently been hammered flat before attachment to the ingot.⁴⁶ The two other inscribed pieces of silver from Poseidonia, one from a subterranean Persephone sanctuary,⁴⁷

⁴³ M. Guarducci, 'Dedica arcaica alla Hera di Posidonia', *Archeologia Classica* 4 (1952), 145–52; Jeffery, *LSAG*² 252, 260, no. 3 ('c. 550–500?'); A. M. Ardivino, 'Nuovi oggetti sacri con iscrizioni in alfabeto acheo', *Archeologia Classica* 32 (1980), 53, no. 4; *SEG* 29, 982; J. G. Pedley, *Paestum, Greeks and Romans in South Italy* (London, 1990), 51, fig. 25. Presumably, the small oval piece of silver fused onto the ingot a little below the centre had been added to increase the weight; for a similar addition melted on to a large cake ingot from Egypt, see van Alfen, 'Herodotos' "Aryandic" Silver' [n. 10], 11, pl. 4, no. 24.

⁴⁴ 2.5 cm square; thickness 0.2 cm. Ardivino, 'Nuovi oggetti sacri' [n. 43], 50–1, pl. 17.1, suggesting a dating around the middle of the sixth century BC; and 'Lingotto in argento con impronte monetarie arcaiche da Paestum', *RIN* 95 (1993), 288. Jeffery, *LSAG*², 457, no. G.1 ('c. 550–525').

⁴⁵ 4.6 × 5.3 cm; thickness 0.75 cm. Ardivino, 'Nuovi oggetti sacri', [n. 43], 51–3, pl. 18; and 'Lingotto in argento' [n. 44], 285–93, with photos of the ingot after cleaning. Jeffery, *LSAG*² 457, no. G.2 ('c. 550–525').

⁴⁶ The complete flattening, hence demonetization, of two of the coins implies that all of them were regarded as bullion when added to the ingot. Since an edge of one of the coins is cut away along a straight edge of the ingot, it appears that the ingot, with coins attached, was initially larger and has lost some of its original silver to chopping, possibly when used transactionally.

⁴⁷ *IG* xiv. no. 665. Jeffery, *LSAG*² 252, 260, no. 4 ('c. 550–500?'). Ardivino, 'Nuovi oggetti sacri', [n. 43], 53–5, no. 3; 'Lingotto in argento' [n. 44], 289. No dimensions or weight recorded.



Figure 1.3. Silver ingot, 111.54 g. Paestum Museum. Enlarged to actual size from A. M. Ardovino, *RIN* 93 (1993), 288.

the other with a dedication to Zeus Xenios⁴⁸ have been lost since their inscriptions were recorded. The first was a small rectangular plaque, the second a small square plaque similar in shape and size to the second Poseidonia piece above (Fig. 1.2) and to the square silver plaque from Francavilla Marittima, which is inscribed Ἀριστῆϊς ἀνέθ<ε>κε, 'Aristeïs dedicated'.⁴⁹

In *SEG* (36, no. 941) the dedicatory inscription on this last plaque is dated to the late seventh or the early sixth century, that is, well before the inauguration of coinage in south Italy near the middle of the sixth century. On the other hand, the ingot with the adhering coins was clearly dedicated after Poseidonia began to mint coins around 530.⁵⁰ Whether any of the other Poseidonian ingots were dedicated earlier and happened to antedate coinage at the city is uncertain; their dedicatory texts are believed to date from around the middle into the second half of the sixth century.

In his articles on this inscribed bullion, A. M. Ardovino aptly noted a parallelism with the bronze bullion that was commonly

⁴⁸ 2.0 × 1.7 × 0.5 cm; weight unrecorded. Ardovino, 'Nuovi oggetti sacri', [n. 43] 65–6; 'Lingotto in argento' [n. 44], 290 n. 9.

⁴⁹ 1.5 × 1.7 × 0.45 cm. In a private collection. L. Gasperini, 'Vecchie e nuove epigrafi del Bruzio Ionico', in *Decima Miscellanea Greca e Romana* (Rome, 1986), 142–5; Ardovino, 'Nuovi oggetti sacri', [n. 43], 289.

⁵⁰ N. K. Rutter (ed.), *Historia Numorum: Italy* (London, 2001), 108. For the drachmas attached to the ingot, see Rutter 109, no. 1108 (c.530–500).

deposited in native Italian sanctuaries.⁵¹ Since this *aes* was dedicated wealth in the form of currency, there is good reason to believe that the silver ingots were similarly dedicated as offerings of monetary specie. The only significant differences would be in the metals and the ethnicity of their users. For money, be it in dedications to the gods or in profane economic activity, the Greek colonists of Magna Graecia relied on silver, in contrast to the traditional native Italian currency of bronze. Given the conservatism of religious custom, it is understandable why pieces of silver bullion continued to be dedicated even after the advent of silver coinage.

Nevertheless, as Ardivino recognized, the tradition of dedicating money did spread to coinage, as dedicatory graffiti on certain silver coins from Magna Graecia attest.⁵² The best known is a late sixth-century stater of Croton in Paris with a dedicatory inscription to Apollo: *ἡιαρὸν τὸ Ἄπό(λλωνος)*.⁵³ Other examples are coins marked with an H, probably for (*ἡιαρὸν*) from the Heraion at Foce del Sele near Poseidonia.⁵⁴ The silver ingots from Poseidonia and Francavilla Marittima thus take their place as a kind of intermediary monetary dedication in archaic Italy, midway between the native bronze bullion-currency of the Italians on the one hand and the developed silver coin-currency of the Greek *poleis* on the other.

A silver brick ingot once in a Sicilian private collection near ancient Himera⁵⁵ provides a further instance of the use of silver bullion in a ritual context. Commentators attribute the letters of its dedication—*Τρυγόν*

⁵¹ 'Nuovi oggetti sacri' [n. 43], 60; 'Lingotto in argento' [n. 44], 291.

⁵² 'Nuovi oggetti sacri' [n. 43], 59.

⁵³ E. Babelon, *Traité des monnaies grecques et romaines*, ii. *Description historique* 1, with plates (Part 3) (Paris, 1907), 1451, no. 2160, pl. LXX. 3. M. Guarducci, *Epigrafia greca* (Rome, 1974), iii. 39, fig. 17a.

⁵⁴ P. Zancani Montuoro, 'L'edificio quadrato nello Heraion alla foce del Sele', *Atti e Memorie della Società Magna Grecia* ns 6–7 (1965–6), 175, pl. 52; Guarducci, *Epigrafia greca*, iii. 39–40, fig. 17b. To these add a Syracusan tetradrachm inscribed *IEPON* (E. Lenormant, 'Les Graffiti monétaires de l'antiquité', *RN* ns 15 [1874–7], 332 n. 9).

⁵⁵ *IG* xiv. 597; cf. G. Manganaro, 'Due studi di numismatica greca', *Annali della Scuola Normale Superiore di Pisa* 20 (1990), 409–27, 425–7. The object is now in the British Museum (inv. 1885.08–07.1): F. Marshall, *The Collection of Ancient Greek Inscriptions in the British Museum*, iv, sect. II: 'Supplementary and Miscellaneous Inscriptions' (Oxford, 1916), no. 1102, with photos.; H. B. Walters, *Catalogue of the Silver Plate (Greek, Etruscan and Roman) in the British Museum* (London, 1921), 3, no. 5, with drawings. It is roughly rectangular with two corners cut off, 11.5 × 4.3 × 1.25 cm.

(the name of the dedicator on Side A), $\Delta\acute{\iota}\omicron\varsigma \Lambda\upsilon\kappa\alpha(\acute{\iota}\omicron\upsilon)$ (on side B)—to the fifth century, which, if correct, confirms that in this part of the Greek world private dedications of unminted silver continued into the era of coinage. Two of its corners had been cut off, arguably an indication that before dedication the ingot or its corners may have been employed in exchange as *Hacksilber*.

The earliest of the mixed hoards, indeed the earliest known silver hoard in the Greek west altogether, is the one recovered in 1960 near Sambiasi, a town in the Brutium uplands behind the western coast of southern Italy (*IGCH* 1872). The hoard, which dates from about 520 BC, is comprised of forty-three early staters of Sybaris, with which were included two staters of Corinth and a 57.7 g chunk of silver that had been chopped from a flat slab ingot (Fig. 1.4).⁵⁶ The hoard belongs to the era of Sybarite expansion, when Sybaris controlled many territories and peoples north and west of its borders, which readily explains the presence of the Sybarite coins. Even so it is notable in the light of the bullion dedicated at Francavilla Marittima and up the coast at Poseidonia, that in the hinterland of south-western Italy a piece of old silver money circulated and was hoarded along with the new.



Figure 1.4. Silver ingot fragment, 57.5 g, from Sambiasi 1960 hoard, *IGCH* 1872. Archaeological Museum of Reggio Calabria, inv. 2335. Actual size. Museum photo.

⁵⁶ The fragment (Museo Nazionale di Reggio Calabria, inv. 2335) measures $4.1 \times 2.7 \times 1.1$ cm. Of the five edges, four are cut, one is original as cast. I thank Dr Elena Battanzi of the Superintendency at Reggio for the photograph and permission to publish. A. W. Van Buren, 'Newsletter from Rome', *AJA* 65 (1961), 381–2, pl. 118.5, published photographs of eight of the Sybaris coins, and suggested that the territory where the hoard was recovered may have belonged to the *polis* of Terina on the coast. It is uncertain, however, whether Terina, a colony of Croton, could have been founded this early, i.e. before Croton succeeded in destroying the power of Sybaris in 510.

A second west Greek mixed hoard, discovered in 1985 either near Selinus on the south-western coast of Sicily⁵⁷ or about 100 km to the east,⁵⁸ is much larger. In addition to more than 170 coins (chiefly those of Aegina, Corinth, Selinus, and some South Italian cities), the published part of the find includes a kilogram and a half of unminted silver in five pieces: a small flattened disk (2.45 g), a complete round cake ingot of roughly a mina in weight (421 g), a thick, cut chunk (597 g) from a massive round cake ingot, and two chunks that had been chopped from flat slab ingots (160 g and 303 g).⁵⁹ Three of the larger pieces bear Greek-style control or inspection stamps, and from isotopic analysis it is known that one (certainly) and two others (probably) came from mining districts in the Aegean.⁶⁰ Since the initial publication of the find, three small chopped ingot fragments said to be from the same hoard have been published.⁶¹ It has been rumoured that other ingots or ingot pieces were recovered but melted down.

Even this hoard is dwarfed by the huge ten-kilogram accumulation of silver that was buried in the early fifth century BC⁶² in a large clay

⁵⁷ C. Arnold-Biucchi, L. Beer-Toby, and N. M. Waggoner, 'A Greek Archaic Silver Hoard from Selinus', *American Numismatic Society Museum Notes* 33 (1988), 1. The find is registered in *Coin Hoards* 8 (1994), no. 35.

⁵⁸ In the vicinity of Palma di Montechiaro (Manganaro, 'Due studi' [n. 55], 427 n. 77).

⁵⁹ Arnold-Biucchi et al., 'Silver Hoard' [n. 57], 26–8, pls. 12–15.

⁶⁰ L. Beer-Toby, N. H. Gale, H. S. Kim, and Z. A. Stos-Gale, 'Lead Isotope Analysis of Four Late Archaic Silver Ingots from the Selinus Hoard', in A. Oddy and M. Cowell (eds.), *Metallurgy in Numismatics* 4 (London, 1998), proposing also that the silver of the flat bar ingot fragment (Ingot B) is probably from Spain; cf. J. G. Milne, 'The Early Coinages of Sicily', *NC* 5th ser. 18 (1938), 49. Manganaro, 'Due studi' [n. 55], 427 n. 77) suggests that the two-letter graffito on this fragment is inscribed in Phoenician characters.

⁶¹ Manganaro 427 n. 77, with pl. 40. The fragments are in a private collection in Sicily. Weights are 11.9 g, 9.82 g, and 4.36 g. Since they are from flat bar ingots, and have been cut on three or four sides, they are similar to the smaller fragments of bars in the Taranto Hoard (J. H. Kroll and S. Heath, 'The British Museum Lot of Silver from the Taranto 1911 Hoard' (*Inventory of Greek Coin Hoards* (1973), no. 1874); 2002 internet publication at <<http://www.numismatics.org/dpubs/taranto1911/indeximages.html>>, nos. 41–51, accessed 12 June 2007.

⁶² The deposition is dated c.500–490 (Kraay, 'Archaic Owls' [n. 14], 49) or c.490–480 (N. K. Rutter, 'Athens and the Western Greeks in the Fifth Century B.C.', in G. Le Rider, K. Jenkins, N. Waggoner, and U. Westermark (eds.), *Kraay-Mørkholm Essays* [Louvain-la-Neuve, 1989], 246; and *Historia Numorum: Italy* [n. 50], 5).

pot in the heart of ancient Tarentum, near the agora (*IGCH* 1874).⁶³ Two-thirds of the silver by weight was in the form of chopped-up ingots and silver scrap, making it the largest assemblage of silver bullion known from the ancient Greek world. Some 600 coins, mostly from South Italian cities but including over 100 from Sicily and Aegean Greece, made up the remaining third of the deposit. Since coins from Tarentum itself are conspicuously absent, the deposit appears to have been the stock of a *trapezites*, or money-changer, who received this foreign currency in exchange for local coinage, presumably the sole legal tender for transactions in the city.⁶⁴

That we are entitled to regard the great mass of unminted silver, along with the coins, as foreign money is implied by the circumstance that nearly all the bullion consisted of *Hacksilber* fragments—most of them relatively modest or even quite small (under 10 g) in size—that had been chopped from ingots. About half this bullion, about three kilos of it, disappeared into the melting-pot. Among the fifty-seven pieces that were saved and were purchased by the British Museum in 1921,⁶⁵ not one is a whole ingot. The 600 coins in the Tarentum deposit are of course money from Greek cities, but that does not mean that all the unminted silver must be from non-Greek sources. Some may have been brought on the ships of Phoenician and Carthaginian traders, who probably continued to depend on weighed bullion in their international, Mediterranean-wide activities. If, however, as one infers from the dedication of ingots, the monetary use of silver bullion had been current among the Western Greeks, a substantial

⁶³ Babelon's publication of the find ('Trouvaille de Tarente', *RN* 4th ser., 16 [1912], 1–40 [= *Mélanges Numismatiques* (Paris, 1912), iv. 304–43] quotes G. Vlasto's unusually detailed accounts of the hoard's discovery and dispersal. The place of discovery was in the lower city (*Borgo nuovo*), 300 m from the sea. For a plan locating the ancient agora in this area see A. J. Evans, 'Recent Discoveries of Tarentine Terra-Cottas', *JHS* 7 (1886), 3–5. Holloway ('Remarks on the Taranto Hoard of 1911', *Revue Belge de Numismatique* 146 (2000), 1–3) has a good review of the dispute, now essentially resolved, over the hoard's integrity.

⁶⁴ As suggested by Holloway (*ibid.* 6), who identified the deposit as a 'banker's hoard', while mentioning also the possibility of its being a sanctuary treasure. But in the latter case local coins would not have been excluded.

⁶⁵ Photos of six of the British Museum pieces are published in M. J. Price (ed.), *Coins: An Illustrated Survey, 650 BC to the Present Day* (New York, 1980), fig. 60. For an annotated and fully illustrated electronic publication of the entire BM lot of bullion see Kroll and Heath, 'Silver from the Taranto Hoard' [n. 61].

proportion of the bullion in question may very well have arrived at Tarentum on Greek vessels and in the purses of Greek travellers.⁶⁶

Regrettably, the most interesting piece from the hoard belonged to the lot of bullion that has vanished. It is the chopped end of an ingot pictured in a drawing (Fig. 1.5) that was published by Ernest Babelon after a sketch made by Gregory Vlasto, who had unsuccessfully attempted to purchase the piece in Taranto.⁶⁷ It was stamped with an incuse-square reverse coin punch from the mint of Selinus, precious evidence that this Sicilian mint was involved in testing, if not manufacturing, ingots of bulk silver at the same time it was minting coins in the later sixth century. One is reminded of the mint at Rome in the third century BC that continued to cast old-style five-pound bronze bars even as it was casting new, round coins of one pound weight and less. Since these Roman ingot or currency bars were frequently chopped and hoarded in fragments, it is clear that they did not routinely pass at face value, like a coin, but rather were weighed out and, if necessary, cut up when employed transactionally. Could it be that Selinus in the late sixth century was

⁶⁶ Some of the coins from the non-South-Italian part of the hoard had been tested on one side with a deep chisel cut or are halves of coins that had been chopped in two. This has led several commentators (e.g. Rutter, 'Athens and the Western Greeks' [n. 62], 246–7, and *Historia Numorum: Italy* [n. 50], 5) to suggest that the Aegean part of the hoard might have reached Tarentum via the eastern Mediterranean, where finds of silver bullion commonly include Greek coins in chopped and gashed condition. But when one counts up the actual number of Taranto specimens that had been chisel-tested (3) or halved (7) the proportion appears relatively small compared to the numbers of mutilated Greek coins in typical Egyptian and Levantine hoards. It is in fact questionable whether the chisel-testing and halving of coins was an exclusively eastern phenomenon. Two of the halved coins in the Taranto find are halved drachmas of Himera that were certainly not cut in the east. And at least one of the Metapontum staters in the BM lot (Kroll and Heath, 'Silver from the Taranto Hoard' [n. 61], no. 61) had been intentionally cut across to ascertain whether it was plated. Nor do the pieces of silver bullion appear to have come from the east. Most of the ingot fragments were chopped from flat or plano-convex ingots of rectangular shape, unlike the round cake ingots that are the standard ingot type in silver hoards found in Egypt and the Levant. If round cake ingots are characteristic of silver from Aegean mining districts, as there is good reason to believe (Arnold-Biucchi et al., 'Silver Hoard' [n. 57], 26–8; Beer-Tobey et al., 'Lead Isotope Analysis' [n. 60], 389; Kroll, 'Small Find' [n. 10], 8–10), it follows that most of the silver bullion in the Taranto find came from western and central Mediterranean sources, as the Selinus stamp on the brick ingot of Fig. 1.5 independently implies.

⁶⁷ Babelon, 'Trouvaille' [n. 63], 32.

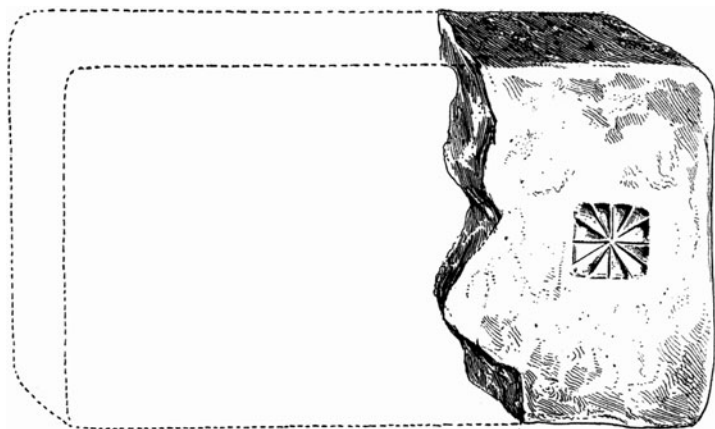


Figure 1.5. Silver ingot fragment, now lost, from Taranto1911 hoard, *IGCH* 1874. Size and weight unrecorded. Reproduced from E. Babelon, *RN* (1912), 32.

similarly issuing both ingots and coins, old bullion ingots for large weight units of silver, and new, struck coins for smaller units—not unlike what appears to have been the case implied by the Asia Minor hoard with the very small Apollo-head coins discussed above? Or, as J. G. Milne once conjectured,⁶⁸ might the ingot have been specifically manufactured for export to Italy, ‘where such an ingot would be as acceptable as a coin’?

4. CONCLUSION

Whether or not future finds will be able to answer such questions about the multiple forms of silver currency when coinage was still new, existing hoards make it clear that weighed bullion was slow to disappear as a transactional medium in the western Greek world, just as in the Greek east.⁶⁹ Such weighed silver was unlikely to be

⁶⁸ Milne, ‘Early Coinages of Sicily’ [n. 60], 49.

⁶⁹ Indeed, the making of payments in bullion and the hoarding of bullion with coins never disappeared entirely (C. Howgego, *Ancient History from Coins* (London, 1995), 89–9).

acceptable officially in cities like Tarentum once they had begun to mint coins and had established a closed monetary system that denied legal tender status to all other currencies.⁷⁰ But in international trading centres (*emporía*), in the great unregulated spaces between cities, and presumably in cities that did not mint or had not passed any legal tender legislation, any type of silver would have been negotiable, as it most certainly had been in Greek cities generally in the era before coinage.

That said, the limitations of the existing hoard evidence are apparent enough. Excavations in the Greek world have recovered an early bullion hoard of gold, largely electrum gold, from the floor of an eighth-century BC house at Eretria,⁷¹ but no bullion hoards of silver. When one recalls how very few hoards of archaic silver coins have been found in excavations, this is perhaps understandable. And since most coin hoards are chance finds that made their way onto the antiquities market because of the voracious demand for highly prized Greek coins, it is fair to assume that such hoards of bullion silver as may have been discovered would normally have been consigned to the melting-pot, for it is inconceivable that any ordinary dealer or collector of coins or fine antiquities would have been interested in unsightly chopped hunks and bits of silver that look like junk. That is why nearly all surviving silver bullion from Greek lands is so far known only from mixed hoards; it was the coins that brought the accompanying bullion to the attention of the occasional middlemen and dealers who were enlightened enough to understand the importance of this material to scholarly collectors and institutions. Consequently it would be mistaken to insist that no pre-coinage hoards of

⁷⁰ On the exclusivity of local coinage as legal tender (*nomisma dokimon*), see T. V. Buttrey, 'The Athenian Currency Law of 375/4 B.C.', in *Greek Numismatics and Archaeology: Essays in Honor of Margaret Thompson* (Wetteren, 1979), 44–5; Holloway, 'Remarks on the Taranto Hoard' [n. 63], 6–8; P. G. van Alfen, 'Problems in Ancient Imitative and Counterfeit Coinage', in Z. H. Archibald, J. K. Davies, and V. Gabrielsen (eds.), *Making, Moving and Managing, The New World of Ancient Economies 323–31 BC* (Oxford, 2005), 324–5, with references.

⁷¹ P. G. Themelis, 'An 8th century Goldsmith's Workshop at Eretria', in R. Hägg (ed.), *The Greek Renaissance of the Eighth Century B.C.* (Stockholm, 1983); Kroll, 'Observations' [n. 15], 77–9; G. Le Rider and S. Verdan, 'La Trouvaille d'Erétrie: réserve d'un orfèvre ou dépôt monétaire?', *Antike Kunst* 45 (2002), 141–52.

Greek silver bullion have been found. We know only that none have been reported.

It is less easy to understand why mixed hoards are known only from the Greek east and west, but not from the centre, in mainland Greece proper. One cannot altogether exclude the possibility that any bullion in early coin hoards from this area might have been removed and melted down prior to the dispersal and selling of the coins. Another, less speculative, consideration is that the cities of the Peloponnese, Crete, and most of central Greece and Thessaly tended on the whole to be economically more conservative, more exclusively agrarian, than coastal Greek poleis. Since very few communities in these large inland regions of central and southern Greece minted coins before the second quarter of the fifth century, one might not expect to find much deployment of silver there either before or even after coinage began to be struck by cities with maritime interests.⁷² On the other hand, when one considers how many of the great early silver-coining and silver-mining cities were clustered around the Saronic Gulf, in the islands, and along the northern shores of the Aegean, the absence of any recorded silver bullion from these coastal regions is a sobering reminder of the problematic nature of the existing hoard record.

Nonetheless, the record is not unhelpful. When added to the testimonia involving silver in Solon's laws, to the transactional terms etymologically derived from weighing, to the extensive revenues in bullion collected by the temple treasurers at Ephesus, and finally to the dedication of uncoined silver in the Greek west, a fairly coherent picture emerges, namely, that before Greeks had begun to employ a money of coined silver in internal and external exchange, they had for some time been performing the very same transactions with a money of weighed silver. Taking the early sixth-century date of Solon's lawgiving as a *terminus ante quem*, I would guess that silver became a recognized means of storing, measuring, and transferring wealth gradually over the course of the seventh century—the 'orientalizing' century of Greek material culture—when maritime activity,

⁷² See the map in Kim, 'Archaic Coinage as Evidence' [n. 15], 10 (= Howgego, *History from Coins* [n. 69], fig. 1) of cities that coined before c.480. On economically conservative Greek communities, including but by no means restricted to Sparta, see S. Hodkinson, *Property and Wealth in Classical Sparta* (London, 2000), 158–60.

especially with the silver-using Phoenicians, was having a transforming impact on many aspects of Greek life. The transformation in this case would have been the substitution of weighed silver for old utensil monetary units such as iron spits.⁷³

The Greeks' relatively long familiarity with transactions in silver helps to explain the quick spread of coinage throughout their world in the latter part of the sixth century. The weight denominations and values were already well known to all; and because of the accumulation of silver bullion in public and private hands, cities had abundant stocks of the metal ready for conversion into coin.⁷⁴ Apart from the

⁷³ Recent discussions of the monetary role of spits, and (on Crete) bronze cauldrons (Kroll, 'Observations' [n. 15], 84–8; Schaps, *IC* 80–8; Seaford, *MEG* 102–9) are notable for their lack of agreement, for example, on whether spits served primarily as notational value units (like Homeric oxen) or whether they were physically transferred as a common medium of exchange.

⁷⁴ From metallurgical analyses, it has been known for some time that the earliest coins of Athens, the so-called *Wappenmünzen*, were minted from non-Attic silver and that this silver had come from a number of sources (N. H. Gale, W. Gentner, and G. A. Wagner, 'Mineralogical and Geographical Silver Sources of Archaic Greek Coinage', in D. M. Metcalf and W. A. Oddy (eds.), *Metallurgy in Numismatics* i (London, 1980), 29–33; H. Nicolet-Pierre, 'Monnaies archaïques d'Athènes sous Pisistrate et les Pisistratides (c.545–c.510) II. Recherches sur la composition métallique des *Wappenmünzen* en collaboration avec Jean-Noël Barrandon et Jean-Yves Calvez', *RN* 6th ser. 27 (1985), 23–44). This is exactly as one might expect in a state that had been collecting revenues and storing its accumulated wealth over time in silver bullion. Before local silver mining at Laurion grew into a large-scale industry in the last quarter of the sixth century, silver in Attica would have come largely from abroad and would have included old, recycled silver as well as recently mined metal from any number of silver-producing centers. Thus when the Athenians chose to coin around the middle of the century the stocks of metal available for minting would have been heavily mixed.

Another possible connection between early coins and the prior circulation of silver bullion may be reflected in the turtle type of Aeginetan coinage. Since the rounded, high-relief turtle device on archaic Aeginetan coins give the coins a shape that approximates the shield-like shape of Aegean silver cake ingots (above n. 66), G. Welter ('Aeginetica XXV: Aiginetische "Schildkröten"', *Archäologischer Anzeiger* (1954), 28–30) hypothesized that the device was chosen by the Aeginetans because the ingots of silver with which they were familiar were known as 'turtles'. The idea has been endorsed by R. R. Holloway (*Catalogue of the Classical Collection, Museum of Art, Rhode Island School of Design, Ancient Greek Coins* (Louvain-la-Neuve, 1998), 3–4) and has much to recommend it, given that none of the other explanations for the turtle type of Aeginetan coinage are particularly convincing. If, as has been suggested (Kroll, 'Observations' [n. 15], 83; cf. Gale et al., 'Mineralogical and Geographical Silver Sources' [n. 74], 33), the Aeginetans were the main traders in Aegean silver before the advent of coinage, Aeginetan ingots would probably have been as well known as Aeginetan turtle coins came to be later. Although Welter does not mention it, the word for 'ingot' in Modern Greek is in fact *χελώνη*, 'turtle', a usage

profit to be made by issuing a currency with a value-added minting charge, there were two great practical advantages in making this conversion. One was that by obviating weighing, it made monetary exchange simpler, faster, and far more efficient. The other was that coinage removed the provision of money from the private sphere and placed it, like weights and measures, under the authority and the legal protection of the state, thereby maximizing the reliability of the means of exchange, which translated into further transactional efficiency.

In these ways the shift to silver coinage facilitated the progressive monetization of the Greek economy. Since this process seems to have been well under way before coinage, however, it is reasonable to conclude that the employment and increasing supply of precious metal was probably more influential than the form in which it was transacted. Certainly the expanding supply of silver and gold, chiefly from Aegean mining districts, contributed far more than coinage per se to the growth of public and private wealth in archaic and classical Greece. Near the beginning of this essay I cited Tim Cornell's observation that '[i]n economic terms, the introduction of coinage [was] not of great significance in itself.' Although Cornell was writing about Middle Republican Rome, there are good reasons for thinking that this claim may be no less true for the cities of late archaic Greece.⁷⁵

that may well go back to early times. Nevertheless, in an electronic search of all ancient literary, epigraphical, and papyrological attestations of *χελώνη*, I was unable to find any with the meaning of 'ingot', meaning that, however attractive, Welter's theory must remain unproved.

⁷⁵ Cf. Descat, 'Monnaie multiple et monnaie frappée' [n. 16], 77: 'La monnaie existe avant la monnaie frappée et tous les fonctions politiques ou éthiques que l'on attribue à la monnaie frappée correspondent aussi aux étalons de métaux pesés utilisés antérieurement.'

What Was Money in Ancient Greece?

David M. Schaps

For over a hundred years, the most thoughtful writers about Greek money have tried to free themselves from modern preconceptions. As long ago as 1892, Sir William Ridgeway proposed the theory that the Greek system of measures was based on the amount of gold that was equivalent in value to a cow.¹ In 1924 Bernhard Laum made the much more daring suggestion that the very idea of money had its place in ritual sacrifice, where at first the animal sacrificed was a substitute for the person sacrificing, and then another item—at first a metal ingot, later a coin—was a substitute for the animal.² The theories developed by Karl Polanyi in the 1940s and 1950s did not bear directly on the question of coinage, but by suggesting that the entire methodological approach of modern economists was inappropriate for describing most of the ancient world, his ideas—given wide currency among ancient historians, in somewhat modified form, by Moses Finley—have strongly influenced my generation, at least, not to take for granted the idea that it was coined money, even as an abstract idea, that offered the means for holding their society together economically.³

¹ W. Ridgeway, *The Origin of Metallic Currency and Weight Standards* (Cambridge, 1892).

² B. Laum, *Heiliges Geld* (Tübingen, 1924).

³ K. Polanyi, *The Great Transformation* (New York, 1944); id., *Primitive, Archaic, and Modern Economies: Essays of Karl Polanyi* (New York, 1968); id., *The Livelihood of Man* (New York, 1977). Cf. M. I. Finley, 'Aristotle and Economic Analysis', *P&P* 47 (1970), 3–25, repr. in Finley (ed.), *Studies in Ancient Society* (London, 1974), 26–52; id., *AE*.

Other scholars, in the meantime, have warned us not to be so certain that even the most modern forms of economic organization—giro-credit,⁴ banks that accept money from their depositors in order to invest it,⁵ insurance,⁶ cycles of inflation and deflation⁷—were unknown to the ancient world. The most famous statement of this attitude was that of Rostovtzeff, ‘that the economy of this period was distinguished from the modern economy only quantitatively, not qualitatively.’⁸ The modernists, no less than the primitivists, have opened our minds to ways of understanding the ancient economy that purely philological methods would never have suggested.

There comes a time, however, when people who have been looking for something must admit that their failure to find it is not just a lack of results, but a negative result: they are not finding what they are looking for because it is not there. When we realize that, we will generally discover that our search, though unsuccessful, has not been wasted. Geometers who tried valiantly to discover a proof for Euclid’s parallel postulate eventually realized that there was no such proof; but on the way they had discovered non-Euclidean geometry. Palaeontologists recognized a few decades ago that if a hundred years of searching had not turned up the ‘missing link’ between men and apes, it was because there was no such thing. They have not rejected Darwinian evolution, but the thousands of fossils they discovered in their quest have provided the basis for new theories of how evolution can be thought to have worked. It behoves us, too, to clear off the table a bit, to see what has been found and what has not been found, and to try to move forward with the results of our century-long investigation.

One distinction that has been developed over this time, and that I believe must now be taken into account in any discussion, is the

⁴ F. Preisigke, *Girowesen im griechischen Ägypten* (Strasburg, 1910).

⁵ R. Bogaert, *Les Origines antiques de la banque de dépôt* (Leiden, 1966); id., *Banques et banquiers dans les cités grecques* (Leiden, 1968); E. E. Cohen, *Athenian Economy and Society: A Banking Perspective* (Princeton, 1992).

⁶ Ibid. 140–1, with the earlier studies cited there, 140 n. 125.

⁷ F. Heichelheim, *Wirtschaftliche Schwankungen der Zeit von Alexander bis Augustus* (Jena, 1930).

⁸ M. I. Rostovtzeff, review of J. Hasebroek, *Griechische Wirtschafts- und Gesellschaftsgeschichte* in *Zeitschrift für die gesamte Staatswissenschaften* 92 (1932), 334 n. 1, repr. in his *Scripta Varia: Ellenismo e Impero Romano*, ed. A. Marcone (Bari, 1995), 459–64.

distinction between special-purpose money and all-purpose money. Among primitive peoples, there is not necessarily any single item that fulfils all the functions that we identify as being monetary. The most accessible example, for a classicist, is the economy glimpsed in the background of the *Iliad* and the *Odyssey*. There prices are quoted in terms of oxen, as we quote prices in terms of dollars; but trade is simple barter, mediated neither by oxen nor by anything else. For storing value bronze tripods are the most popular item, though when one wants to state the value of a tripod one evaluates how many oxen it is worth. For paying damages there is no single medium, but the guilty party must estimate what sorts of gifts will appease the victim, or will at least be considered by others to have been an appropriate offer.⁹ Similar forms of monetary arrangements have been documented for dozens of other societies, in ancient and in modern times.¹⁰ For us, on the other hand, all monetary functions are at least conceptually performed by pounds and pence, or dollars and cents, or whatever the local currency may be. The distinction between these two sorts of monetary system is chiefly a matter of how the society imagines itself. In actual fact we, too, use coins for small transactions, paper money for larger transactions, cheques and credit cards for still larger ones; the American government, as far as I know, still stores at least some of its treasure in the form of bullion at Fort Knox, but most of us store it in banks where no physical entity corresponds to the wealth we think we have there. In spite of these differences in which form of money we use, in all matters we think of ourselves as storing, giving, and receiving pounds and pence, dollars and cents, and in that sense we are using modern money.¹¹

For the period when the Greeks used special-purpose money, the list of monetary items is restricted. For the storage of wealth the Homeric heroes used utensils, chiefly bronze tripods; on Crete and elsewhere in the archaic period we also find cauldrons and iron

⁹ D. M. Schaps, *The Invention of Coinage and the Monetization of Ancient Greece* (Ann Arbor, 2004), 65–71, 77–9.

¹⁰ For exhaustive, though by no means final or authoritative and now quite dated, catalogues see A. H. Quiggin, *A Survey of Primitive Money* (London, 1949), 25–320; P. Einzig, *Primitive Money*, 2nd edn. (Oxford, 1966), 29–306.

¹¹ On this point see J. Melitz, 'The Polanyi School of Anthropology on Money: An Economist's View', *American Anthropologist* 72 (1970), 1020–40, and Schaps, *IC* [n. 9], 219–20.

spits.¹² That pretty much exhausts the matter of utensil-money. Archaeology has produced nothing to suggest that sickles,¹³ arrow-heads,¹⁴ knives,¹⁵ or beads¹⁶—all items that had monetary uses in other societies—were ever used as money by Greeks. Even where utensils were used, their monetary function was secondary: the Greeks did not develop, as other societies did, simplified utensils that were produced specifically for monetary use.¹⁷ Precious metals were certainly used in foreign trade, and the evidence that John Kroll presents in this volume puts it, to my mind, beyond doubt that they were also used for storing wealth before coins were invented.¹⁸ Cattle were a unit of account, but animals were never, as they later were among the Mongols, the chief mode of storing wealth.¹⁹ The most

¹² M. Guarducci, 'Tripodi, lebeti, oboli', *Rivista di filologia classica* NS 22–3 (1944), 171–80.

¹³ C. Sommerfeld, *Gerätgeld Sichel* (Berlin, 1994).

¹⁴ S. Sorda, 'A proposito di un rinvenimento di punte di freccia', *AION* 26 (1979), 185–206; H. B. Wells, 'A Further Study of the Arrowhead-money', *SAN* 12 (1981), 53–4; W. Stancomb, 'Arrowheads, Dolphins and Cast Coins in the Black Sea Region', *Classical Numismatic Review* 18 (1993), 5.

¹⁵ Peng Xinwei, *A Monetary History of China*, trans. E. H. Kaplan (Bellingham, Wash., 1994), 30–7; F. Thierry, *Monnaies chinoises i. L'Antiquité préimpériale* (Paris, 1997), 58–65, 96–7, 106–15, 124–9.

¹⁶ Quiggin, *Survey* [n. 10], 36–44.

¹⁷ Schaps, *IC* [n. 9], 87–8.

¹⁸ J. H. Kroll, above, Ch. 1. Two talents of gold were offered as a prize on Achilles' shield (Hom. *Il.* 18. 507) and the blazing fire of gold was what characterized a rich man to Pindar, but the inscription on which Kroll bases himself is significant in that it shows this use in an institutional setting. The major remaining difference between Kroll and myself is the question of whether weighed silver was ever a significant medium of domestic trade in Athens. The question is not relevant to my claim that the modern concept of money first arises with Greek coinage; the peoples of the Near East certainly used bullion (or, more generally, *Hacksilber*) in all the ways that we use money, but there was still a difference between the way they thought of silver and the way classical Greeks thought of coin: see Schaps, *Invention* [n. 9], 54–6. The same could conceivably have been true of the Greeks, but I do not see that either archaeology or history has yet demonstrated it. Nor does the question bear upon my claim that it was the structural inadequacy of the Greek economy that made coinage so attractive to the Greeks: however developed early archaic Greek commerce may have been—and it is becoming increasingly clear that it was much more developed than had once been thought (see e.g. J.-P. Wilson, 'The "Illiterate Trader"?', *Bulletin of the Institute of Classical Studies* 42 [1997–8], 29–53)—the economic structures available to the Greeks were certainly nothing like those that were normal among the people of Mesopotamia and the Levant, with whom Greek traders were in constant contact.

¹⁹ This may be an overstatement. T. Peisker, 'The Asiatic Background', in *The Cambridge Medieval History* (Cambridge, 1911), 343, who speaks of 'a sheep coinage'

widespread form of primitive money, the cowrie shell, is to my knowledge unknown in Greek archaeology.

Nobody doubts, nor do I think that it can be doubted, that Athenian society at least passed from the use of special-purpose money to the use of all-purpose money somewhere between the Dark Ages and the classical age. Certainly by the age of the orators, and almost certainly by the age of the tragedians, Athenians thought of all wealth as being a matter of *minae*, *drachmae*, and obols, and regularly expressed themselves that way. Recent books by Richard Seaford and myself have attempted to trace that development, my own book dealing with the economic effects and Seaford's with the philosophical.²⁰ A lot remains to be said about the details. In my book I held that the transition to all-purpose money came about with the adoption of coinage; Kroll has argued that the transition began earlier, and was based upon the use of bullion.²¹ But there is no doubt that by the classical period Athenians, at least, were using all-purpose money, and conceived of all their worldly possessions as having monetary equivalents.²² Once we have left the world of Homer, the world of special-purpose money exists only on the fringes of the societies we are studying.

Another uncontroversial matter is that from the classical period onward, the chief way that goods circulated throughout the society

among the Mongols, does it with the expression *sit venia verbo*, and one might hesitate before agreeing with Einzig, *Primitive Money* [n. 10], 274, that the savagery of the Mongols was chiefly designed to release more land to pasture their animals. Nevertheless, it is true that their taxes and feudal dues were determined by the size of their herds (H. F. Schurmann, 'Mongolian Tributary Practices of the Thirteenth Century,' *Harvard Journal of Asiatic Studies* 19 (1956), 312–17; cf. J. M. Smith, 'Mongol and Nomadic Taxation,' *Harvard Journal of Asiatic Studies* 30 (1970), 59–76, and D. Morgan, *The Mongols* (Oxford, 1986), 100). To this day Mongolia, the only country in the world whose horses outnumber its people, has almost six sheep per person: C. P. Atwood, *Encyclopedia of Mongolia and the Mongol Empire* (New York, 2004), 222 s.v. horses, 498 s.v. sheep.

²⁰ Schaps, *IC* [n. 9]; R. Seaford, *Money and the Early Greek Mind* (Cambridge, 2004).

²¹ J. H. Kroll, 'Silver in Solon's Laws', in *Studies in Greek Numismatics in Memory of Martin Jessop Price* (London, 1998), 225–32; id., 'Observations on Monetary Instruments in Pre-Coinage Greece', in M. S. Balmuth (ed.), *Hacksilber to Coinage: New Insights into the Monetary History of the Near East and Greece* (New York, 2001), 77–92; id., review of Schaps, *Invention* [n. 9], *Classical Review* 55 (2005), 344–6. For my counter-arguments see Schaps, 'The Conceptual Prehistory of Money and its Impact on the Greek Economy', in Balmuth (ed.), *Hacksilber to Coinage*, 96–100, and n. 18 above.

²² Schaps, *IC* [n. 9], 15–17, 111–21.

was in a regular market-place not very different in concept from the vegetable and fresh fish markets that still exist in New York. These markets, in turn, formed part of a larger 'market' in the economic sense, an economic space in which prices were set chiefly by the law of supply and demand. The extent of these markets may have varied: Gary Reger has argued for 'regionalism', a market whose extent did not go far past the limits of the Cyclades, in Hellenistic Delos;²³ Peter Temin argues that in imperial Rome, on the contrary, the prices of the Roman market influenced the price structure of the entire empire.²⁴ These two claims do not necessarily contradict each other, but both take for granted a conceptual world of economics much more like our own than like the societies characterized chiefly by Polanyi's mechanisms of reciprocity or redistribution. Gabriel Danzig and I have tried to show that as early as Plato's *Laws* the Greeks could not even conceive of any other way of distributing goods, as much as some of them might disapprove of the market as an institution.²⁵

Finley claimed famously that for all ancient states 'money was coin and nothing else'.²⁶ In a sense he was right, as he would have been right to say that for most moderns money means bills and coins. Ask a child to draw money and I suspect that you will get some kind of rectangular figure with scribbles on it and a few circles; it would be a child of considerable sophistication who would tell you, 'You can't draw money, that's just an abstraction.' Finley was also right to state that the concept of money as coin held a much firmer grip on the mind of adult Greeks than it does on moderns, so that they spent

²³ G. Reger, *Regionalism and Change in the Economy of Independent Delos*, 314–167 B.C. (Berkeley, 1994).

²⁴ P. Temin, below, Ch. 7. This brings a new level of statistical sophistication to the statement of F. W. Walbank, *The Awful Revolution: The Decline of the Roman Empire in the West* (Liverpool, 1969), 20, 31 (cited with disapproval by Finley, *AE* 33) that the Roman Empire in the second century 'was a single economic unit, capable—with a few exceptions—of satisfying its own needs . . . knit together, to a degree hitherto unknown, by the intensive exchange of all types of primary commodities and manufactured articles'.

²⁵ G. Danzig and D. M. Schaps, 'The Economy: What Plato Saw and What He Wanted,' in F. L. Lisi (ed.), *Plato's Laws and its Historical Significance* (Sankt Augustin, 2001), 143–7; see also A. Fuks, 'Plato and the Social Question: The Problem of Poverty and Riches in the *Republic*', *Ancient Society* 8 (1977), 49–83; id., 'Plato and the Social Question: The Problem of Poverty and Riches in the *Laws*', *Ancient Society* 10 (1979), 33–78.

²⁶ Finley, *AE* 166.

proportionally more effort than we do in physically transporting coins to effect payments.²⁷ The *hieropoioi* inscriptions of Delos²⁸ are generally divided into two sections: One side lists ‘monetary’ accounts, including how much coin the *hieropoioi* (temple-managers) received on assuming office, what they expended—down to the last copper—and what they transmitted to the next year’s *hieropoioi*. The other section gives an inventory of the temple, listing large numbers of items, mostly silver, whose weight is always recorded; it is obvious that these are considered the god’s assets, but not his money. The Persian king’s practice of cutting off an appropriate amount of bullion for expenses is recorded by Herodotus as a curiosity;²⁹ it was not a form of payment that was common in Greece.

Finley’s statement, however, can be taken much more dogmatically than it should. Payment in bullion, and even bribery in bullion, undoubtedly took place even in the classical and Hellenistic periods, though it did so on the fringes of an economy that was generally transacted in coin.³⁰ Barter must have taken place, too, although it is striking how little of it is attested. People or polities might get what they wanted by offering honour, love, or any of the other non-monetary currencies on which scholars and lawyers generally put a price tag.

None of these practices was so widespread as to invalidate Finley’s claim, though they do indicate something of its limitations. Much more damaging, because it applies to regular transactions in the centre of the economy, is the banking activity that had been documented well before Finley’s time and that has not disappeared from the evidence, despite Finley’s dismissive attitude towards it.³¹ Payment by bank-transfer was commonplace in Hellenistic Egypt, though we cannot trace it in earlier ages.³² Money-lending took various forms, but it undoubtedly permeated society, though never reaching the level of a major political

²⁷ Finley, *AE* 141. ²⁸ *IG* xi. 135–290, *Inscriptions de Délos*, 291–498.

²⁹ *Hdt.* 3. 96. 2.

³⁰ Gifts given as *xenia*, in particular, might be valuable items other than coin: G. Herman, *Ritualised Friendship and the Greek City* (Cambridge, 1987), 65–7, 82–115. This was especially the practice of Persian diplomacy: L. G. Mitchell, *Greeks Bearing Gifts* (Cambridge, 1997), 111–14.

³¹ Cohen, *Athenian Economy* [n. 5].

³² Preisigke, *Girowesen* [n. 4]; Cohen, *Athenian Economy* [n. 5], 41, claims that the idea would have been out of place in the context of Athenian banking; it is certainly unattested there, but that cannot mean much when we have no actual documents from Athenian banks.

factor as it did in Rome.³³ All this, as Edward E. Cohen has shown before and discusses again in the present volume, was from the point of view of an economist or a financier nothing less than the creation of money³⁴—money that can only be considered coin if one is willing to grant that a single coin may be in many people's hands, performing many different functions, at one and the same time.

But here, too, we have to be aware of the limitations of the phenomenon being described. To this extent I suspect that Finley is still right, that the concept of money as coin held such sway over the ancients that it put a real limit on the sophistication of their credit instruments.³⁵ I do not think it was from lack of inventiveness that the Greeks failed to invent the cheque or the banknote, a credit message payable not to any named individual but to 'the bearer', whoever happened to present it at the bank.³⁶ I suspect—though I am not certain of this, and I have at least what might appear to be one piece of evidence to the contrary³⁷—that the Greeks did not issue banknotes because they never thought of themselves as actually having paid until the coin, wherever it was, had verifiably reached the legal possession of the payee. We ourselves think of the payment as having been made the moment we write the cheque;

³³ P. Millett, *Lending and Borrowing in Ancient Athens* (Cambridge, 1991); J. Andreau, *Banking and Business in the Roman World*, trans. J. Lloyd (Cambridge, 1999), 100–11. The Roman state, unlike modern states, did not resort to credit as a usual means of finance: R. Duncan-Jones, *Money and Government in the Roman Empire* (Cambridge, 1994), 3–4, though cf. 8; Andreau, *Banking and Business*, 121–3. Greek *poleis* often did, though not as a matter of routine: L. Migeotte, *L'Emprunt public dans les cités grecques* (Quebec, 1984).

³⁴ Cohen, *Athenian Economy* [n. 5], 11–18, and below, Ch. 4.

³⁵ In this opinion I have been preceded by the perceptive article of S. von Reden, 'Money and Coinage in Ptolemaic Egypt: Some Preliminary Remarks', in *Akten des 21. Internationalen Papyrologenkongresses: Berlin, 13–19.8.1995, Archiv für Papyrusforschung*, Suppl. 3 (Stuttgart, 1997), 1003–8.

³⁶ Instructions to a banker to pay funds to a given person—that is, non-endorsable checks—have been found in Egypt: R. S. Bagnall and R. Bogaert, 'Orders for Payment from a Banker's Archive', *Ancient Society* 6 (1975), 79–108; R. Bogaert, *Trapezitica Aegyptiaca* (Florence, 1994), 20–4, 245–52.

³⁷ At Esther 3: 9, where Haman promises to 'pay [the Hebrew is *eshqol*, "I shall weigh"] ten thousand talents of silver' to the king's treasury for the destruction of the Jews, the Septuagint has him promising to 'write over' the money: *καὶ γὰρ διαγράψω εἰς τὸ γαζοφυλάκιον τοῦ βασιλέως ἀργυρίου τάλαντα μύρια*. The simple implication would seem to be that as soon as Haman 'wrote over' the money—that is, as soon as he wrote the order to the bank to transfer the funds—it would be considered paid; but more likely the expression is simply shorthand for the entire transaction, including the transfer of the funds on the bank's books.

if it is not honoured, that is a problem that arises later that casts a retroactive pall on the cheque itself. We certainly do not consider that our debt is paid only when the payee presents the cheque at the bank. To us, transferring the cheque transfers the money; to the Greeks, writing the order to the bank only directed that the transfer be made. When people thought that way, they were not likely to think of telling the bank to pay whoever might happen to show up there carrying this slip of papyrus. In so far as the ancients thought as Finley claimed they did, that money was really coin, they were limited in the sophistication of their credit arrangements. But the absence of sophisticated credit instruments put a real limit on the creation of money by credit—a limit much broader, indeed, than an uncritical acceptance of Finley's claim would have led us to believe, but still much more restricted than what we take for granted today.³⁸

The fact that credit was much less sophisticated also meant that its most professional practitioners, the banks, never dominated the Greek financial world as banks and brokers dominate the modern. Businessmen rarely, and states apparently never, borrowed from banks.³⁹ Private lenders, friends, and family seem to have provided a much more sizeable proportion of the available credit than they do today⁴⁰ (although we have to be cautious in this statement, not only because professional bankers—like all professionals—are underrepresented in our ancient sources,⁴¹ but also because private lenders—like all private individuals—are heavily underrepresented in modern economic statistics). That bankers and businessmen did not dominate Greek public policy, as Cornford imagined they had,⁴² was due not only to Greek class prejudice, but also to the much more limited resources Greek bankers and businessmen could command.⁴³

³⁸ For one of innumerable examples, we may take the modern practice of mortgage bundling: a bank that has issued, shall we say, a thousand mortgages for varying sums may treat them all as a 'bundle' of which it can sell shares: other financial institutions buy 'shares' of the bundle—thus financing the mortgages—and get corresponding shares of the mortgage payments as they come in. There is no evidence for any ancient bank performing at this level of abstraction, treating loans as a commodity that could be bundled and sold, and it is hard to imagine one doing so.

³⁹ Migeotte, *L'Emprunt* [n. 33], 363–77, cf. 308–9; Duncan-Jones, *Money* [n. 33], 3.

⁴⁰ Millett, *Lending* [n. 33], 127–217.

⁴¹ Schaps, *IC* [n. 9], 241–6.

⁴² F. M. Cornford, *Thucydides Mythistoricus* (London, 1907), 15–24.

⁴³ In Rome, the elite managed much vaster sums, and the *publicani* indeed became a political factor to be reckoned with, despite class and even legal prejudice much

Another consequence of the Greek attitude towards money was the rarity of token currency. Throughout the history of coinage two contradictory concepts have competed with each other. According to one concept, a coin is a piece of precious metal whose value is essentially equivalent to the value of the bullion from which it was made, and the stamp on its face is merely a guarantee that it has (or had when minted) a particular weight and purity. According to another, a coin is a token whose value depends entirely on people's willingness to accept it in exchange for other items. Its weight and fineness are of no intrinsic interest, except for the fact that if a coin is too valuable people will be tempted to melt it down for bullion. In times of stability—and we have been living in a time of exceptional stability—the second, 'token' concept dominates; in times when the very existence of states is in danger, the first, 'bullion' concept comes to the fore, since the bullion value of a coin can be counted on even if the issuing state should go under.

The ancient Greeks were not unaware of the possibility of issuing coins that had only a token value. They did so in times of emergency—most famously, the Athenians after the Sicilian catastrophe—and the Ptolemies did so as a regular practice, though they also minted gold and silver coinage for foreign trade.⁴⁴ The more striking is the long time it took for token coinage to be widely accepted in Greece.⁴⁵ I have suggested⁴⁶ that it was political fragmentation that made it unappealing—no Greek state ruled over a large enough territory to

stronger than anything that is ever attested in Greece: E. Badian, *Publicans and Sinners* (Oxford, 1972), 67–118, cf. Andreau, *Banking* [n. 33], 9–29, 100–11, 127–38.

⁴⁴ Ar. *Frogs* 718–37; O. Mørkholm, *Early Hellenistic Coinage* (Cambridge, 1991), 4–5, 63–7, 105–8; von Reden, 'Money and Coinage' [n. 35]. The bronze currency was significantly heavier than ordinary Greek coins, 'comme si l'on avait voulu donner à ces pièces une valeur nominale approchant de celle de leur poids de cuivre': C. Préaux, *L'Économie royale des Lagides* (Brussels, 1939), 276. Even when Greeks minted fiduciary currency, they did so at first, it would seem, with a bad conscience.

⁴⁵ Even the earliest coins may have been fiduciary to some extent, if, as has been asserted (R. B. Wallace, 'The Origin of Electrum Coinage', *AJA* 91 (1987), 393; Seaford, *Money* (n. 20), 145–6), they circulated above their bullion value; but this is not certain, and the normal mark-up, if any, was not large. Coins of the classical period, even in small *poleis*, were regularly made of silver, even when, as was often the case, production was limited. It was only from the second half of the second century, when the Ptolemies had shown the way and when hegemony and a good deal of wealth had passed to Rome, that Greek civic coinage became overwhelmingly token coinage.

⁴⁶ Schaps, *IC* [n. 9], 30–1.

make it able to ignore the problems that would arise if its coins were valueless beyond its borders—but many states issued so few coins that this consideration cannot have been a weighty one, and other factors must have come into play.

The things we have learned from the anthropologists—economies managed by reciprocity and redistribution, special-purpose money, credit independent of the profit motive and even of money, and most importantly, the embedding of the economy in the social system—existed in ancient Greece, but they were not the dominant factors organizing the economy. The things we have learned from the economists—inflation and deflation, the integration of markets, the creation of money through credit, and even, Finley to the contrary, the influence of business-produced wealth on the state—also existed in Greece, but they were on a scale much more modest than that known to us, and there is a point at which quantitative differences become qualitative differences: phenomena that were restricted, rare, or difficult become secondary factors where in other circumstances they might be dominant.

Sometimes, as I am walking in the street, I see on the ground something that looks like money. On closer examination it may turn out to be an advertisement, or a button, or a wad of chewing gum. I have now been spending more than two decades—more of my life than I ever intended to devote to such a topic—studying the money of the ancient Greeks. I would have liked to believe that my insights, along with those of others in the field, had revealed an utterly new truth of which earlier scholars had been unaware, and I am disappointed that this is not the case, but I do not think anything is to be gained by pretending otherwise. I do think that we have learned a lot more about the details of what money and coinage meant to the Greeks and Romans and how they worked. But in the end, no matter how carefully I look at the money of ancient Greece and Rome, I do not see a cowrie shell, nor a token of an embedded transaction, nor a transient marker in a vast system of credits and debits. I think I know much better than I used to what a coin is, but after more than twenty years of looking at Greek money, I still see a coin.

3

Money and Tragedy

Richard Seaford

In the sixth century BC the advanced Greek city-states were rapidly and pervasively monetized, largely through the introduction of coinage. The cultural consequences of this historically unprecedented development have been almost entirely ignored. I have in several recent publications¹ suggested that this monetization was a crucial factor in the genesis and in the preoccupations both of Presocratic philosophy and of Athenian tragedy. This chapter takes the argument about tragedy a step further,² but only by means of a sketch that may be confirmed, modified, or abandoned as a result of further research. I will relate the monetization of Athens first to the development of polis festivals under the tyrants and then to the form and content of tragedy, which came into being in a polis festival of Dionysos.

1. THE RESOURCING OF FESTIVALS

Tragedy came into being—and continued to be performed—in a festival of the Athenian polis. How did the Greeks resource their communal festivals? There are various possible modes.

My thanks go to Robert Parker for his comments on an earlier draft.

¹ Especially the following: ‘Tragic Money’, *JHS* 118 (1998), 19–39; ‘Dionysos, Money, and Drama’, *Arion* 11. 2 (2003), 1–19; *Money and the Early Greek Mind* (Cambridge, 2004); ‘Monetisation, Ritual, and the Genesis of Tragedy’, in D. Yatromanolakis and P. Roilos (eds.), *Greek Ritual Poetics* (Cambridge, Mass., 2004), 71–93.

² In order to do so I will have to reproduce some of the evidence presented in my earlier publications.

- (a) One is a function of the kind of command economy (more specifically 'redistributive' economy) such as we find in the ancient Near East. In Greece this may have obtained in the Bronze Age, but is not found in the polis of the archaic and classical periods.
- (b) Another is the provision by state, ruler, or sanctuaries of their own goods (herds of sacrificial animals etc.). This form of ownership is not common in the polis.
- (c) Another is the practice of individuals bringing contributions, of food etc., to the same place at the same time. Not being coordinated from a centre, this depends on word of mouth and on tradition, but also on the cycle of nature and of agriculture (the new moon, spring flowers, the harvest, etc.).
- (d) Finally, money may be used (by a central authority, sanctuary, or wealthy individuals) to purchase what is required, notably numerous sacrificial animals.

Of our four modes the only one involving *exchange* is (d). Another conceivable mode is (e) the organizing body or person providing what is needed by means of *barter*, but this would be extremely cumbersome and unreliable, and I know of no evidence for it. But simultaneous procurement of numerous animals etc. by exchange does become feasible with monetization, as (d). Of course two or more modes may coexist in a single festival.

Now for some actual festivals. We begin with the premonetary (and largely pre-state) society described by Homer, in which we find two sacrificial feasts for a whole community. At Pylos there are on the beach nine groups, each of 500 men with nine bulls (*Od.* 3. 5–8), and on Ithaka heralds drive bulls through the town for a public feast of Apollo of the New Moon (*Od.* 20. 276–7). But in neither case are we told whence or how the bulls are procured (in contrast to the orders given by Nestor at *Od.* 3. 421–6 for procuring the bull for his household sacrifice). If these descriptions are inspired (if only remotely) by actual public festivals, then in those actual festivals mode (c) probably predominated, but there may also be a distant memory of (a).

As for the polis, the festivals that we know most about are Athenian of the classical period. We begin with an instance of the (unusual) presence of mode (b). This is the elaborate procedure—reported in

ch. 60 of the *Ath. Pol.* (Aristotelian *Constitution of the Athenians*) for providing the olive oil awarded (in amphoras) as prizes at the Athenian Great Panathenaia. The magistrate collects the oil from the owners of the fields containing the sacred olive-trees, three half-*kotylai* from each tree. He then hands over—to the state *tamiai* (stewards or treasurers) on the Acropolis—all the oil accruing in his year of office, and he cannot proceed to be a member of the Areopagus until he has handed over the full amount. The *tamiai* keep the oil on the Acropolis, but at the Panathenaia they measure it out to the commissioners of the games (*athlothetai*), who in turn measure it out to the victors.³

But prizes of oil from the sacred olive trees are a special case, and represent only one element of the expenses of the Panathenaia. Where we know something about the resourcing of Athenian festivals, we find that in general either (c) or (d) seems to predominate.

An example of the apparent predominance of mode (c) is the Athenian Diasia, held just outside the city every spring. There is evidence for some meat being provided by demes, for private hospitality, and for offerings of cakes in the form of animals. But although people attended the festival *pandēmei* (*en masse*) (Thuc. 1. 126. 6), there is no evidence that anything was provided by the polis.⁴

Another example of a festival in which mode (c) seems to predominate is the Anthesteria, at which the new wine was opened and drunk. 'The Athenians bring the new wine' to the temple of Dionysos, according to Phanodemos (a fourth-century BC Athenian, 325 *FGrH* F12). Here again, there does not seem to be any substantial contribution by the state.⁵ The name 'Anthesteria' derives from the Greek word for flower. The date of the festival may have been determined (originally, at least) by the appearance of the first shoots of blossom in spring, which was thought a good time to open the new wine.

³ It is also stated that earlier the polis used to sell the fruit: this has been taken to mean that the polis sold what was surplus to the requirements of the Panathenaia, or that the right to collect the oil was farmed like a tax; see P. J. Rhodes, *A Commentary on the Aristotelian Athenaion Politeia* (Oxford, 1981).

⁴ R. Parker, *Athenian Religion: A History* (Oxford, 1996), 77–8, with refs.

⁵ Robert Parker points out to me that, besides the absence of any surviving evidence of contribution, the Lycurgan skin-sale record (*IG* ii². 1496) does not include the Anthesteria. And note V. J. Rosivach, *The System of Pubic Sacrifice in Fourth-Century Athens* (Atlanta, Ga., 1994), 61.

Thucydides (2. 15. 4) describes the Anthesteria as ‘the more ancient’ Dionysia. The City Dionysia seems to have been the newest.⁶ In general mode (c) must be older than mode (d). The earliest evidence for Greek money comes from the time around 600 BC, for instance in the sums specified as compensation for injury (or fines) in the legislation of Solon.⁷ To Solon the Athenians also attributed a calendar of sacrifices, fragments of which survive. Robert Parker has argued in detail for assigning the calendar to the sixth century BC, if not to Solon himself, and that ‘a prime function of the sixth-century code was surely to define what monies of the Athenian people were to be expended on what gods’.⁸ It is generally recognized that the public inscription of a calendar of sacrifices may have been a significant step in the development of polis religion: authoritative public definition helps to coordinate participation, even though some of the feasts in the calendar were ‘on no fixed day’ (perhaps because agricultural). What has not been recognized is the potential contribution made to the development of complex large-scale festivals by their monetization.

Mode (c) depends on the collective memory of tradition prompted by the progress of seasons and of agriculture, and is therefore unlikely to become more complex. Mode (b), being centralized, is in principle more flexible, and may have been introduced for the Panathenaic oil prizes (albeit, I suspect, as a traditional practice) in the sixth century. But most flexible is mode (d), which combines centralized control with the use of money: the officials of the polis had available (in sanctuaries) imperishable precious metal that was easy to collect, store, guard, and transport, and was moreover attractive throughout the year—even in small quantities—to all the providers of the various goods (including animals) and services required for a complex urban festival. With money, a large variety of goods and services can be assembled simultaneously by the same kind of simple transaction. Central control is best able to manage the complexity that may result from innovation, and is strengthened by its use of money.⁹ The unprecedented power of money transcends the traditionality of occasion, and may even seem to transcend the cycle of nature. This

⁶ *Ath. Pol.* 56. 5 with 3. 3. and 57. 1.

⁷ Seaford, *MEG* 88–95.

⁸ Parker, *Athenian Religion* [n. 4], 43–55.

⁹ As well as contributing to the development of sacrificial feasts, monetization may also itself have been promoted by them : Seaford, *MEG* 109–15.

advantage of money obtains even with management and funding devolved on to wealthy individuals (liturgies). This saves the state money, and may for some events have organizational advantages.

For mode (*d*) we have for classical Athens much literary and inscriptional evidence, most of it collected and discussed by Rosivach.¹⁰ For instance, 5,114 drachmas were spent on the hecatomb at the Greater Panathenaia of 410/9 BC.¹¹ Rosivach argues that the purchase of large numbers of oxen for polis festivals involved much greater complexity and unpredictability (and variation in price) than the purchase (probably from 'closed markets') of the smaller animals generally sacrificed at deme festivals. A group of state officials was called 'ox-buyers', *boōnai*.

As for the City Dionysia, Rosivach estimates that in 334/3 BC at least eighty-one oxen were sacrificed. Other elements of this festival were financed largely by the money of wealthy individuals—the choruses by the *chorēgoi* (see sect. 5) and the procession at one time by the *epimelētai* (*Ath. Pol.* 56. 4, adding that they now receive 100 minas for it). The archaic (*c*) is perhaps symbolically acknowledged in the practice of citizens carrying wineskins in the procession.¹²

In the literary sources a distinction is made between 'traditional sacrifices' (*patrioi thusiai*) and 'additional festivals' (*epithetoi heortai*).¹³ The former were on the whole funded by rents from sacred property, the latter from general taxation. It was the latter that tended to be administered by state officials 'in place of closed priestly corporations . . . with large numbers of victims sacrificed so that their meat could be distributed to the citizen populace at large, and not merely to a chosen few'.¹⁴ This distinction does not correspond to our distinction between (*c*) and (*d*), because traditional sacrifices could involve either (*c*) or (*d*). But it does tell us that those festivals for all citizens that were funded through the financial apparatus of the state, like the Panathenaia and (to a large extent) the City Dionysia, were envisaged as 'added', i.e. more recent than the 'traditional sacrifices'. Isocrates praises the good old days when many

¹⁰ See n. 5. ¹¹ *IG* i³ 375. 7; Rosivach, *System* [n. 5].

¹² *Suda*, s.v. *askophorein*, which probably refers to the City Dionysia.

¹³ Isocrates, *Areop.* 29, 52; *Ath. Pol.* 3. 3; Lysias 30. 19.

¹⁴ Rosivach, *System* [n. 5], 5. Cf. the reservations of Robert Parker in his review in *JHS* 106 (1996), 222.

citizens chose to remain in the countryside, using their own private goods, rather than to come to town for communally funded festivals (*Areop.* 52).

2. FESTIVALS AND TYRANTS

The Athenian tyrants, according to Thucydides (6. 54. 5), ‘while taxing the Athenians at only five per cent, adorned their city beautifully and carried out the wars and sacrificed in the temples (*es ta hiera ethuon*)’. This implies that the tyrants used money to procure sacrificial victims, and probably also other things needed for public festivals. The tyrants also had available to them money from other city-states (Hdt. 1. 61) and from Thrace (*Ath. Pol.* 15. 2; Hdt. 1. 64), and it is likely that coinage—an especially efficient and pervasive form of money—was introduced into Attica under their rule.

Thucydides goes on to say that ‘in other respects, the city went on using its existing laws’. In their use of money for public festivals, the tyrants may well have been using the pre-existing arrangements for procurement, with the important difference that—to judge from the report by Thucydides—the sacrifices now were thought of as *provided by the tyrants themselves*. Sacrificial victims are in Homer sometimes provided by rulers for an inner group, but the tyrants did it for public festivals,¹⁵ by means of money, and presumably through the state apparatus. Money may give power of an unprecedented kind to its individual possessor.

The tyrants controlled—and may have lived on—the Acropolis, which contained much public wealth, notably in the temple of Athena. The ‘treasurers of Athena’ were regulated in a law ascribed to Solon (*Ath. Pol.* 8. 1; 47. 1), and appear already in sixth-century inscriptions.¹⁶ It was to the Acropolis that Peisistratus was escorted in a chariot by a girl dressed as Athena (Hdt. 1. 60). This trick to secure power surely evoked the festival procession escorting the triumphal

¹⁵ The largest feast in Homer provided by an individual is the one provided by Alkinoos (though not for the whole community) in the fabulous kingdom of Phaeacia (*Od.* 8. 59–61).

¹⁶ Parker, *Athenian Religion* [n. 4], 79.

arrival of a deity into Athens. Festivals and sacrifices are often associated with tyrannical coups. For instance, Kylon was told by the Delphic oracle to seize the Athenian Acropolis during the great festival of Zeus.¹⁷

A procession for Athena was also the occasion for the murder of Hipparchus, which led to the downfall of his brother the tyrant Hippias (Peisistratus' son) by making him harsher. Hipparchus had been rejected as a lover by Harmodius, whose sister he then invited to bear a basket in a festival procession and then rejected her as unworthy. In response to this insult, Harmodius and his lover Aristogeiton planned a coup at the Panathenaia, but succeeded only in killing Hipparchus. It is noteworthy that in the accounts of Thucydides and the *Ath. Pol.*, though they differ in details, the tyrannical family not only has the power to decide who participates in processions but is actively engaged in sending off and receiving the Panathenaic procession, and in arranging its component parts (*hekasta*).¹⁸

The Panathenaia was reshaped in the second quarter of the sixth century, notably by the establishment of the Greater Panathenaia held every fourth year with athletic and musical contests. The later introduction of rhapsodic recitations of Homeric epic was attributed to Peisistratus or his son Hipparchus.¹⁹ The other great civic festival in the fifth century was the newest Dionysiac festival, the City Dionysia; and this too had been reshaped in the sixth century (probably towards its end), to accommodate performances of dithyramb and tragedy. The specification 'City [*en astei*, "in the town"] Dionysia' distinguished it from more rural Dionysiac celebrations (especially the Dionysia *kat' agrous*, 'in the fields'). Both festivals are, unlike most Athenian festivals, named after a deity rather than an activity or a place; and both are devoted to (pan-Hellenic) display, rather than to promotion or celebration of the fertility of nature.

The sixth-century development of these festivals may well have been facilitated by the use of money. Our concern is specifically with the establishment of *performances*.

¹⁷ Thuc. 1. 126; other examples: Seaford, 'Tragic Tyranny', in K. Morgan (ed.), *Popular Tyranny* (Austin, Tex., 2003), 97–8.

¹⁸ Thuc. 1. 20; 6. 56, 57; *Ath. Pol.* 18. Idomeneus (c.325–c.270 BC) reports (for what it is worth) that Hippias and Hipparchus devised (*heurein*) festivities and revels.

¹⁹ Esp. Ps.- Pl. *Hipparchos* 228b; Lyk. *Leokr.* 102; Isocr. *Paneg.* 159.

3. PERFORMANCE

Cash prizes for rhapsodes at the Panathenaia are mentioned in Plato's dialogue between Socrates and Ion,²⁰ and in an early fourth-century inscription the cash prizes for musical contests in general are considerable.²¹ In the democracy dramatic and dithyrambic poets, and perhaps also actors, were paid by the state.²² Isocrates (*Ant.* 166) states, no doubt with exaggeration, that the Athenians gave Pindar a reward of 10,000 drachmas.

As for the tyrants, we have no direct evidence of their giving money to the rhapsodes at the Panathenaia. But Hipparchus invited various poets to Athens, including Simonides and Anakreon.²³ Simonides he persuaded 'by large payments and gifts' (Ps.-Pl. *Hipparchus* 228c), an expression incidentally which nicely embodies the transitional ambiguity between reciprocal and monetary relations. Simonides, who performed in the dithyrambic competitions at Athens, was said to be the first poet to perform *epinikia* for a wage, and to be over-fond of money.²⁴ Anakreon also spent time with the tyrant Polykrates on Samos, who took the famous doctor Demokedes away from Athens by offering him more money (Hdt. 3. 131). This is an era in which skilled professionals move from place to place to earn money. An early instance, in the time of Periander of Corinth, was the poet Arion's tour of Italy and Sicily, on which he 'earned much money' (Hdt. 1. 24). Simonides was remarkable for the number of his clients—individual athletes, tyrants, cities, dynasts—in Italy, Sicily, Thessaly, Corinth, and elsewhere. And like his younger contemporaries Pindar and Bacchylides, Simonides was remarkable also for the number of *genres* in which he produced poetry. When Pindar writes (*Isthm.* 2. 6–8) that 'the Muse was then not avaricious nor a working girl (*ergatis*). Nor were sweet songs with silvered faces sold...', the metaphor of prostitution implies not only the recent commodification of song but also the concomitant promiscuity.²⁵ As

²⁰ Pl. *Ion* 535e4–6. ²¹ IG ii². 2311.

²² P. J. Wilson, *The Athenian Institution of Khoregia* (Cambridge, 2000), 64–5, 85–6.

²³ *Ath. Pol.* 18; Ps.-Pl. *Hipparchos* 228c.

²⁴ Xenophanes fr. 21; Aristoph. *Peace* 698–9.

²⁵ On money as promiscuous see Seaford, *MEG* 155–7.

he writes elsewhere (*Pyth.* 11. 41–4), ‘Muse, it is your task, if you have contracted to provide your voice silvered for a wage, to set it in motion at different times in different ways’.

The world described by Homer provides us with one model for the functioning of choral song. We hear of four kinds of choral song: the paian, the Linos song, the wedding song, and the lament.²⁶ These are not songs composed by individuals, but traditional songs appropriate for specific occasions: plague and warfare, the grape harvest, wedding, and funeral. This is not to say that the society in which Homeric epic was created knew only these kinds of choral song. But the traditional choral song sung on specific occasions is a widespread phenomenon in preliterate cultures. Choral song as mentioned in Homer is in a broad sense *functional*. It belongs to a ritual that achieves a transition (wedding, funeral), or it persuades Apollo to grant release from plague, or celebrates a victory (paian), or it accompanies the work of the grape harvest (perhaps celebrating the dying vegetation deity Linos).

The choral poetry known to us from the seventh and sixth centuries is, by contrast, for the most part not anonymous. The extent to which it is nevertheless in a broad sense functional (for instance written for—or as if for—ritualized occasions) is not an issue that I can deal with here. I focus rather on a passage that reflects the *reform* of a traditional choral genre by an individual poet (also composer and performer). Arion was, according to Herodotus, ‘the first person we know of to compose and name and teach a dithyramb, in Corinth’, where he spent a long time with the tyrant Periander (1. 23). The dithyramb was certainly much older than Arion, whose achievement was probably to replace a traditional, anonymous song with his own more formal composition.²⁷

This passage has been much discussed. What I propose is to see it historically, in the light of what Herodotus says next—that Arion earned a lot of money on his tour to Italy and Sicily. It was also money, no doubt, that brought Arion from his native Lesbos to the wealthy tyrant Periander. Money, as we have seen, promoted

²⁶ *Iliad* 1. 472–4; 18. 569–73, 493–5 (cf. *Od.* 23. 144–9); 22. 391; 24. 720–2. Note also the hint of a *partheneion* at *Od.* 6. 101–2. Group *dancing* is described at esp. *Iliad* 18. 590–606 (on 604–6 see M. W. Edwards, *The Iliad, a Commentary. Books 17–20* (Cambridge, 1991)); *Odyssey* 8. 262–4.

²⁷ See also *Suda* s.v. Arion.

the mobility of people like Arion. But this mobility has consequences for traditions of performance. The pan-Hellenic virtuosity for which the tyrant pays good money is employed for the embellishment of a local performance tradition. Arion was probably versed in the dithyrambic tradition on Lesbos. What he composes at Corinth is not the dithyramb of a particular local tradition, but a dithyramb or dithyrambs performable in more than one locality. Because a Corinthian dithyramb by Arion is not local, it would—for the first time, as Herodotus says—have a ‘name’ (i.e. a title) and be ‘taught’. Moreover, money can also enhance other aspects of the performance, such as costumes. The function of the performance is modified in the direction of *display*. Monetization tends to detach performance from its earlier functional (notably ritual) context.

But what was the function of the dithyramb? It was early in its history a processional hymn to escort Dionysos into a community. It was subsequently transformed into a static hymn that, though still performed in a festival of Dionysos, acquired non-Dionysiac themes. This has been sufficiently discussed elsewhere.²⁸ I propose to add a new perspective. A choral song escorting Dionysos into town is for two reasons well suited to lose its specific function, to develop into mere praise of the god as a first step to acquiring apparently unlimited variety of content. One reason is that its function is relatively unspecific. A wedding song cannot retain its identity if it no longer refers to a wedding, and the same point applies to lament, epinikian, and so on. But the dithyramb was able to retain its identity, or at least as much identity as inhered in its name, despite losing the function of riotously escorting the god into town. It retains its identity even when performed at Athens, in a Dionysiac festival but no longer on a Dionysiac theme, in a competition with nine other dithyrambs. The second reason is that this riotous escort is a very public event, the initial act of a festival in which the whole community participates. It does therefore present an exceptional opportunity for spending money on *display*.

The early dithyramb was very likely to have been performed sometimes by men dressed as satyrs. An extant song (or part of a

²⁸ The most important recent contribution is A. D’Angour, ‘How the Dithyramb Got Its Shape’, *Classical Quarterly* 47 (1997), 331–51.

song) attributed to Pratinas, who was said to have been the first writer of satyr-plays, was almost certainly sung by a chorus of satyrs.²⁹ It employs a hyperbolic form of the dithyrambic linguistic style to incite violence against the pipe (*aulos*), and includes the words ‘Mine, mine is Bromios (Dionysos) . . . Let the *aulos* be second in the dance, for it is a subordinate.’

Athenaios (617bc), who quotes the song, preserves information about its context: when the dancing-places were being occupied by pay-receiving (*misthophoroi*) pipe-players and chorus-members, the choruses began to accompany the pipe-players (rather than the reverse, as had obtained before), and Pratinas was indignant at this new domination by the pipe-players.

Here then is evidence of tension introduced by the monetization of performance into the performance itself—tension between on the one hand the amateur participants in a traditionally riotous celebration associated with the periphery (‘it is my task to rush over the mountains with Naiads, sing the satyrs), and on the other hand the use of money to control the performance by hiring urban professional soloists and even whole new (more subordinate) choruses.

Much later, in Euripides’ *Cyclops*, the chorus of satyrs sing of their loss of Dionysos and of roaming with Nymphs on the mountainside, now that they are slaves of Polyphemos (63–75), who bans their Dionysiac music and dance (203–5). To judge from the meagre remains of satyric drama, the satyrs, who do not understand money, were frequently the captives of an individual who was at least sometimes represented as wealthy (as indeed Polyphemos is in Euripides, in contrast to Homer).³⁰ And so it is interesting that in Pratinas’ song—the earliest surviving song sung by a chorus of satyrs (probably from an early satyr-play)—they assert their Dionysiac identity in the face of a hired oppressor (the pipe-player). We may well imagine that in general the power obtained by a paid individual over a traditional chorus (and not only of satyrs) created tension between the chorus and the individual, especially as the individual might be choreographer and performer as well as composer, and

²⁹ Seaford, ‘The “Hyporchema” of Pratinas’, *Maia* 29 (1987–8), 81–94. Note also Wilson, *Athenian Institution* [n. 22], 336 n. 85.

³⁰ Seaford, ‘Dionysos, Money’ [n. 1].

might even be an outsider, such as Pratinas (from Phleious) and numerous dithyrambists at the City Dionysia, and Arion at Corinth.

I have suggested that monetization tends to detach performance from functional (especially ritual) context. But performance may move away from its ritual function while retaining some of its identity as ritual. For instance, the quasi-festal procession enacted by Peisistratus (mentioned above) had the function not of a normal festal procession but of ensuring Peisistratus' return to Athens. More outrageously, Peisistratus' son Hipparchus used his control of public ritual to insult an enemy by rejecting his sister from a procession. In general, indeed, tyrants had the reputation of using and abusing public ritual for their own ends. To select one example from many, Herodotus reports that when the women of Corinth come to the temple of Hera 'as if for a festival' Periander strips them of their clothes.³¹

It is from this perspective that we should see the famous passage of Herodotus (5. 67) about Kleisthenes, tyrant of Sikyon in the first quarter of the sixth century: being hostile to the Argives, he transferred the tragic choruses from the Argive hero Adrastus to Dionysos, and the rest of Adrastus' cult to the hero Melanippus. I am not concerned here with the question of what exactly—at this early date—the 'tragic choruses' were, but rather to note that they were a performance *deliberately detached from its traditional ritual context* for political reasons by a tyrant who had large amounts (Hdt. 6. 130) of precious metal money.

In the newly and rapidly monetized city-state the political power of money—to coordinate the activities of the moneyless—enhanced the centralization of the state, but might also be owned by a single individual, who could as 'tyrant' usurp the centralized state. Such an individual, in order to obtain or maintain tyranny, would be inclined to manipulate the *traditional* means of expressing the coordination of the community, namely public ritual. And so tyrants use their monetized power to detach public ritual from its traditional functional context, whether directly in a power struggle or for the purposes of display.

³¹ Hdt. 5. 92 g. Other examples: Seaford, 'Tragic Tyranny' [n. 17], 97–8.

4. TRAGEDY

In the Athenian democracy of the fifth and fourth centuries BC the actors and poets of tragedy were paid by the polis, whereas the responsibility for arranging and financing the tragic chorus (pay, training, costumes) was assigned to a wealthy individual, the *chorēgos*. The *chorēgia* also financed dithyrambic and comic choruses, and was one of a series of liturgies that included the provision of warships. We hear (especially in Lysias 21) of the large sums of money spent by a *chorēgos*, for example 3,000 drachmas on a tragic chorus. A glimpse allowed us into the workings of the *chorēgia* reveals the advantage of money: one of the overseers appointed by the *chorēgos* is assigned the task of ‘buying and spending whatever the poet or any of these other men (the other overseers) told him’ (Antiphon 6. 13).

We do not know when exactly the tragic competitions were established at Athens. It may have been as late as the last decade of the sixth century, and they may even have been established by the nascent democracy. But tragedy was surely not simply invented at this time: some development must have occurred the second half of the sixth century BC. How—in that period—were choral performances financed? The only information that we have is from a late fourth-century text, the pseudo-Aristotelian *Economica* (1347a), which states that the tyrant Hippias allowed people to commute liturgies (including the *chorēgia*) for a moderate sum (and nevertheless to be enrolled as liturgists). Although much (not all) in this text is clearly fabricated, it is argued by Peter Wilson, in his magisterial account of the *chorēgia*, that ‘it is not inconceivable that a memory of ancient practice should be preserved here in a form heavily coloured by contemporary arrangements’.³² We may add that there are general considerations, discussed above, that make it likely that Hippias would be interested in precisely this kind of measure. And a consequence of the measure would be more effective coordination of increasing sums spent on more elaborate and spectacular choral performances.

³² *Athenian Institution* [n. 22], 15.

The earliest occurrence of the word *chorēgos*, in Alkman's *Parthenion*,³³ exemplifies the authority of the 'chorus-leader', who, sing the chorus, 'does not allow me to praise or blame her in any way at all'. With the differentiation of the functions of (a) overall (especially financial) control of the chorus and (b) controlling it from within the performance, the idea of leadership or authority inherent in the word *chorēgos* is inherited by (a)—the Athenian *chorēgos*, who has overall control as well as making 'paradramatic' public appearances.³⁴ Such differentiation is likely to have been promoted by the sixth-century monetization and formalization of traditional choral performances, so that for instance Hippias may have been imagined as *chorēgos* by virtue of exercising overall control of choruses (just as he did of the Panathenaic procession).³⁵ After the democratic revolution the advantages of individual responsibility for a chorus were retained—without the danger of a single individual sponsoring the entire festival—by giving (or restoring?) responsibility to several *chorēgoi*, to each of whom the elected magistrate 'gives' a chorus, thereby expressing the primacy of the polis. Nevertheless, Wilson detects a 'degree of ideological continuity between the pre- and post-democratic organisation of drama', and proposes an analogy between the *chorēgos* and the tragic individual in their relation to the community.³⁶

Aristotle (*Poetics* 4) tells us that tragedy developed from the leaders of the *dithyramb* and from the *saturikon* ('satyr-play-like'), and that in this development it became more solemn. I suggest that a factor in this solemnization was the disciplining—by a paid poet-composer, in an increasingly urban environment—of traditional and previously unruly choral performances. As an example of the tension in this process we have seen Pratinas' dithyrambic song performed by a chorus of satyrs in the earliest period of drama (in this case, to be sure, the oppressive individual is not composer but paid pipe-player; but this is the only song that happens to have survived from this milieu, preserved by ancient musical theory).

³³ In its Doric form: *Poetae Melici Graeci* 1. 44.

³⁴ Wilson, *Athenian Institution* [n. 22], 136.

³⁵ If Peisistratus was visually identified with Dionysos (as reported at Athenaios 12. 44), this may have expressed his claim to lead the chorus, or at least to preside over the festival. Cf. Eur. *Bacch.* 319–20, and subsequent autocrats identified with Dionysos.

³⁶ Wilson, *Athenian Institution* [n. 22], 109–10, 150–1, 194–7.

The solemnization contains the tension between individual and chorus. I suggest that this tension was a factor in the development of the kind of tension between powerful individual and relatively weak chorus that we find frequently in satyric drama but also in the only surviving tragedy on a Dionysiac theme, Euripides' *Bacchae*, which I regard as in various respects prototypical of tragedy. Indeed the powerful but isolated individual and the weak or marginal chorus are both features of tragedy as a whole.

It may seem odd that tension between the chorus and the individual who controls it should give rise to a tradition of representing tension between figures of *myth*—such as between Pentheus and Dionysos' thiasos of maenads, or between Polyphemos and the thiasos of satyrs. But the aetiological myths of Dionysiac festivals that tell of Dionysos being at first rejected³⁷ may well be—in part—the mythical representation of an erstwhile actual tension between a popular festival and political authority. The processional entry of Dionysos, accompanied by the dithyramb, was envisaged as re-enacting a triumph over initial opposition. Any subsequent tension between thiasos and powerful individual would also naturally be imagined as involving Dionysos himself—as indeed occurs in Pratinas' song.

One precondition of the development of the dithyramb into drama was its transformation from a processional into a static song. Another was that the mythical opposition to Dionysos became focused in a single individual, with the result that the dithyramb had not just one (Dionysos) but two individual leaders opposed to each other, thereby allowing agonistic dialogue and action independent of the chorus as well as between the chorus and the antagonistic individual. I suggest that a factor in this crucial focusing of the opposition in a single individual was the disciplining of Dionysiac choral performances consequent on sixth-century monetization of cult. I also suggest that this single individual came to be represented, in or during the democratic revolution, as the man who had exercised overall control over the Dionysiac choral performance, the tyrant. The shared identity of chorus leader and overall controller is, we have seen, implied in the history of the word *chorēgos*.

³⁷ e.g. (for the City Dionysia) Schol. Ar. *Ach.* 242.

The earliest stage of tragedy is encapsulated in the *Bacchae*, in which the processional dithyrambic entry-song brings Dionysos (as *exarchos* of the chorus, 141) to the house of the ‘tyrant’ (*turannos*) Pentheus, who opposes his cult as licentious (225, 240, etc.). In doing so Pentheus displays an excessive preoccupation with money used to pay for cult. He accuses the seer Teiresias of wanting to make money out of introducing the cult of Dionysos (257), and when—at the turning-point of the play—he is offered a sight of the maenads, he replies that he would give very much money for it (812).³⁸

The understanding of Athenian tragedy has long been impeded by such concepts as ‘fate’ and ‘hero’. In fact the word *hero* occurs only once³⁹ in the extant tragedies, whereas *turannos* and its cognates occur over 170 times. All extant tragedy derives from the democracy, a period in which the Athenian polis expressed its detestation of tyranny in numerous ways that included the annual proclamation, at the City Dionysia, of a reward for killing any of the tyrants.⁴⁰ The three characteristics of tyrants in historical and philosophical texts (Herodotus, Plato, Xenophon, etc.) are frequent in tragedy: these are preoccupation with money, the killing of kin, and the abuse of ritual. The unprecedented isolation of the tragic tyrant—from his own kin and from the gods—expresses the historically unprecedented autonomous power conferred by money on the individual who possesses it. I have demonstrated this in detail elsewhere, as part of a reinterpretation of tragedy from a historical perspective. What I add here is the argument that the genesis of tragedy and the tragic representation of tyranny are both influenced by the conditions of choral performance inherent in the sixth-century monetization of cult.

It remains to make one further point. The influence I propose is not just on the tyrannical *content* of tragedy, but also on its *form*. This is already implicit in my remarks about individuals and chorus. But more importantly, what especially distinguishes tragedy from all previous genres is that it *imitates a sequence* of distinct rituals (or elements of rituals). Euripides’ *Hippolytus*—to take an illustrative example almost

³⁸ For further examples of the tyrannical synthesis of money and ritual in tragedy see Seaford, ‘Tragic Money’ [n. 1].

³⁹ At Aesch. *Ag.* 516, of the dead, and in the plural.

⁴⁰ Seaford, ‘The Social Function of Attic Tragedy: A Response to Jasper Griffin’, *Classical Quarterly* 50 (2000), 34–5.

at random—moves through hymn, offering, supplication, wedding-song, lamentation, and *propemptikon*. Such a sequence, within a single performance, was more distinctive than that it seems to us now, especially given the likelihood that bodily movements, (sometimes) attire, accoutrements, words, and music all conspired to evoke in the audience memories of the same rituals enacted in real life.

This too I have demonstrated in detail elsewhere.⁴¹ But I am now in a position to offer a historical perspective on it. I suggest that the detachment of ritualized performances from their functional context, as I described it in section 4, is a precondition for their imitated coexistence in tragedy, in which the generic promiscuity of the paid Muse (sect. 3) creates a prestigious home. The abuse and perversion of ritual in tragedy derive from communal horror at the abusive control of ritual by historical tyrants. But it was the same control by moneyed tyrants that allowed the *sequential imitation* (peculiar to tragedy) of rituals to emerge from the *enactment* of ritual. Viewed historically, content and form coincide.

⁴¹ 'Monetisation' [n. 1].

Elasticity of the Money Supply at Athens

Edward E. Cohen

Ancient historians, following M. I. Finley's influential assertions, have long insisted that the money supply at Athens (and indeed in the entire ancient world at all times) was essentially inelastic because of its reliance on 'coin' and because of the lack of 'machinery for credit beyond the lending of coins'.¹ Banks could not create 'bank money', because—according to an opinion once universally held—'banks' did not exist at Athens: the Athenian *trapezitēs* was a mere pawnbroker and money-changer. Merchants could not increase the money supply by providing credit to customers since the Greek Law of Sale required full payment of the purchase price to effectuate the sale of a good, thus eliminating the possibility of an increase in the money supply through credit provided by vendors. This prohibition of financing by sellers supposedly mandated the laborious accumulation of hoards of metallic coins by persons seeking to make a purchase (with a consequent removal of currency from circulation). In short, in Finley's words, 'the absence of credit-creating instruments and institutions remains as an unshaken foundation of the ancient economy'.² For Finley, this absence 'of official banknotes or similar fiduciary money [was the] basic condition of ancient business practice and finance', mandating the essentially 'primitive' nature of all ancient economies.³ Reiterated forcefully over the years, this catechism has come to exert a wide influence.⁴

¹ AE 196–7.

² AE 198.

³ AE 196–7.

⁴ Cf. e.g. R. Bogaert, *Banques et banquiers dans les cités grecques* (Leiden, 1968), 328, 354–5, 374–5; J. Rougé, *Recherches sur l'organisation du commerce maritime en*

The dogma, however, is demonstrably untrue. In this chapter, I will show that the money supply in fourth-century Athens was in fact strikingly elastic, since it could be—and was—substantially increased through the provision of credit by merchants and through the banks' creation of non-coin money via deposit accounts and other mechanisms.

1. CONCEPTUALIZATIONS OF 'MONEY' AND 'MONEY SUPPLY'

Conventional modern economic analysis posits two forms of money—often referred to as commodity money and non-commodity (or token) money. Commodity money is invariably a good in scarce supply having inherent utilitarian worth coupled with some limited possibility of expansion of its quantity through trade or production. Thus, commodity money (in Western historical experience principally gold and silver) by definition has intrinsic value but is in relatively inelastic supply.⁵ But fourth-century Attika possessed within its territory substantial reserves of unmined silver, whose exploitation could be accelerated to increase the amount of commodity money in circulation—a

Méditerranée sous l'empire romain (Paris, 1966), 3, chs. 2, 7; S. Humphreys, *Anthropology and the Greeks* (London, 1978), 153 ('the ancient banks lacked the main function of the modern bank, that of creating credit'). With increasing dogmatism, Finley insisted on this orthodoxy over several decades: cf. 'Land, Debt and the Man of Property in Classical Athens', *Political Science Quarterly* 68 (1953), 74 (with reference specifically to classical Athens); 'Multiple Charges on Real Property in Athenian Law', in *Studi in onore di Vincenzo Arangio-Ruiz* (Naples, 1953), iii. 490–1; and the first edition of *AE* (1973), 141–3.

⁵ For the diverse forms of commodity money in antiquity, see Schaps, *IC* chs. 1, 3, and 4; id., review of D. Tandy, *Warriors into Traders: The Power of the Market in Early Greece*, in *Bryn Mawr Classical Review* (1998), 98.11.1; C. Grandjean, 'Introduction', *RN* 157 (2001), 9–13. Cf. Schaps, 'Intervention', in *PPF* 10–11. Modern economists have reached no consensus on the composition of contemporary token money (cf. M1 through M5, PSL1 and various unrelated theoretical agglomerations): see C. Goodhart, *Monetary Theory and Practice* (London, 1984); id., 'The Endogeneity of Money', in *Money, Macroeconomics and Keynes: Essays in Honour of Victoria Chick* (London, 2002), 14–24; M. Belongia, 'Measurement Matters: Recent Results from Monetary Economics Revisited', *Journal of Political Economy* 104 (1996), 1065–83; id. and J. Chalfant, 'The Changing Empirical Definition of Money: Some Estimates from a Model of the Demand for Money Substitutes', *Journal of Political Economy* 96 (1989), 387–97.

somewhat more laborious version of the printing-press used by some inflation-prone jurisdictions today. One fourth-century commentator insisted that Athens could increase its mining of silver exponentially, because its reserves were virtually inexhaustible.⁶ (In fact, mining activity increased substantially during the fourth century, and almost 2,500 years later, silver was still being mined in Attika.)⁷ In contrast, token money lacks intrinsic value and therefore, at least in principle, is always highly elastic because of its negligible cost of production relative to its purchasing power. Increasingly during the twentieth century, ‘unbacked fiat money’, in the form of paper notes, came to constitute an important form of token money. Athens, of course, entirely lacked such paper currency, but it did not therefore entirely lack ‘unbacked fiat money’, that is, currency whose intrinsic value is less than its nominal denomination and whose acceptance is therefore dependent on governmental designation as ‘legal tender’ which must be accepted for payment. By the mid-fourth century, or perhaps even earlier,⁸ Athens was making use of a bronze coinage whose metallic value was far less than its nominal worth, thus constituting a form of ‘unbacked fiat money’.⁹ But the dominant form of non-commodity money in the

⁶ Xen. *Poroi* 4. 11: θαρροῦντες μὲν ὅτι πλείστους ἀνθρώπους ἐπὶ τὰ ἀργύρεα ἄγωμεν, θαρροῦντες δὲ κατασκευαζόμεθα ἐν αὐτοῖς, ὡς οὔτε ἐπιλειμούσης ποτὲ ἀργυρίτιδος οὔτε τοῦ ἀργυρίου ἀτίμου ποτὲ ἐσομένου. (We need not hesitate to bring as many men as we can get into the mines and carry on work in them, feeling confident that the ore will never give out and that silver will never lose its value.) On the archaeological evidence for the vast scale of silver mining operations at Laureion, see T. Rihll, ‘Making Money in Classical Athens’, in D. Mattingly and J. Salmon (eds.), *Economies beyond Agriculture in the Classical World* (London, 2001), 115–42, with abundant references to earlier literature.

⁷ Increased activity: M. Langdon, ‘Poletai Records’, in G. Lalonde, M. Langdon, and M. Walbank (eds.), *Inscriptions: Horoi, Poletai Records, and Leases of Public Lands* (Princeton, 1991), 61; R. Hopper, *Trade and Industry in Classical Greece* (London, 1979), 179–80. Modern extraction: K. Konopagos, *Tò ἀρχαῖο Λαύρειο* (Athens, 1980). For increased demand for silver currency (‘development of monetization’) throughout the fifth and fourth centuries, see K. Shipton, *Leasing and Lending: the Cash Economy in Fourth-Century BC Athens* (London, 2000), 7–14. For earlier periods, see J. Davies, ‘Ancient Economies: Models and Muddles’, in H. Parkins and C. Smith (eds.), *Trade, Traders and the Ancient City* (London, 1998), 239–40.

⁸ See H. Kim, ‘Small Change and the Moneyed Economy’, in P. Cartledge, E. Cohen, and L. Foxhall (eds.), *Money, Labour and Land: Approaches to the Economies of Ancient Greece* (London, 2002), 44–51. Cf. A. Bresson, ‘Monnayage et société dans les mondes antiques’, *RN* 157 (2001), 51–68.

⁹ C. Grandjean, review of E. Cohen, *Athenian Economy and Society: A Banking Perspective*, *Topoi* 5 (1995), 552–3; J. Kroll, *The Athenian Agora: Results of the*

modern world—as at Athens—has been credit money,¹⁰ which in turn consists of bank money (that is, bank deposits more or less broadly defined) and debt-related money in all its manifestations (as a practical matter principally credit generated by sales transactions). Bank deposits and other forms of credit can function as part of the money supply as long as there is confidence in their easy conversion into acceptable means of actual payment.¹¹ Because Athens supposedly lacked banks or similar sophisticated credit-generating entities, scholars traditionally have been in broad agreement that Athens lacked bank money.¹² Because Athenian law supposedly prohibited the direct provision of credit by vendors, the Athenian money supply could not be expanded through financing by sellers generating debt-related credit money. In my opinion, however, bank operations and retail sales both contributed significant elasticity to the money supply at Athens.

2. GENERATION OF DEBT-RELATED CREDIT MONEY THROUGH SALES TRANSACTIONS

In 1950, in a massive volume that has come to dominate its subject ‘more than perhaps any other’ study in the entire field of Greek legal

Excavations Conducted by the American School of Classical Studies at Athens. xxvi. *The Greek Coins* (Princeton, 1993), 24–7; G. Le Rider, comment in *Comptes-rendus de l'Académie des Inscriptions* (1989), 687 (noting ‘l'aspect fiduciaire que peut comporter la monnaie’).

¹⁰ ‘The key to understanding monetary economics is the demand and supply of loanable funds’ (J. Stiglitz and B. Greenwald, *Towards a New Paradigm in Monetary Economics* (Cambridge, 2003), 2).

¹¹ See J. Handa, *Monetary Economics* (London, 2000), 4–14, 231–48; C. Rogers, *Money, Interest and Capital: A Study in the Foundations of Monetary Theory* (Cambridge, 1989), 3–17; A. Crockett, *Money: Theory, Policy and Institutions* (London, 1979), 12–13. Acceptance is not instantaneous for new types of representative money: for initial resistance to ‘the latest forms of derivative money—electronic money, wire transfers and the now omnipresent credit card’, see H. de Soto, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (London, 2000), 203–4.

¹² J. Andreau, however, long ago demonstrated how Roman banks created credit money (‘même en l'absence de monnaie scripturale, l'activité bancaire a pour effet d'augmenter le pouvoir d'achat global’): ‘M.I. Finley, la banque antique et l'économie moderne’, *Annali della Scuola Normale Superiore di Pisa*, ser. 3, 7 (1977), 1130–52.

history,¹³ Fritz Pringsheim enunciated the Greek Law of Sale.¹⁴ For more than half a century now, in a field in which virtually every modern thesis is contested, there has been almost universal acceptance of Pringsheim's insistence on a fundamental rule—which 'Greek law never abandoned'¹⁵—that a sale attains juridical significance (that is, gives rise to a legal action for claims relating to the transaction) only through simultaneous payment of the purchase price and delivery of the good being purchased.¹⁶ This rule renders sale, for legal purposes, an instantaneous transaction: immediately prior to the exchange, neither party has any juridical obligation or right relative to the other. Since a legal relationship, and hence a basis for court enforcement of an obligation between the parties, could thus arise only upon actual delivery of goods against actual payment of the full purchase price, under this formulation Greeks could not enter directly into legally enforceable future (that is, 'executory') obligations, such as sellers' provision of credit secured by sellers' continuing security interest in the commodities being purchased.

¹³ S. Todd, *The Shape of Athenian Law* (Oxford, 1993), 255.

¹⁴ F. Pringsheim, *The Greek Law of Sale* (Weimar, 1950).

¹⁵ Because of Pringsheim's pervasive insistence on the unity of 'Greek law', discussion of his views mandates occasional use of the term. But reference to 'Greek law' in this chapter should be understood as consonant with Foxhall and Lewis's conclusion that 'as a coherent entity it does not exist... but as variations on a theme [it] does remain analytically useful' (L. Foxhall and A. Lewis, 'Introduction', in Foxhall and Lewis (eds.), *Greek Law in its Political Setting* (Oxford, 1996), 2–3. Similarly: M. Gagarin, 'The Unity of Greek Law', in id. and D. Cohen (eds.), *The Cambridge Companion to Ancient Greek Law* (Cambridge, 2005), 10; S. Tröianos and J. Vélissaropoulos-Karakostas, *Ιστορία Δικαίου, από την αρχαία στη νεώτερη Ελλάδα* (Athens, 1997), 34–5.

¹⁶ See Pringsheim, *Greek Law* [n. 14], 86–90, 179–219. In accord: L. Gernet, in his edition *Démosthène, Plaidoyers Civils* (Paris, 1954), i. 261; J. Jones, *The Law and Legal Theory of the Greeks* (Oxford, 1956), 227–32; H. Wolff, 'Die Grundlagen des griechischen Vertragsrechtes', *Zeitschrift der Savigny-Stiftung für Rechtsgeschichte. Romanistische Abteilung* 74 (1957), 26–72; Wolff, 'Zur Rechtsnatur der *Misthōsis*', in *Beiträge zur Rechtsgeschichte Altgriechenlands und des hellenistisch-römischen Ägyptens* (Weimar, 1961); D. MacDowell, *The Law in Classical Athens* (London, 1978), 138–40; E. Harris, 'When is a Sale not a Sale? The Riddle of Athenian Terminology for Real Security Revisited', *Classical Quarterly* 38 (1988), 360; P. Millett, *Lending and Borrowing in Ancient Athens*, (Cambridge, 1991), 174; S. von Reden, 'The Politics of Monetization in Third Century B.C. Egypt', in A. Meadows and K. Shipton (eds.), *Money and Its Uses in the Ancient Greek World* (Oxford, 2001), 74; A. Maffi, 'Family and Property Law', in M. Gagarin and D. Cohen (eds.), *The Cambridge Companion* [n. 15], 260–1.

Vendors accordingly could not provide credit to a buyer, because, under Pringsheim's formulation, until actual payment of the purchase price the seller had no continuing legal relationship with the buyer, and hence would have no security interest in the good. Delivery of a good without simultaneous payment was therefore tantamount to a gift of the item to the would-be buyer. For proponents of a 'primitive' (or 'embedded') Athenian economy—one side of the seemingly perpetual dispute on the nature of the ancient economy¹⁷—the inflexibility of such a simple system and its inability to meet the sophisticated requirements of a more developed economy¹⁸ have been welcome as confirming the essentially 'primitive' nature of the Athenian economy.¹⁹ But for the proponents of a 'modern' (or 'market-oriented') Athenian economy, Pringsheim's rule was also welcome, as it facilitated the demonstration of a variety of sophisticated credit mechanisms developed in the ancient world, albeit at places other than Athens and at times later than the classical.

In fact, Athenian sources contradict Pringsheim's thesis. Although he did collect masses of material (mainly scraps of papyrus) relating to 'sale' in the Greek world over a thousand-year period, the truncated content of these citations, and their lack of context, forced Pringsheim to acknowledge the impossibility of drawing conclusions from such sources.²⁰ Instead, he argued that 'the similarity of Doric and Ionian institutions' permitted a Greek Law of Sale to be derived essentially from classical Athenian testimonia, which represented, in

¹⁷ Polarized analysis of the ancient economy was already into its second century when Bücher published in 1893 his seminal 'primitivist' exposition of the ancient economy to which Meyer in 1895 and Beloch in 1902 issued 'modernizing' responses. For the decades of dichotomized struggle that followed, see E. Cohen, 'Introduction', in Cartledge et al. (eds.), *Money, Labour* [n. 8]; D. Schaps, review of D. Tandy, *Warriors into Traders* [n. 5]; S. Meikle, 'Modernism, Economics, and the Ancient Economy', in W. Scheidel and S. von Reden (eds.), *The Ancient Economy* (New York, 2002), 233–50.

¹⁸ Millett, *Lending and Borrowing* [n. 16], 17.

¹⁹ See P. Millett, 'Sale, Credit and Exchange in Athenian Law and Society', in P. Cartledge, P. Millett, and S. Todd (eds.), *Nomos: Essays in Athenian Law, Politics and Society* (Cambridge, 1990), 180–2; Finley, *AE* 141. Cf. Finley, *Studies in Land and Credit in Ancient Athens* (rev. edn., New Brunswick, 1985), 298 n. 28. L. Gernet considers it a paradox that the system was able to function 'dans un état économique déjà avancé' (*Droit et société dans la Grèce ancienne* (Paris, 1955), 207; cf. 222 n. 1).

²⁰ *Greek Law* [n. 14], 500.

Pringsheim's opinion, the 'preponderance of texts' that are relevant.²¹ In practice however, Pringsheim almost entirely ignored Athenian material: in a chapter on *arrha* consuming almost 100 pages,²² there is only a single example from Athens;²³ in equally lengthy discussions of sales on credit, he cites virtually no evidence from Athens.

In opposition to the Greek Law of Sale, however, Athenian sources enunciate, with repetitive consistency, a single fundamental principle: a mere consensual agreement, *homologia*,²⁴ is 'legally binding' (*kuria*)²⁵ from the moment of mutual consent, even when the *homologia* is clearly anterior to delivery of the good or payment of the full purchase price. Athenian law thus holds 'legally binding . . . whatever arrangement one party might agree upon with another' (Dem. 47. 77).²⁶ Demosthenes 42 similarly refers to 'the law' that 'mutual agreements (*homologiai*) are legally binding'.²⁷ Deinarkhos insists that the 'law of the polis' imposes legal liability on anyone who

²¹ *Greek Law* [n. 14], 5–6.

²² *Ibid.* 333–428.

²³ Isaios 8. 23 makes brief reference to a deposit (termed *arrhabōn*) covering some funerary items. On the *arrha*, see M. Talamanca, *L'arra della compravendita in diritto greco e in diritto romano* (Milan, 1953).

²⁴ For *homologia* as 'contract' at Athens, see J. Vélissaropoulos-Karakostas, *Ιστορία Δικαίου* (Athens, 1993), 163–5. In an effort to force the ancient sources to conform to modern preconceptions, some scholars have resorted to interpreting *homologia* as 'admission': see D. Mirhady, 'Contracts in Athens', in *Law, Rhetoric and Comedy in Classical Athens: Essays in Honour of Douglas M. MacDowell* (Swansea, 2004), 58; G. Thür, *Beweisführung von den Schwurgerichtshöfen: Die Proklesis zur Basanos* (Vienna, 1993), 180–5.

²⁵ On the interpretation of *kuria*, see J. Vélissaropoulos-Karakostas, 'Remarques sur la clause *kuria* ή *συγγραφή*', in E. Cantarella and G. Thür (eds.), *Symposion 1997* (Cologne, 2001); E. Cohen, 'A Legal Fiction: "The Athenian Law of Sale"', in *Agoranomia: Studies in Money and Exchange Presented to John H. Kroll* (New York, 2006), 88 n. 6.

²⁶ τὸν (νόμον) ὃς κελεύει κύρια εἶναι ὅσα ἂν ἕτερος ἐτέρω ὁμολογήσῃ. (The law which ordains that whatever arrangement one party might agree upon with another shall be legally binding.) A naked promise by one party was not itself actionable: H. Wolff, 'Debt and Assumpsit in the Light of Comparative Legal History', *The Irish Jurist* 3 (1966), 322; J. Vélissaropoulos-Karakostas, *Ιστορία Δικαίου* [n. 24], 165–6.

²⁷ Dem. 42. 12: ἀλλ' ἀνθ' ἐνὸς δύο νόμους ἤκει πρὸς ὑμᾶς παραβεβηκώς, ἔνα μὲν τὸν κελεύοντα τριῶν ἡμερῶν ἀφ' ἧς ἂν ὁμόσῃ τὴν οὐσίαν ἀποφαίνειν, ἕτερον δὲ τὸν κελεύοντα κυρίας εἶναι τὰς πρὸς ἀλλήλους ὁμολογίας. (Instead, he now appears before you as one who has transgressed two laws instead of one; the first declares that the inventory shall be presented within three days after that on which one takes the oath, and the second declares that mutual covenants, agreed upon in the presence of witnesses, shall be legally binding.)

violates any agreement (*homologēsas*) made with another citizen.²⁸ Isokrates cites the Athenian rule that agreements between individuals (‘private agreements’: *homologiai idiai*) be ‘publicly’ enforceable, and insists on the importance of complying with these consensual arrangements (*hōmologēmena*).²⁹ In fact, as Pringsheim concedes,³⁰ some texts even emphasize this mutuality of commitment as essential to the creation of a legally enforceable obligation. Thus Demosthenes 56. 2 confirms the binding effect of ‘whatever arrangements a party might willingly agree upon with another’,³¹ and Demosthenes 48 cites ‘the law’ governing agreements ‘which a willing party has agreed upon and covenanted with another willing party’.³² Even popular discourse recognized the primacy of consensual agreements among willing parties: in a discussion of the demands of erotic love, Plato in the *Symposium* has the acclaimed playwright Agathon allude to the city laws’ sanctifying ‘that which a willing person should agree upon with another willing person’.³³

The sale of real estate without payment of the full purchase price—impossible under the Pringsheim thesis—is confirmed by a *horos* (‘mortgage’) inscription published in 1982,³⁴ some decades after the

²⁸ Dein. 3. 4: καὶ ὁ μὲν κοινὸς τῆς πόλεως νόμος ἐάν τις εἰς ἕνα τινὰ τῶν πολιτῶν ὁμολογήσας τι παραβῆ, τοῦτον ἔνοχον εἶναι κελεύει πῶ ἀδικεῖν. (The common law of the city provides that if anyone breaks an agreement with any other citizen, he shall be liable as an offender.) The text (Nouhaud 1990) incorporates Lloyd-Jones’s emendation εἰ ἕνα τινα for manuscripts A and N’s ἐναντίον.

²⁹ τὰς μὲν ἰδίας ὁμολογίας δημοσίᾳ κυρίας ἀναγκάζετ’ εἶναι. (That private agreements must be held legally binding by public authority) (18. 24); ἀναγκαῖον εἶναι τοῖς ὁμολογημένοις ἐμμένειν. (You were forced to abide by your agreements) (18. 25).

³⁰ ‘... ἐκὼν merely emphasizes that contracts depend on consent, whereas delicts do not’ (Pringsheim, *Greek Law* [n. 14], 36).

³¹ τοῖς νόμοις τοῖς ὑμετέροις (sc. Ἀθηναίοις) οἳ κελεύουσι, ὅσα ἂν τις ἐκὼν ἕτερος ἐτέρῳ ὁμολογήσῃ κύρια εἶναι. (Your laws [Athenian laws], which ordain that all agreements into which a man voluntarily enters with another shall be legally binding.)

³² Sects. 11, 54: τὸν νόμον ... καθ’ ὃν τὰς συνθήκας ἐγράψαμεν πρὸς ἡμᾶς αὐτοὺς (the law in accordance with which we drew up our agreements) ... ἃ μὲν ὁμολόγησεν καὶ συνέθετο ἐκὼν πρὸς ἐκόντα. (Which a willing party has agreed upon and covenanted with another willing party.)

³³ Plato, *Symp.* 196c2–3: ἃ δ’ ἂν ἐκὼν ἐκόντι ὁμολογήσῃ, φασὶν οἱ πόλεως βασιλῆ νόμοι δίκαια εἶναι.

³⁴ SEG 33 (1983) no. 175 = SEG 34 (1984) no. 167 = P. Millett, ‘The Attic *Horoi* Reconsidered in the Light of Recent Discoveries’, *Opus* 1 (1982), 219–49, no. 12A: ὄρος χωρίου καὶ οἰκίας καὶ κήπων πεπραμένων ἐπὶ λύσει Φιλίνου Ἀλαεῖ τιμῆς ἐνοφε[ι]λομένης τοῦ ἡμισσοῦ χωρίου. (Mortgage of land, house, and gardens put up as security to Philon of Halai for the price owed on half the land: 3,000 (drachmae).)

appearance of *The Greek Law of Sale*, resolving the interpretation of a number of previously disputed examples of seller-financed mortgages.³⁵ In the dispute between Epikrates and Athenogenes described by Hypereides—the only Athenian business ‘deal’ preserved in detail³⁶—Epikrates (against his own interest) specifies entry into the contract, not the subsequent delivery and payment, as the source of his legal obligation.³⁷ In contrast to the paucity of evidence supporting many of the presently accepted principles of Athenian law—scholars often consider the text of a law or the existence of a legal principle to be incontrovertibly well established if it is confirmed by two or three testimonia³⁸—existence of legally enforceable consensual contracts at Athens is thus attested by a multitude of examples occurring not in a single context, but over a broad range of subjects: taxation, personal services, the obtaining of judgments, real estate (transfer and security), business transactions, maritime finance.

Because of a profusion of consumer and business finance, seller-generated credit was significant for the Athenian money supply. ‘Lending and borrowing permeated Athenian society.’³⁹ Comic presentations in the theatre,⁴⁰ speakers’ contentions in the courtroom, stonemasons’ records, are all suffused with references to loans. A good example: some 150 separate financing arrangements are mentioned in only thirty-two surviving ‘private speeches’ attributed to Demosthenes (27–59). Aristophanes, Menander, Philemon, and Theophrastos posit living on

³⁵ M. I. Finley, *Studies* [n. 19], nos. 3, 112, 113, 114, 115.

³⁶ The absence from our corpus of other cases involving sales should not suggest that legal disputes relating to property were in fact rare at Athens. A. R. W. Harrison has identified no less than fifteen additional forensic presentations whose contents have not been preserved, but whose titles suggest that they focused on issues involving property (*The Law of Athens* (Oxford, 1968), i. 200 n. 1).

³⁷ Sect. 7: ὁμολογήσας αὐτῷ τὰ χρέα ἀναδέξασθαι . . . ἐπάξειν μοι ἔμελλον ὕστερον τοὺς χρήστας καὶ τοὺς πληρωτὰς τῶν ἐράνων ἐν ὁμολογίᾳ λαβῶν. (I had agreed with him that I would assume the debts . . . thereafter it was likely that the various creditors (*chrestas* and *plerotas*) would pursue me, once he had entrapped me by contract.)

³⁸ The accuracy of a portion of the Law against *hubris*, for example, is ‘assured’ because it is quoted in two independent texts (N. R. E. Fisher, *Hybris* (Warminster, 1992), 36 n. 1).

³⁹ Millett, *Lending and Borrowing* [n. 16], 5.

⁴⁰ Both Alexis and Nikostratos wrote plays entitled *The Creditor* (Τοκιστής) (Kassel-Austin, *Poetae Comici Graeci*, ii. 232–5 and vii. 26). Plot construction in a number of

credit as a normal condition for an inhabitant of Attika.⁴¹ Many of these loans were supplied by vendors. A seller of slaves, for example, provides financing for a 3,500-drachma purchase, and at a high rate of interest;⁴² another seller claims that a buyer has failed to pay 2,000 drachmas plus interest, vendor-supplied financing for the sale of another slave.⁴³ A manufacturer of swords and sofas offers consumer financing on a continuing basis, apparently as a routine aspect of his business.⁴⁴ Wholesale transactions in wine, olive oil, grain, and other commodities are attested as entirely financed by sellers.⁴⁵ Surviving *horoi* ('mortgages') document sellers' financing of sales of real property.⁴⁶ In short, in the absence of artificial interpretative complexities engendered by Pringsheim's Greek Law of Sale, vendor-supplied credit emerges as a clear source of elasticity for the Athenian money supply.

works—Aristophanes' *Clouds*, Menander's *Hero* and *Dis Exapaton*, for example—turns on loan arrangements.

⁴¹ Aristoph. *Birds* 114–16. *Ekkl.* 567, 660–1; Men. *Kith.* fr. 1 (Sandbach); Philemon fr. 92 (K-A); Theophr. *Char.* (dozens of references to loans in thirty short vignettes).

⁴² Lγk. *Leokr.* 23: ὁ Ἀμύντας αὐτὸς πάλιν ἀποδίδοται τὰνδράποδα πέντε καὶ τριάκοντα μνῶν Τιμοχάρει Ἀχαρνεὶ τῷ τὴν νεωτέραν ἔχοντι τοῦτου ἀδελφῆν ἄργυριον δὲ οὐκ ἔχων δοῦναι ὁ Τιμοχάρης συνθήκας ποιησάμενος καὶ θέμενος παρὰ Λυσικλεῖ, μίαν μνᾶν τόκον ἔφερεν τῷ Ἀμύντα. (Amyntas sold the slaves again himself for thirty-five minas to Timochares of Acharnae who had married Leocrates' younger sister. Timochares had no ready money for the purchase and so drew up an agreement which he lodged with Lysicles and paid Amyntas interest of one mina.)

⁴³ Dem. 41. 8: δύο μνᾶς, <ᾶς> ἐμαρτύρησεν Ἀριστογένης ἐγκαλεῖν ἀποθνήσκοντα Πολυεύκτον ὀφειλομένας αὐτῷ παρὰ Σπυδιᾶ καὶ τὸν τόκον (τοῦτο δ' ἐστὶν οἰκέτου τιμῆ, ὃν ἔωνημένος οὗτος παρὰ τοῦ Πολυεύκτου, τὴν τιμὴν οὐτ' ἐκείνῳ διέλυσε οὔτε νῦν εἰς τὸ κοινὸν ἀνεήροχεν)... (Aristogenes has deposed that Polyeuctus, when about to die, charged that there were due him from Spudias two minae with interest (this was the price of a domestic slave whom the defendant had bought from Polyeuctus, but had neither paid the money nor has now entered it in the general account).)

⁴⁴ Dem. 27. 9 (describing the assets of the *ergastēria*): ἀργυρίου δ' εἰς τάλαντον ἐπὶ δραχμῇ δεδανεισμένον, οὗ τόκος ἐγίγνετο τοῦ ἐνιαυτοῦ ἐκάστου πλεῖν ἢ ἑπτὰ μναί. (In money he left as much as a talent, loaned at the rate of a drachma a month, the interest of which amounted to more than seven minae a year.) Cf. L. Gernet, in his edition of Demosthenes [n. 16], i. 29–31, 261.

⁴⁵ Aristotle, *Oik.* 2. 2. 8, 1347b3: Ἡρακλεώται πέμποντες ναῦς τετταράκοντα ἐπὶ τοὺς ἐν Βοσπόρῳ τυράννους οὐκ εὐποροῦμενοι χρημάτων, παρὰ τῶν ἐμπόρων συνηγόρασαν τὸν τε σίτον πάντα καὶ τὸ ἔλαιον καὶ τὸν οἶνον καὶ τὴν ἄλλην ἀγοράν, χρόνου δισταμένου ἐν ᾧ ἔμελλον ἀποδώσειν τὴν τιμὴν. τοῖς δὲ δὴ ἐμπόροις καλῶς εἶχε μὴ κοτυλίξειν, ἀλλ' ἀθρόα τὰ φορτία πεπρᾶσθαι. (The people of Heraclea, intending to dispatch a fleet of forty ships against the tyrants of Bosphorus, were at a loss for the necessary funds. They therefore bought up all the merchants' stock of wheat, oil, and wine and other marketable commodities, agreeing to pay at a future date. The merchants were well satisfied to have disposed of their cargoes not at retail, but in bulk.)

⁴⁶ See n. 34 above.

3. GENERATION OF BANK-RELATED CREDIT MONEY

If the term ‘bank’ be defined through its generally accepted essence—a business having an obligation to repay funds (‘deposits’) received from a multitude of sources, but with the interim right to make loans and investments for its own account⁴⁷—the Athenian *trapeza* is undeniably a ‘bank’. Demosthenes, for example, defines the *trapeza* as ‘a business operation producing risk-laden revenues from other people’s money’,⁴⁸ pithily focusing on the making of loans (‘risk-laden revenues’: *prosodous epikindynous*) and the receipt of deposits (‘other peoples’ money’: *khreumatōn allotriōn*). These mechanisms of deposit and loan constituted a ready source of ‘bank money’, and thus an easy means of expanding Athens’ supply of money.

Expansion through bank deposits, without any increase in commodity (or fiat) money, can be easily demonstrated. If the Athenian banks had on deposit 11 talents (66,000 drachmas) of silver coinage, a combined balance sheet initially would be as follows:

<i>Assets</i>	<i>Liabilities</i>
Silver coinage	66,000 dr.
	Deposits of silver coinage
	66,000 dr.

If 3 talents (18,000 dr.) of loans are made by the banks, the balance sheet becomes:

<i>Assets</i>	<i>Liabilities</i>
Silver coinage	48,000 dr.
Loans receivable	18,000 dr.
	Deposits of silver coinage
	66,000 dr.

Without any change in the banks’ liabilities, there has been an increase of 18,000 dr. in money circulating outside the banks. If these funds are used to buy goods and services, and the recipients of the funds deposit a tenth (1,800 dr.) of this coinage back into the banks, the combined balance sheet now will appear thus:

⁴⁷ See e.g. 12 USCA sect. 1841; Banking Act of 1984 (France).

⁴⁸ Dem. 36. 11: ἡ δ’ ἐργασία προσόδους ἔχουσι επικινδύνους ἀπὸ χρημάτων ἀλλοτριῶν. (For that is a property which involves no risk, while the bank is a business yielding a hazardous revenue from money which belongs to others.)

<i>Assets</i>		<i>Liabilities</i>	
Silver coinage	49,800 dr.	Deposits of silver coinage	67,800 dr.
Loans receivable	18,000 dr.		

Clearly, the total amount of bank deposits—claims that on request can immediately or eventually be turned into currency—has grown without any corresponding increase in the amount of silver (Athenian commodity money) and in the complete absence of paper currency. The Athenian money supply would further expand whenever any part of the proceeds of a bank loan was redeposited in a bank by the ultimate recipients of the funds advanced. The money supply at Athens (as in any society where banks are functioning) can thus be seen to consist of bank liabilities ('deposits'), other credit money, and cash in circulation. The amount of increase in the bank portion of this money supply will depend on the volume and velocity of bank loans, the percentage of these loan funds immediately or ultimately redeposited in the *trapezai*, and the time period and volatility of deposits (which influence the banks' need or desire to retain currency reserves, and thus affect both the amount of additional moneys available for further lending and further increase in the money supply). Monetary expansion through bank activity will be substantial if trapezitic deposits represent a significant part of the total Athenian money supply, if the making of bank loans is not unduly inhibited by the volatility of deposits or other factors, and if a reasonable portion of the new purchasing power generated by these loans is immediately or ultimately redeposited in the banks. For the determination of these issues, the absence of paper currency is entirely irrelevant.

Of course, lack of statistical data precludes our exploring these issues systematically.⁴⁹ However, surviving evidence makes it clear that to some extent the Athenian bankers did create credit and thus 'money' beyond the available supply of precious metals. The lack of governmental scrip, in fact, lent added importance to the various banking alternatives to the physical exchange of bulky metal coins.

⁴⁹ The 'ignominious truth' is that 'there are no ancient statistics' (A. H. M. Jones, *Ancient Economic History* (London, 1948), 3). On methodological alternatives, see E. Cohen, 'Commercial Lending by Athenian Banks: Cliometric Fallacies and Forensic Methodology', *Classical Philology* 85 (1990) 177–90.

Supplementing the banks' direct creation of money and expansion of credit through their loan and deposit processes, the *trapezai* issued guarantees of credit, expedited commerce by confirming availability of funds in bank accounts, and executed payment orders through which commercial transactions were settled and obligations met without the actual transfer of coins.

Bank lending was extensive and varied. *Trapezai* seem to have been heavily involved with businesses selling perfumes, a popular product requiring relatively extensive inventories and therefore dependent on the availability of credit.⁵⁰ In advancing money to fund the ongoing operations of these fragrance operations, *trapezitai* often cooperated with other lenders: the business described in Lysias fragment 38 had been originally financed by the banker Sosinomos; additional funds were advanced by others, to the point that the daily line of creditors seeking repayment is said to have resembled a funeral procession (sect. 4). In Hypereides,⁵¹ we learn of a bank's involvement in the sale of a perfume business encumbered by loans in excess of five talents (perhaps \$1.5 million US dollars, calculated on purchasing power parity). Bankers provided loans to purchase mining concessions and processing mills,⁵² to establish a cloth-making operation,⁵³ to purchase land,⁵⁴ to help political leaders,⁵⁵ to aid military operations,⁵⁶ to ransom friends,⁵⁷ to finance the import of lumber,⁵⁸ to assist business clients and their associates,⁵⁹ to avoid creditors' execution on a ship.⁶⁰ In the dominant sphere of Athenian trade, maritime credit, the *trapezai* held an important, perhaps a prime roll as lenders, an area where they provided a type of intermediation (*ekdo-sis*) 'through the bank' (*dia tes trapezes*).⁶¹

The bankers also expedited commerce—and concurrently enlarged the effective money supply—through credit-enhancement devices that utilized bank deposits in place of coins. As a result of legal problems arising from ship financing, a bank customer was required to post seven talents with the state: the sum was provided

⁵⁰ For the role of fragrances in Athenian life, see T. Webster, *Life in Classical Athens* (London, 1969), 30, 36.

⁵¹ *Against Athenogenes* 5–9.

⁵² Dem. 37, 40. 52.

⁵³ Xen. *Mem.* 2. 7.

⁵⁴ IG II² 2762, for example.

⁵⁵ Dem. 49. 17, 23.

⁵⁶ Dem. 49. 6.

⁵⁷ Dem. 53. 9.

⁵⁸ Dem. 49. 35–6.

⁵⁹ Isokr. 17. 12, 38.

⁶⁰ Dem. 33.

⁶¹ Dem. 45. 64–6.

not in cash, but through a surety guarantee from a bank, furnished in reliance upon the customer's deposits.⁶² Settlement of overseas commercial obligations by transporting moneys from Athens might have significantly reduced the supply of silver circulating in Attika. By guaranteeing payment of funds at far-off locations, the banks averted this drain and allowed customers to avoid the dangers and inconvenience inherent in transporting a large amount of coins or bullion. Thus when Stratokles, about to journey to the distant Black Sea, anticipated the need for currency there, he was able to leave his own money on loan in Athens and carry instead a bank guarantee of payment of principal and interest on 300 Kyzikene staters.⁶³ This bank commitment was issued by Athens' largest bank, that of Pasion, in reliance on money remaining on deposit in the bank.⁶⁴ Bank deposits thus effectively became 'bank money', enhancing the supply of coinage in circulation in Athens.

Even within the local economy, the *trapezai* conserved currency through bank payment orders, an alternative to coinage-consuming escrow arrangements, down payments, or the hoarding of currency to gather sufficient funds for future payment in silver. When the merchant Lykon was leaving Athens and wanted to make payment of 1,640 drachmas to a business colleague, he directed that funds on deposit at

⁶² Isokr. 17.44: τῶν δ' ἑπτὰ ταλάντων ἐγγυητής μοι ἐγένεθ' ἡγούμενος πίστιν ἔχειν ἱκανὴν τὸ χρυσίον τὸ παρ' αὐτῷ κείμενον. (He became my surety for seven talents because he judged that the gold on deposit with him was a sufficient guarantee.)

⁶³ Isokr. 17. 35–7: μέλλοντος Στρατοκλέους εἰσπλεῖν εἰς τὸν Πόντον, βουλόμενος ἐκείθεν ὡς πλείστ' ἐκκομίσασθαι τῶν χρημάτων ἐδεήθην Στρατοκλέους τὸ μὲν αὐτοῦ χρυσίον ἐμοὶ καταλιπεῖν, ἐν δὲ τῷ Πόντῳ παρὰ τοῦ πατρὸς τοῦμου κομίσασθαι, νομίζων μεγάλα κερδαίνειν εἰ κατὰ πλοῦν μὴ κινδυνεύοι τὰ χρήματα . . . Πασίων' αὐτῷ συνέστησα, καὶ ὠμολόγησεν οὗτος αὐτῷ καὶ τὸ ἀρχαῖον καὶ τοὺς τόκους τοὺς γυνομένους ἀποδώσειν. Καίτοι εἰ μηδὲν ἔκειτο παρ' αὐτῷ τῶν ἐμῶν, οἴεσθ' ἂν αὐτὸν οὕτως ῥαδίως τοσοῦτων χρημάτων ἐγγυητὴν μου γενέσθαι; (When Stratocles was about to sail for Pontus, I, wishing to get as much of my money out of that country as possible, asked Stratocles to leave with me his own gold and in Pontus to collect its equivalent from my father there, as I thought it would be highly advantageous not to jeopardize my money by the risks of a voyage. . . . I introduced Pasion to him, and Pasion himself agreed to repay him both the principal and the accrued interest. And yet if Pasion had not had on deposit some money belonging to me, do you think he would so readily have become my guarantor for so large a sum?)

⁶⁴ A similar potential transaction, involving the banker Pasion's son Apollodoros is chronicled at Dem. 50. 28.

Pasion's bank be paid at a future time to Kephisiades.⁶⁵ So routine were such transactions that standard banking procedures had been developed for effectuating them: we are told that when a private depositor ordered payment to someone, 'all the bankers were accustomed' to make formulaic entries in their records setting forth the name of the person providing the funds, the sum involved, and the name of the recipient or the persons who would identify the payee.⁶⁶ Since a customer's instructions were given in person, and were paid only on the recipient's personal appearance, these orders—unlike modern cheques—were entirely paperless (except for the entries made in the bank's books).

Bankers routinely made written notations concerning individual accounts 'so that the sums taken and the amounts received for the accounts might be clearly known'.⁶⁷ Among persons commercially active, bank accounts appear to have been widely held: 'all the *emporoi*' (maritime traders) had accounts—and at a single *trapeza*, that of Pasion.⁶⁸ Maintenance of a bank account was expected of an individual purporting to be of substance.⁶⁹ This combination of

⁶⁵ Dem. 52. 3.

⁶⁶ Dem. 52. 4: εἰώθασι δὲ πάντες οἱ τραπεζίται, ὅταν τι ἀργύριον τιθεῖς ἰδιώτης ἀποδοῦναι τῷ προστάτῃ, πρῶτον τοῦ θέντος τοῦνομα γράφειν καὶ τὸ κεφάλαιον τοῦ ἀργυρίου, ἔπειτα παραγράφειν 'τῷ δεῖνι ἀποδοῦναι δεῖ', καὶ ἐὰν μὲν γινώσκωσι τὴν ὄψιν τοῦ ἀνθρώπου ᾧ ἂν δέῃ ἀποδοῦναι, τοσοῦτο μόνον ποιεῖν, γράφειν ᾧ δεῖ ἀποδοῦναι, ἐὰν δὲ μὴ γινώσκωσι, καὶ τούτου τοῦνομα προσπαραγράφειν ὃς ἂν μέλλῃ συστήσει καὶ δείξειεν τὸν ἄνθρωπον, ὃν ἂν δέῃ κομίσασθαι τὸ ἀργύριον. (Thus all bankers are accustomed, when a private person deposits money and directs that it be paid to a given person, to write down first the name of the person making the deposit and the amount deposited, and then to write on the margin 'to be paid to so-and-so'; and if they know the face of the person to whom payment is to be made, they do merely this, they write down to whom they are to make payment; but, if they do not know it, they write on the margin the name also of him who is to introduce and point out the person who is to receive the money.)

⁶⁷ Dem. 49. 5: οἱ γὰρ τραπεζίται εἰώθασιν ὑπομνήματα γράφεσθαι ὧν τε διδόασιν χρημάτων καὶ εἰς ὃ τι καὶ ὧν ἂν τι θήται, ἵνα ἢ αὐτοῖς γνώριμα τὰ τε ληφθέντα καὶ τὰ τεθέντα πρὸς τοὺς λογισμοὺς. (For bankers are accustomed to write out memoranda of the sums which they lend, the purposes for which funds are desired, and the payments which a borrower makes, in order that his receipts and his payments may be known to them for their accounts.) Cf. Dem. 49. 8, 30, 43, and 59; Dem. 36. 20–1 and 36.

⁶⁸ Dem. 52. 3: Λύκων . . . τῇ τραπεζῇ τῇ τοῦ πατρὸς ἐχρήτο, ὡσπερ καὶ οἱ ἄλλοι ἐμποροί. (Lycón . . . was a customer of my father's bank like the other merchants.)

⁶⁹ Theophr. *Khar.* 23. 1–2: ὁ δὲ ἀλαζὼν τοιοῦτός τι οἶος . . . ἐν τῷ διαζεύγματι ἐσθηκῶς διηγείσθαι ξένους ὡς πολλὰ χρέματα αὐτῷ ἔστω ἐν τῇ θαλάττῃ, καὶ περὶ τῆς ἐργασίας τῆς

trapezitic accounts and payment orders provided a ready means for converting bank deposits into 'bank money'. The frequent use of these accounts for payment of debts is suggested by a litigant's scornful contempt for a creditor who resorted to collection efforts although funds to pay him were on deposit 'at the bank'.⁷⁰ Where payments were made not by actual transfer of coins but by entry on the books of the bank favouring the recipient's account, the need for physical coins, 'commodity money', was obviously eliminated. This appears to have happened so routinely that the Athenians even had a term (*diagraphe*) for the cashless settlement of debts through bank entries.⁷¹ To the extent that banks could anticipate handling payment orders and other calls by written memoranda (*hypomnemata*) and not by cash, the amount of currency reserves kept by the bankers might be reduced, with a corresponding increase in the money supply through additional bank lending or bank spending.

Lykon's payment order was effectuated by the bank of Pasion alone, without the involvement of any other *trapeza*.⁷² Indeed, the concentration of sea merchants' accounts at this single bank may have had the (perhaps intended?) effect of expediting maritime transactions by permitting non-cash settlements through this one *trapeza*. If business people commonly maintained a number of banking relationships, or if the concentration of maritime traders at Pasion's bank was not atypical—with practitioners in specific fields concentrating their banking activities in a single *trapeza*—then a significant volume of book-entry settlements, with a significant potential effect on the money supply, might have occurred without the involvement of a second bank.

δανειστικῆς διεξιέναι ἡλίκη, καὶ αὐτὸς ὅσα εἴληφε καὶ ἀπολώλεκε, καὶ ἅμα ταῦτα πλεονάζων πέμπει τὸ παιδάριον ἐπὶ τὴν τράπεζαν, οὐδὲ δραχμῆς αὐτῷ κειμένης. (The pretentious man will stand on the breakwater and tell strangers about the great sums of money he has in ventures upon the sea; he goes into detail about the extent of his money-lending business and the amount of his profits and losses; and while he exaggerates these, he sends off his slave to the bank, though he does not have a drachma to his name.)

⁷⁰ Dem. 47, 49, 51, 57, 62, 64.

⁷¹ Harpokration (s.v. *διαγράψαντο*).

⁷² Dem. 52, 3, 7.

Where numerous banks are functioning and no single *trapeza* commands a dominant position, however, cashless settlements by bank entry limited to a single *trapeza* and its clients will necessarily result in only limited expansion of the money supply. Yet where an individual pays for goods with a payment order on Bank Alpha, Bank Beta may be willing to credit the seller's account with an increase in deposits even without demanding immediate transfer of silver currency from Bank Alpha; the banker may even be willing to retain indefinitely this claim on Alpha, which could be used to settle a debt with Banker Gamma, Delta, or Epsilon at some future time. Again, the absence of 'negotiable instruments' or 'paper currency' would create no theoretical barrier to such interbank arrangements: the necessary entries would be carried directly on the banks' books. There would have been no need of, and there is no clear evidence for, a system of interbank clearance procedures (akin to a modern 'clearinghouse' or *Giroverkehr*).

Finally, I offer a warning against the kind of anachronistic 'modernizing' that seeks to attribute to classical civilization conditions prevailing today. The world is now strewn with money machines (ATMs in British and US parlance) dispensing unbacked fiat money—'cash'—to hundreds of millions of users, a metallic plenitude of potential specimens of 'material culture' likely to impress archaeologists of future millennia. But these putative antiquarians will find no remnants of the modern world's ethereal stock of credit money—although it amounts to trillions and trillions of dollars. A similar fate befell Athenian money. The abundance of surviving examples of Athenian commodity money—silver coins—tends to obfuscate the significance of the physically evanescent credit money of Athens. Yet because the money supply of Athens in the fourth century was not composed solely of fully valued commodity money, Athens avoided the artificial (dare we say 'primitive?') condition of the United States of America which only in 1971 first came to use unbacked fiat money (promising prior to that time to redeem all paper currency, on demand, with its equivalence in precious metals, thus providing a *de facto* gold standard for the world, and a substantial subsidy

to the precious-metals industries).⁷³ At Athens, such a subsidy would have been meaningless, since the Athenian people always owned all unmined silver reserves in Attika, and Athenian bankers and vendors generated ‘money’ without the legalistic dependence on physical metals familiar from the recent history of the United States.

⁷³ See M. Melvin, *International Money and Finance* (New York, 1985), 138–49; H. Wallich, ‘The Evolution of the International Monetary System’, in M. Connolly (ed.), *The International Monetary System: Choices for the Future* (New York, 1982), 280–92.

Coinage as ‘Code’ in Ptolemaic Egypt

J. G. Manning

1. INTRODUCTION

In this chapter I discuss the use of money in Ptolemaic Egypt in relationship to the development of the state. My aim here is to summarize some recent work and to set the process of monetization into a broader context of state development. The topic of money and coinage in the ancient world is enormously complex and work is ongoing on several fronts.¹ Much of what Moses Finley believed about money has been disputed in recent years.² The most important scholarly shifts have resulted from work on banks and banking, and the closer examination of regions and historical periods ignored by Finley, Ptolemaic Egypt being an important case in point. The last decade has witnessed an explosion in both technical studies of coinage and more general economic treatments.³ Despite this, however,

I thank William Harris, Sitta von Reden, and Andrew Monson for valuable comments on earlier drafts.

¹ The forthcoming work on Ptolemaic money by Sitta von Reden will be important, and will treat far more thoroughly than I can the issues that I can only touch on here. I shall not treat the physical description of Ptolemaic coinage since von Reden has dealt with this excellently. I am grateful to her for showing me a draft of the book and for allowing me to signal its appearance. Some of the issues were briefly addressed by von Reden in ‘Money and Coinage in Ptolemaic Egypt. Some Preliminary Remarks’, in *Akten des 21. Internationalen Papyrologenkongresses: Berlin, 13.–19.8.1995* (Stuttgart, 1997), 1003–8.

² Trends in scholarship are well summarized in S. von Reden, ‘Money in the Ancient Economy: A Survey of Recent Research’, *Klio* 84 (2002), 141–74.

³ Good surveys by A. Bresson, ‘Coinage and Money Supply in the Hellenistic Age’, in Z. H. Archibald, J. K. Davies, and V. Gabrielsen (eds.), *Making, Moving and*

the issues involved in the study of Ptolemaic monetary history are complex, and the data scattered over technical publications in Greek and demotic Egyptian papyrology, and numismatics as well as in archaeological site reports. The economic historian of the period is always at risk in over- or underemphasizing one particular data-set or point of view. While some scholars have emphasized the cultural or political context of coinage, others have concentrated on the use of coinage in private transactions or its role in economic growth. In this chapter I set the monetization of the economy into the larger process of asserting sovereignty over Egyptian institutions that is also reflected in the encapsulation of Egyptian law and Egyptian temples within the new state structure. All of the available evidence points to Ptolemy II Philadelphus as the key driver in the process, in part a reflection of the lag between the takeover by Alexander and the political processes of gaining control of the country, a country which went from a largely unmonetized (i.e. coin usage) economy to a largely monetized one during the course of the third century BC.

Coinage, of course, was of fundamental importance to the finance of Hellenistic states, but an examination of the process of monetizing the taxation mechanisms in Egypt illustrates one of the best reasons why the Ptolemies were so successful. By the end of the third century BC, for example, there was an independent bronze coinage, a fact that coincides well with the stronger Ptolemaic institutional control throughout Egypt.⁴ I draw a distinction between cash transactions within the fiscal system (monetary accounting, tax payments) and private cash transactions, which were largely undocumented and are therefore more difficult to study in absolute terms, although it is clear that the Ptolemaic insistence on coinage in taxation and the use of coinage as a unit of account had profound effects, as Sitta von Reden argues (forthcoming, further below).

The use of coinage is one of the key features of Hellenistic economies, and, because of its rich documentation, Ptolemaic Egypt

Managing: The New World of Ancient Economies, 323–31 BC (Oxford, 2005), 44–72; F. de Callatay, 'A Quantitative Survey of Hellenistic Coinages: Recent Achievements', in Archibald et al. (eds.), 73–91.

⁴ J. G. Manning, *Land and Power in Ptolemaic Egypt. The Structure of Land Tenure* (Cambridge, 2003), 161–4.

holds a special place in monetary history, although it has not been treated as such by economic historians. Primarily thanks to the documentary papyri, and increasingly the tax receipt ostraca, Ptolemaic Egypt offers us the best ancient material to study the impact of Greek economic institutions on a new region. Even before the Ptolemies, Egypt offers important material evidence for the history of monetization. Like so much else in Hellenistic economic structure and organization, strong institutional continuities existed with both Persian imperial practice and the fourth-century Greek experience, both connected by the theoretical concerns of Xenophon, Aristotle, and his students. The well-known text of Ps.-Aristotle, *Oikonomika*, Book 2, for example, most of it composed, probably, at the end of the fourth century BC, reveals much about the *mentalité* and the taxation policy of Hellenistic states, whether the Seleucid kingdom is the specific subject of the treatise or not.⁵

It has generally been assumed that the use of coinage had profound effects, but it is important to bear in mind that Egypt had been partially monetized for quite some time before the Ptolemies, being a crucial point of contact between the Greek world and the Persian Empire. It was certainly, therefore, well connected to the eastern Mediterranean economy before Alexander. The joining of the Greek 'stock of knowledge' to the ancient Egyptian agrarian economy and its social structure centred around the basin irrigation system is what makes the study of money in the Ptolemaic period, despite its many remaining technical problems, particularly with the bronze coinage, so interesting. Money in the form of coinage existed in Egypt since at least the seventh century BC.⁶ This is important in understanding the *mentalité* of Egyptians in the new world that was the Ptolemaic economy. What was new was the process of monetization, the increased demand for coin through taxation and, probably, the increased use of coin in private transactions.⁷ But there is an important *caveat*. The documentary

⁵ See the very good discussion by G. G. Aperghis, *The Seleukid Royal Economy. The Finances and Financial Administration of the Seleukid Empire* (Cambridge, 2004), 117–35. On the date, *ibid.* 129–35.

⁶ For coins minted in Egypt dating to the Persian king Artaxerxes III (probably at Memphis), although found elsewhere, see S. P. Vleeming, 'Coins of Pharaoh Artaxerxes III', in *Some Coins of Artaxerxes and Other Short Texts in the Demotic Script Found on Various Objects and Gathered from Many Publications* (Leuven, 2001), 1–4.

⁷ For a good treatment of similar issues later, see W. C. Schultz, 'The Monetary History of Egypt, 642–1517', in C. F. Petry (ed.), *The Cambridge History of Egypt* (Cambridge 1998), i. 318–38.

evidence is far from clear enough to be certain that there was extensive use of coinage in small transactions, and it is likely that there existed in Egypt as elsewhere in the Hellenistic world a gap between urban areas that were more monetized and rural areas that remained 'zones of low monetization'.⁸

2. HISTORY OF 'MONEY' IN EGYPT

Metals and grain were used as media of exchange, a store of value, and a means of payment for more than a millennium before coins. Gold rings and copper blades as well as grain were well known in New Kingdom transactions, and a nominal exchange rate between copper and silver was fixed at 1 : 60.⁹ An important Ramesside period letter shows, for example, that the harvest tax collected on private land was paid in 'gold into the treasury of Pharaoh'.¹⁰ The term 'gold' in this text is susceptible to several interpretations but it is at least plausible that the term refers in a general sense to 'money' and that taxes in grain were conceived of in monetary terms. A silver standard was in place by the end of the New Kingdom. Under the Persians, the treasury of Ptah in Memphis was the guarantor of a silver bullion standard, and this standard may have been more widely accepted than in earlier times.¹¹

⁸ Bresson, 'Coinage and Money Supply' [n. 3], 66.

⁹ Good summaries of the pharaonic Egyptian economy (i.e. primarily the New Kingdom economy, when the documentary evidence is at its thickest) may be found in B. J. Kemp, 'The Birth of Economic Man', in *Ancient Egypt. Anatomy of a Civilization* (London, 1989), 232–60; B. Menu, 'Le système économique de l'Égypte ancienne', *Méditerranées* 17 (1998), 71–97. Barter exchange measured against fixed value of a commodity (silver, copper/bronze, grain) is well known in ancient Egypt and described by J. J. Janssen, 'Prolegomena to the Study of Egypt's Economic History during the New Kingdom', *Studien zur altägyptischen Kultur* 3 (1975), 127–85, and by B. J. Kemp (see above). On the dangers of assuming that any pre-modern state had the ability to guarantee exchange rates, see the cautionary remarks of Schultz, 'Monetary History' [n. 7], 322–3.

¹⁰ P. Valençay I; A. B. Gardiner, 'A Protest against Unjustified Tax-demands', *Revue d'Égyptologie* 6 (1951), 115–33; S. L. D. Katary, *Land Tenure in the Ramesside Period* (London, 1989), 207–16; D. A. Warburton, *State and Economy in Ancient Egypt. Fiscal Vocabulary of the New Kingdom*, *Orbis Biblicus et Orientalis* 151 (Fribourg, 1997), 136–7.

¹¹ On money in pre-Ptolemaic Egypt, see F. Daumas, 'Le Problème de la monnaie dans l'Égypte antique avant Alexandre', *Mélanges de l'École française de Rome* 89

In the so-called Third Intermediate Period (1069–664 BC), some taxes were clearly monetized. A 10 per cent transfer tax is known in a few documents.¹² Increased monetization seems to be associated with a higher volume of trade with Greece beginning in the seventh century BC, at the same time as the Greek trading colony at Naukratis in the western Delta was established.¹³ It is therefore not surprising to see an increase in coin hoards in the sixth century BC. If Kim's suggestion is correct, the use of small change in the Greek world speaks to a deeply embedded institution across the range of the social hierarchy and, as a Greek institution, would have been familiar to Greek immigrants in Egypt.¹⁴ As Muhs rightly argues though, monetized transactions were still limited to a small elite circle, preponderantly soldiers, and coinage was used mainly as bullion.¹⁵ By the fourth century BC, the evidence for the use of bronze coins in small transactions increases. Persian imperial practice of demanding some taxes in silver must have had an effect in monetizing private transactions, although the extent of it can hardly be estimated.

Papyrus Hou 12, a money loan, perhaps for the purpose of purchasing of a cow, is one example of a Persian period loan of money written in demotic Egyptian.¹⁶

Year 35, 2d month of the *shemu* season (Payni) under Pharaoh [Darius]. Says the [Goose]herd [of the Domain of Amon, Petash]otmef, son of Inarou, his mother Te[te]tichy, to the Gooseherd of the Domain of Amon (2) [., son of In]arou, his mother Obastorer: [I have received from you] 3 [*kite* silver]

(1977), 425–42. See e.g. the demotic marriage contract dated to the reign of Darius I from Saqqara published by C. J. Martin, 'A Twenty-Seventh Dynasty "Marriage Contract" from Saqqara', in *Studies in Honour of H. S. Smith* (London, 1999), 193–9; S. P. Vleeming, *The Gooseherds of Hou (Pap. Hou). A Dossier Relating to Various Agricultural Affairs from Provincial Egypt of the Early Fifth Century BC* (Leuven, 1991), 89.

¹² On the history of the transfer tax, see M. Depauw, *The Archive of Teos and Thabis from Early Ptolemaic Thebes. P. Brux. Dem. Inv. E. 8252–8256* (Turnhout, 2000), 58–63; and briefly, B. Muhs, *Tax Receipts, Taxpayers, and Taxes in Early Ptolemaic Thebes: Demotic and Greek Ostraca in the Oriental Institute Collection*, Oriental Institute Publications 126 (Chicago, 2005), 3–4.

¹³ Muhs, *Tax Receipts* [n. 12], 4.

¹⁴ H. S. Kim, 'Small Change and the Moneyed Economy', in P. Cartledge, E. E. Cohen, and L. Foxhall (eds.), *Money, Labour and Land. Approaches to the Economies of Ancient Greece* (London, 2002), 44–51.

¹⁵ Muhs, *Tax Receipts* [n. 12], 4.

¹⁶ Suggested by Vleeming, *Gooseherds of Hou* [n. 11], 161.

of the treasury of Ptah, [refined, which you gave] me; it is I who will give you 6 *kite* silver of the treasury of Ptah, refined,¹⁷ (3) [because of] them, in year 36, 1st month of the *peret* season (Tybi). If I fail [to give] you [these] 6 *kite* silver of the treasury [of Ptah, refined], in year 36, 1st month of the *peret* season (Tybi) they will bear (interest) against me, 1/10th of silver to (4) each (*kite* of silver), from year 36, 2^d month of the *peret* season (Mecheir) onwards, while they don't stop as interest [in any month (and) any year] that they will be with me, while interest (will) bear as interest against me (5) again, and also this interest which is (mentioned) above, till whatever ever [*sic*] they would reach; and I will give then [to you and also their interests]. This(?) money which is (mentioned) above and also their interests [will] befall on me (6) (and) on my children, and also (on) the pledges that you will want [from me, all, all, (as) houses, slave, (female) slave, cow,] donkey, and cattle, barley, emmer, (7) silver, bronze, clothing, everything as chattels, and you will take them [to you] because of them, till [you have filled them with the above money and their interests]. [I shall not be able to say], 'I have given to you money (or) interest among them, while (8) this document is in your hand. In writing of Onnōfri, son of Tethotefōnch.

Four witnesses sign on the verso of the contract.¹⁸

There are only a handful of pre-Ptolemaic money loan contracts, and caution must be exercised in drawing conclusions about the extent of private lending of money.¹⁹ While we have no comparable evidence from Egypt of monetary theory to rival Xenophon or Aristotle, it seems difficult to believe that the trends in Greek thought in the fourth century would not have at least been observed in the fourth-century economy of Egypt. The imitation owl coins minted in Egypt in this period may reflect a link between Greek theory and Egyptian practice before the Ptolemies, and the enormous quantity of precious metal from the Persian treasury circulated as coin as the result of Alexander's campaigns must surely have affected early Ptolemaic Egypt.²⁰

¹⁷ Here the term 'refined' refers to weight standards (not the fineness of silver content) of the temple of Ptah in Memphis against which silver 'pieces' were weighed.

¹⁸ Translation of Vleeming, *Gooseherds of Hou*, whose textual notes are invaluable.

¹⁹ See briefly Depauw, *Archive of Teos* [n. 12], 146–7.

²⁰ F. de Callatay, 'Les Trésors achéménides et les monnayages d'Alexandre: espèces immobilisées et espèces circulantes', *Revue des Études Anciennes* 91 (1989), 259–74.

3. THE PTOLEMAIC ECONOMY

The rather famous and oft-quoted passage in Saint Jerome's *Commentary on the Book of Daniel* (XI. 5) stating that the annual revenue of Ptolemy II amounted to 14,800 talents of silver and 1.5 million *artabae* of wheat, whether we believe the figures or not, tells us a good deal about the scale of the Ptolemaic royal economy and the sources of revenue: direct taxation of agricultural production, some of which, fodder crops for example, were converted into coin, and the taxation in cash of persons and private transactions.²¹ The agricultural sector was of course dominant, but if Jerome's figures are to be considered meaningful in any way, the amount of cash in the annual revenue is the more impressive figure. There were, obviously, good reasons to keep revenue in grain. Neither wheat nor silver was new with Ptolemy I, but Greek fiscal institutions probably allowed for a greater (and more efficient?) capture of revenue than at any time in previous Egyptian history. It was under the Ptolemies that Greek fiscal institutions, coinage, banks, and tax farming, were first introduced in Egypt. The subsequent monetization of the traditional agricultural economy marks a turning point, somewhat earlier than usually posited, in the rise of the 'mercantile state'.²² It is now, I believe, *communis opinio* that the Ptolemaic transition in the early third century BC was marked more by continuity with Persian rule than discontinuity. The fact that Ptolemy acted at first as a satrap is only the most obvious and public signal that Ptolemaic rule in Egypt maintained well-established and functioning institutions. Like the Seleucid dynasty, the Ptolemies established themselves on a Persian foundation and provided a new incentive structure for state service and private economic activity.²³ Egypt had been an important trade axis connecting the Mediterranean to the east and south for a millennium before the Ptolemies, but Greek immigration, the new cities of Alexandria and Ptolemais, and Greek fiscal institutions had profound effects. The intellectual foundations for the use of coinage

²¹ See further Manning, *Land and Power* [n. 4], 135 n. 21, on the figures.

²² J. Hicks, *A Theory of Economic History* (Oxford, 1969).

²³ A good survey of Persian history: P. Briant, *From Cyrus to Alexander. A History of the Persian Empire* (Winona Lake, Ind., 2002).

in state finance expressed in Ps.-Aristotle, *Oikonomika* 2. 1–2, is as important for understanding Ptolemaic policy as it is for Seleucid. It is in this setting that coinage and the increase in monetization should be understood.

The economic policy of the early Ptolemaic kings, and I think 'policy' is a fair term to use, was (to judge mainly from a reading of *P. Rev.*) predictability, stability, insulation from risk (at least in theory), and, above all else, revenue capture by, in theory, taxing anything that moved, including animals.²⁴ Change came in economic intensification—increased urbanization, increased long-distance trade, and increased monetization, especially in the realm of taxation, and in structure-intensified agrarian production, royal banks, and royal granaries. Along with this change came rural unrest that, on one occasion (207–186 BC), led to the secession of most of the Thebaid from the Ptolemaic state, and consequently a loss of tax revenue.²⁵ The increased presence of Greeks and their role in the bureaucratic hierarchy, in military service and in other economic activity, altered the structure of social power in terms of language (the increased use of Greek in the villages) and access to rents (i.e. income). Above everything else, however, stands the Ptolemaic closed currency system that on the one hand set off Egypt and the Ptolemaic imperial possessions from other Hellenistic states, and on the other became established as a universal fiscal institution within Egypt.

Some considerable advances in the understanding of Ptolemaic coinage have been made recently.²⁶ It is clear that Ptolemaic taxation

²⁴ For *P. Rev.*, see B. P. Grenfell and J. P. Mahaffy, *The Revenue Laws of Ptolemy Philadelphus* (Oxford, 1896), C. Préaux, *L'Économie royale des Lagides* (Brussels, 1939), 65–93, J. Bingen, *Papyrus Revenue Laws*, *Sammelbuch griechischer Urkunden aus Ägypten*, suppl. 1 (Göttingen, 1952), Bingen, *Le Papyrus Revenue-Laws. Tradition grecque et adaptation hellénistique* (Opladen, 1978). On Ptolemaic intentions, see A. E. Samuel, *From Athens to Alexandria: Hellenism and Social Goals in Ptolemaic Egypt*, *Studia Hellenistica* 26 (Leuven, 1983).

²⁵ On the revolts of the period, see the summaries in B. C. McGing, 'Revolt Egyptian Style. Internal Opposition to Ptolemaic Rule', *Archiv für Papyrusforschung* 43 (1997), 273–314, Manning *Land and Power* [n. 4], 164–71, and the study by A.-E. Véisse, *Les 'Révoltes égyptiennes.'* *Recherches sur les troubles intérieurs en Égypte du règne de Ptolémée III à la conquête romaine*, *Studia Hellenistica* 41 (Leuven, 2004). The causes of the revolts are unclear.

²⁶ For a good summary see R. A. Hazzard, *Ptolemaic Coins. An Introduction for Collectors* (Toronto, 1995). See also O. Picard, 'L'Apport des monnaies des fouilles

policy that required some taxes to be collected, or at least calculated, in terms of money, and the creation of banks, played key roles in monetization.²⁷ There may have been a regional difference in the process, influenced by where Greeks settled. On the basis of the scanty evidence, commodity prices appear to have remained relatively stable.²⁸ New fiscal measures were taken in the production, manufacture and sale of key items such as flax, salt, beer, and for certain oil crops. Here the Ptolemaic state utilized competitive bids and labour contracts that fixed workers in a specific place over the length of the contract, often supplied raw materials and tools, and granted state licences for the sale of the finished product (the so-called Ptolemaic 'monopolies', although they scarcely were). The aim here, as throughout the Ptolemaic fiscal system, was to secure labour, and to produce predictable income for the state.²⁹

There was initially a tri-metallic coin system, although gold was hardly circulated. The silver and bronze coins were linked through a fixed exchange mechanism, adjusted at the end of the third century BC. The taxation policy of the Ptolemies that required some payments to be made in coin, and the control of 'monopoly' industries, accelerated the circulation of coin (bronze) throughout Egypt. The spread of banks from urban centres to (some) Egyptian villages was not only the crucial process in linking taxpayers to taxation collection but was also an important nexus between cash and kind in rural areas where the circulation of coinage may have been limited.³⁰

d'Alexandrie', *Études alexandrines* 10 (2004), 81–90; F. Burkhalter and O. Picard, 'Le Vocabulaire financier dans les papyrus et l'évolution des monnayages lagides en bronze', *Études alexandrines* 10 (2004), 53–80; S. von Reden, *Money in Ptolemaic Egypt* (Cambridge, forthcoming).

²⁷ Cf. D. Rathbone, 'The Ancient Economy and Graeco-Roman Egypt', in L. Criscuolo and G. Geraci (eds.), *Egitto e storia antica dall'ellenismo all'età araba*. (Bologna, 1989), 159–76; von Reden, *Money* [n. 26].

²⁸ Land prices: A. E. Samuel, 'The Money Economy and the Ptolemaic Peasantry', *Bulletin of the American Society of Papyrologists* 21 (1984), 187–206, H. Cadell, 'Le Prix de vente des terres dans l'Égypte ptolémaïque d'après les Papyrus grecs', in S. Allam (ed.), *Grund und Boden in Altägypten* (Tübingen, 1994), 289–305. Cf. K. Baer, 'The Low Price of Land in Ancient Egypt', *Journal of the American Research Center in Egypt* 1 (1962), 25–45.

²⁹ E. G. Turner, 'Ptolemaic Egypt', in *CAH* vii. 1, 2nd edn. (Cambridge, 1984), 151–53; von Reden, *Money* [n. 26]. *P. Rev.* is the key document.

³⁰ Von Reden, 'Money in the Ancient Economy' [n. 2], 147; D. Foraboschi and A. Gara, 'L'economia dei crediti in natura (Egitto)', *Athenaeum* 70 (1982), 69–83.

The paucity of price data preserved in the papyri is a serious barrier to understanding the long-term performance of the Ptolemaic economy. References to items in the papyri can be frustratingly obscure, small items such as hoes are rarely given values, we are not always sure whether a price is reckoned in silver or bronze, and there are significant gaps in our information (e.g. for the price of wheat from the mid-third century BC to 209 BC).³¹ The data derived from penalty clauses in contracts can mislead. The explanation for the long-term history of commodity prices is exacerbated by our lack of knowledge about the amount of money in circulation and the velocity of circulation.³² The supposed price inflation that occurred in the reign of Ptolemy IV Philopator has received extensive comment and various explanations.³³ Earlier analyses have focused on the reduction in precious metal of the silver coins, in a new bookkeeping system, or in a reduction of the weight of the bronze drachma and the consequent increase in the value of coin in circulation.³⁴ Much of the so-called price inflation, however, is derived not from a single new bronze accounting standard but from multiple re-tariffings of the bronze coins against silver and gold.³⁵ An independent bronze standard was introduced at the end of the third century BC.

The Egyptian rural economy was long used to monetized exchange (usually reckoned in grain against fixed values), and grain and wine continued to be used as such into the Roman period.³⁶ While it is clear that the Ptolemies were increasingly interested in generated

³¹ Samuel, 'The Money Economy' [n. 28]. For the gap in wheat prices, see H. Cadell and G. Le Rider, *Prix du blé et numéraire dans l'Égypte de 305 à 173*, *Papyrologica Bruxellensia* 30 (Brussels, 1997).

³² R. S. Bagnall, review of Cadell and Le Rider [n. 31], *Revue Suisse de Numismatique* 78 (1999), 197–203.

³³ T. Reekmans, 'The Ptolemaic Copper Inflation', *Studia Hellenistica* 7 (1951), 61–119; K. Maresch, *Bronze und Silber. Papyrologische Beiträge zur Geschichte der Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.*, *Papyrologica Coloniensia* 25 (Cologne, 1996); Cadell and Le Rider, *Prix du blé* [n. 31]; Bagnall, review [n. 32].

³⁴ Reekmans, *ibid.*

³⁵ Bagnall, review [n. 32], 198; von Reden, *Money* [n. 26].

³⁶ Wine: W. Clarysse and K. Vandorpe, 'Viticulture and Wine Consumption in the Arsinoite Nome (P. Köln V 221)', *Ancient Society* 28 (1997), 67–73. On Egyptian mentalities, see J. Bingen, 'Économie grecque et société égyptienne au IIIe siècle', in H. Maehler and V. M. Strocka (eds.), *Das Ptolemäische Ägypten. Akten des Internationalen Symposions 27.–29. September 1976 in Berlin* (Mainz, 1978), 211–19.

revenue in coin, the continued use of grain as a medium of taxation limited Ptolemaic ability to monetize the rural economy completely.³⁷ But that, of course, was not the aim of the Ptolemaic fiscal system. Contract wage labour, in the agricultural sphere as well as for short-term building projects, canal building and the like, was common, with daily or monthly payment being done in kind as well as cash.³⁸ Like so much else with the Ptolemies, what is characteristic was the intensification of trends seen in the Saite and Persian periods (664–332 BC)—increased urbanization, long-distance trade, and monetization. This last was significantly aided by the Greek institution of banking.³⁹ We can add one more concept to the definition of ‘monetization’, and that is that valuations are given in terms of money (i.e. the Ptolemaic coinage system added a new element of numeracy to accounting methods), and wrongs are adjudicated in terms of money. Here the legacy of Rome that Hicks discussed⁴⁰ should be understood as resting on a Ptolemaic foundation. The use of coinage, then, was part of a larger state project to establish new standards and increase stable revenue.

4. COIN AS ‘CODE’ IN PTOLEMAIC EGYPT

The use of coined money in the taxation system, as payment in wage labour and in small transactions was a new feature of the Egyptian economy under the Ptolemies, and it is Ptolemy II who appears as a major reformer. This king did two important things with respect to coinage: (1) Reform of the taxation system, most importantly in the institution of the capitation tax known as the salt tax,⁴¹ and (2) institution of the tax farming system supported by a public auction for the sale of tax collection contracts. The salt tax was the major new

³⁷ Samuel, ‘The Money Economy’ [n. 28], J. Rowlandson, ‘Money Use among the Peasantry of Ptolemaic and Roman Egypt’, in A. Meadows and K. Shipton (eds.), *Money and its Uses in the Ancient Greek World* (Oxford, 2001), 149.

³⁸ Treated well by von Reden, *Money* [n. 26].

³⁹ R. Bogaert, *Trapezitica Aegyptiaca. Recueil de recherches sur la banque en Égypte gréco-romaine*, Papyrologica Florentina 25 (Florence, 1994).

⁴⁰ J. Hicks, *A Theory of Economic History* (Oxford, 1969), 70.

⁴¹ On this tax, see Muhs, *Tax Receipts* [n. 12], 41–51; W. Clarysse and D. Thompson, *Counting the People in Hellenistic Egypt* (Cambridge, 2006), ii. 36–89.

institution in the process of monetizing the economy and a key source of state control; indeed it is the monetization of taxes, and the bureaucratic infrastructure that revolved around it, that stands out as the single most important aspect of the internal history of Egypt in the last three centuries BC. The payment of taxes in the Ptolemaic period was divided into two types: those collected (or at least calculated) in terms of grain, and those taxes that were demanded in coin. Certain taxes on agricultural production were also required to be paid in coin. The most important of these were the *apomoira*, a tax on vineyards, the tax on fruit trees, and a fodder tax. Surely by the second century BC, and probably before, Egyptian temples were fully involved in the cash game. Recently published texts from Edfu, for example, suggest that temples were involved in the marketing of wine.⁴² Other forms of business, beekeeping for example, were cash businesses in which the state normally received cash rents.⁴³ But as both von Reden and Rowlandson have pointed out recently, the persistence of the Roman policy of collecting the tax on grain-bearing land in kind for pragmatic reasons formed a natural limitation to monetizing the economy in coin.

The 'Ptolemaicization' (i.e. political systemization or institutionalization) of Egypt, that is, the desire to impose a homogenous bureaucratic culture and the adoption of Ptolemaic state institutions by the population of Egypt, was not accomplished by coercion alone, although coercive force may have occasionally played a role in the enforcement of state rules, including tax collection. Ptolemaic development was also driven by the adaptation to pre-existing institutions. Development was, therefore, variable across time and region in Egypt in the third century BC, but was probably well established by the second century BC. The story of the shift to Ptolemaic institutions is a complicated one and involves social processes on many different levels, from institutional signals (the Greek language, circular letters, and other kinds of 'instruction' texts and so on⁴⁴) by the central state, to incentive

⁴² *P. Carlsb. 409 and 410*. See now M. Schentuleit, *The Carlsberg Papyri 9: Aus der Buchhaltung des Weinmagazins im Edfu-Tempel. Der demotische P. Carlsberg 409*, CNI Publications 32 (Copenhagen, 2006).

⁴³ See the comments by Bingen, 'Économie grecque' [n. 37].

⁴⁴ For a well-known example of 'instruction', see *P. Tebt. 703*, with the comments of D. J. Crawford, 'The Good Official of Ptolemaic Egypt', in Maehler and Stročka (eds.), *Das Ptolemäische Ägypten* [n. 36], 195–202.

structures and individual choice by settlers and local populations throughout Egypt. Greeks, of course, were in an advantaged position in certain respects initially in their use of the Greek language and their familiarity with coined money.⁴⁵ The Zenon archive in this context, documenting newly exploited land, and a high degree of monetization, is exceptional.

Coinage, to be sure, represented the authority of the king, and the control of minting from a central point in Alexandria highlights this fact, as of course does the iconography of the coins themselves. That authority is found not only in the demand for taxes and the fixing of the value of coins but also in the power of the king to assign tenure to land, to survey fields, to establish nome boundaries, to conduct censuses of men and animals, to guarantee justice, to establish weights and standards, and so on.⁴⁶ Coinage, then, was a new institution brought to bear in the ancient power struggle between central and local authority in Egypt, and the establishment of the Ptolemaic mint in Alexandria by 320 BC was an important signal by the new sovereign state, a point also well stressed by von Reden (forthcoming).

Demotic legal texts show us the history of the relationship between money and the state in the first millennium BC rather clearly. In Saite demotic documents, as well as Aramaic ones, amounts of money are mentioned in terms of weighed pieces of silver against a certain weight standard of a temple: 'silver, x *deben* of the Treasury of Ptah, refined'. The Egyptian weight standard was known as the *deben*, and it was at the treasury of the most important temple of the Saite-Persian and Ptolemaic period, that of the god Ptah at Memphis, where the standard measures were fixed. This important role of the temple was replaced in the Ptolemaic period when the phrase 'silver, x *deben* of the Treasury of Ptah, refined' was an archaism with the new meaning not of a standardized weight but of a specific amount of silver in Ptolemaic coins.⁴⁷ This was a subtle yet important shift in

⁴⁵ See J. Bingen, 'Les Tensions structurelles de la société ptolémaïque', in *Atti del XVII Congresso internazionale di papirologia* (Naples, 1984), 921–37, on this point.

⁴⁶ Hicks, *A Theory* [n. 40], 63–80. The institution of public auction was a new mechanism introduced by the Ptolemies to assign tenure to land, among other things including the right to collect taxes.

⁴⁷ See Vleeming, *Gooseherds of Hou* [n. 11], 88–9, with literature.

political and economic power away from Egyptian temples and into the hands of the Ptolemaic kings.

The fixing of the value of each coin and the determination of how many of each type of coin should circulate was an additional source of sovereign power of the kings (Ps.-Arist., *Oik.* 2. 1. 3).⁴⁸ Thus, coins, their circulation, and use are strongly linked to the early Ptolemaic project to integrate the royal economy with the ancient institutional structure of Egypt. Von Reden (forthcoming) rightly stresses the connection between coinage and royal legitimacy. A taxation system that demanded payments in coin was an imposition of state authority on villages just as, in ancient times, the king imposed a rural order in the establishment of nome (i.e. district) boundaries. The act of demanding coin was an act of sovereignty, a constraint on the hinterland, and a means by which state authority was imposed, at least in theory, in a uniform or standardized way. It should be stressed here that while the Ptolemaic kings attempted to impose a political order on Egypt, this order was neither uniform nor completely accepted. The establishment of coinage as a means of the payment of taxes and in small transactions was part of the imposition of a larger political order, related, for example, to the formation of a new legal order that incorporated both Greek and Egyptian legal traditions into one state system. The process in Ptolemaic Egypt is rather different than that described by Seaford for the Greek polis,⁴⁹ and it did not involve as much of a threat against the local elite that undermined traditional society.⁵⁰ In the context of post-Saite and Persian rule, when I believe more serious adjustments to centralized rule occurred, the imposition of coinage was more a matter of contract between the king and the elites that exchanged rents and the acceptance of sovereignty for justice. That is not to say, however, that priests never found themselves in trouble with respect to Ptolemaic fiscal demands, as the Milon archive discussed below shows. But coinage is only part of a larger story of reform, which involved not only coercive pressure from above but also acceptance from below.

⁴⁸ Cf. Eric Helleiner, 'Electronic Money: A Challenge to the Sovereign State?', *Journal of International Affairs* 51 (1998), 387–409.

⁴⁹ Seaford, *MEG*.

⁵⁰ Cf. the remarks of von Reden, 'Money' [n. 2], 165–6.

An important aspect of this reordering of the countryside was the encapsulation of Egyptian law within the state. Codified law in Egypt, in the sense of a written set of rules, customs, and commentary on law, is documented directly only in Ptolemaic and Roman times, although there is a tradition that carries codified law back to the beginning of Egyptian history. Whether codified law existed in Egypt or not, the documentary evidence for codified law in the Ptolemaic period reflects Saite recentralization of the state and Persian codification recorded in the *Demotic Chronicle*, not *sensu stricto* a codification at all but in all likelihood merely an order to translate into Aramaic the existing legal traditions in Egypt.⁵¹ The most important Ptolemaic period document of Egyptian law is known as the Hermopolis legal code (= *P. Mattha*). There has been vigorous debate about the nature of this text, whether it is in fact a code similar to the Near Eastern codes, a kind of legal commentary, or a manual used by judges to decide cases. Be that as it may, the real question here is the origin of the text, and scribes to draw up instruments. Is it, as Pestman has argued,⁵² merely a Ptolemaic copy of a text generated in the eighth century BC by king Bocchoris, one of the 'lawgivers' of Diodorus, or is it the result of a broad codification of local traditions promoted by Ptolemaic rule? Others have suggested that the text is related to the tradition of Darius' collecting of Egyptian law. To be sure, the 'code' as we have it dates to the third century BC, and most scholars accept a date in the reign of Ptolemy II based on paleography. The argument for an earlier date of composition is based on three incomplete dates in the papyrus that may refer back to the period between 645 and 582 BC, the mention of a pre-Persian form of marriage contract⁵³ and, in a few places in the text, archaic orthography. The range of subjects covered in the Hermopolis code (and similar texts from the same period) is rather limited to formal rules of making contracts (sales, leases, and the like) and to procedure. The

⁵¹ D. B. Redford, 'The So-called "Codification" of Egyptian Law under Darius,' in J. W. Watts (ed.), *Persia and Torah. The Theory of Imperial Authorization of the Pentateuch* (Atlanta, 2001), 135–59.

⁵² P. W. Pestman, 'L'Origine et l'extension d'un manuel de droit égyptien: quelques réflexions à propos du soi-disant code de Hermopolis,' *Journal of the Economic and Social History of the Orient* 26 (1983), 14–21.

⁵³ J. H. Johnson, "Annuity Contracts" and Marriage', in *For his ka. Essays Offered in Memory of Klaus Baer*, Studies in Ancient Oriental Civilization 55 (Chicago, 1994), 114.

original editors of the text understood it as merely a part of a 'great code' yet to be discovered, making the incorrect assumption that a code must be comprehensive.⁵⁴

Since its discovery in 1938–9 'in a partially broken jar in the debris of a ruined building opposite the room of mummification'⁵⁵ at Hermopolis, and its subsequent publication in 1975, the Hermopolis code has received much attention among scholars of demotic Egyptian. The milieu of such a text is no doubt a temple archive, and it probably originated in the House of Life—a temple scriptorium where important books on religion and traditional learning were copied.⁵⁶ A Greek papyrus (*P. Oxy.* 3285) from the second century AD shows some similarities to the Hermopolis text. In this Roman text, the existence of a copy may only suggest antiquarian interest by a priest rather than proof of the application of Egyptian law in the second century AD. It is certainly a Greek translation, probably going back to the early Ptolemaic period, of an Egyptian body of law.

It is tempting to associate the writing of this text with other efforts at early Ptolemaic state reorganization. Evidence is clear enough to show that the efforts of the early Ptolemaic kings to reorganize Egypt was systematic. The 'text' that provides us with the most important information about the nature of the Ptolemaic state survives only by way of references in other documents, where it is referred to simply as 'the legislation' (Greek *to diagramma*).⁵⁷ Whether it occurred on one occasion, or over the course of several years, references to different sections of the 'legislation' suggest that the effort was a comprehensive one. Among other issues, it empowered courts to decide the law assigned to them, established rules for selecting judges, and promulgated maximum interest rates on loans. Bocchoris' reforms in the eighth century BC limited the maximum interest rate (*Diod. Sic.* 1. 79), but

⁵⁴ On the wide range of definition of code, see J. Lindgren, 'Measuring the Value of Slaves and Free Persons in Ancient Law', in *Chicago-Kent Law Review* 71/1 (1995), 150–2.

⁵⁵ G. Mattha and G. R. Hughes, *The Demotic Legal Code of Hermopolis West*, Bibliothèque d'Étude 45 (Cairo, 1975), p. xi.

⁵⁶ A mathematical treatise is recorded on the verso of the Hermopolis text.

⁵⁷ On this 'legislation' see H.-J. Wolff, 'Plurality of Laws in Ptolemaic Egypt', *Revue Internationale des Droits de l'Antiquité* 3 (1960), 191–223; J. Méléze-Modrzejewski, 'The Septuagint as *Nomos*: How the Torah Became a "Civic Law" for the Jews of Egypt', in J. W. Cairns and O. F. Robinson (eds.), *Critical Studies in Ancient Law, Comparative Law, and Legal History* (Oxford, 2001), 190–3.

a 100 per cent rate on a money loan is recorded in the fifth century BC.⁵⁸ Interest rates for money loans under the early Ptolemies may be inferred to have been 30 per cent, reduced to 24 per cent per annum by the legislation of Ptolemy II, and later to maximum of 12 per cent in the early Roman period.⁵⁹

The process of Ptolemaicizing Egyptian institutions can, I think, be well understood in the light of Mancur Olson's 'stationary bandit' model. In such a model, the ruler binds himself by giving over rights and coercive power to constituent groups in the society in exchange for revenue extraction. The reforms of Ptolemy II may also have prompted the recording of Egyptian legal procedures that appear in Egyptian legal texts such as the Hermopolis legal code. The consolidation of legal traditions appears to have been a concerted effort to bring the constituent elements of Ptolemaic Egyptian society under the corporate structure of the state, while at the same time preserving the legal customs of the various populations in Egypt. Modrzejewski has recently suggested that we understand the writing of the Septuagint in the third century BC in the same light, i.e. as a confirmation of pre-existing Jewish law now in codified, Greek form.⁶⁰ That the efforts of Ptolemy II reached villages in Upper Egypt as well as in the Fayyum is shown in the resolution of disputes within the context of Egyptian law.⁶¹

In his treatment of legal reforms, it is interesting to note that the Ptolemies are hardly given a mention by Diodorus other than to say that Egyptian institutions were changed by them:

The system, then, of law used throughout the land was the work, they say, of the men just named, and gained a renown that spread among other peoples everywhere; but in later times, they say, many institutions which were regarded as good were changed, after the Macedonians had conquered and destroyed once and for all the kingship of the native line.

(Diod. Sic. 1. 95. 6, Oldfather translation)

This is a rather harsh critique of Ptolemaic rule in Egypt, and was no doubt coloured by the realities of later Ptolemaic history, which, by

⁵⁸ *Pap. Hou 12* (= *P. Loeb 48 + 49A*), Hûw (Upper Egypt), 487 BC, republished and discussed by Vleeming, *The Gooseherds of Hou* [n. 11], 156–77.

⁵⁹ On interest in Egyptian loans, see P. W. Pestman, 'Loans Bearing no Interest?', *Journal of Juristic Papyrology* 16–17 (1971), 7–29.

⁶⁰ Méléze-Modrzejewski, 'The Septuagint' [n. 57].

⁶¹ See the Asyut family archive discussed below.

all accounts, was a very difficult time both politically and economically. Diodorus' time in Egypt, between the years 60 and 56 BC, were not happy years for Egypt. Documents both before and after these years are clear about the agricultural problems: communication lapses in the administration, flight from the land, crop failure culminating apparently in 48 BC, when Pliny (*HN* 5. 58) notes the lowest flood level known to him, no doubt part of a longer and unpleasant inter-annual trend.⁶²

Ptolemaic institution building during the third century BC tells a rather different story than either Pliny's or Diodorus'. There were great successes, including the building of a new capital city at Alexandria, a new regional administrative centre at Ptolemais in southern Egypt, a massive land reclamation project in the Fayyum, an accommodation of Egyptian institutional structures at the same time as new Greek fiscal institutions, and the new administrative language (Greek), gradually replaced Egyptian economic and political structures. Because there are very few Greek documents dated to the reign of Ptolemy I, and the enormous amount of documentary material from the reign of Ptolemy II, it is usually assumed that it was the latter king who created the institutions of the Ptolemaic state. But an important first step, and an indication of a plan to govern Egypt, was taken by Ptolemy I in founding the southern Greek city of Ptolemais (modern el-Manshah) just above modern Sohag. The foundation of a Greek polis in this part of Egypt was a recognition that the Thebaid region (Aswan down to about Abydos) required strong administrative presence by the new regime. The Thebaid, centred on the temple of priesthood of the god Amun in Thebes in the first millennium BC, was used to semi-independence from the political capital in the north. Another text of Ptolemy I, the *Satrap Stela*, shows that while he still functioned technically as a Persian governor (satrap) of Egypt, he functioned, in Egyptian eyes (the intended audience of the text) as a pious Egyptian pharaoh. The contours of royal ideology are already clearly established in this text.

With Ptolemy II's reign we have much more documentation in Greek and Egyptian, and it is assumed that this increase reflects not merely an accident of preservation but an increase in state activity,

⁶² D. J. Thompson, 'Egypt, 146–31 BC', in *CAH* ix, 2nd edn. (Cambridge, 1994), 322–3.

and important changes in the taxation system including, importantly, the use of bronze coinage for certain tax payments. The well known *Karnak Ostrakon*, for example, a demotic text usually dated to 258 BC, shows that a royal order to survey land reached the south of the country and the important temple of Amun at Thebes.⁶³ Such an order emanated from the king himself, probably originally in the form of a *prostagma*, and was sent down the chain of the bureaucracy, and translated into demotic so that local priesthoods (or agents of the state) as well as farmers could be informed of what was expected by the Ptolemaic authorities who were responsible for generating a budget for the king. This suggests that the orders were intended to go through the temple bureaucracy, not through a separate bureaucracy, a good indication that the temple structure was utilized by the early Ptolemies for such administrative purposes. The order also clearly shows that information on tenure and water conditions flowed from the villages up to the capital and not the reverse. This is in any case the theory, and the text at hand is good evidence that the order penetrated deep into the Egyptian countryside to at least the powerful priesthood of the temple of Amun at Karnak.

Two important texts from the reigns of Ptolemy II and III show us the ideal of the bureaucracy, and the operation of the new fiscal system.⁶⁴ The first text, *P. Tebt. 703*, dating to the early part of the reign of Ptolemy III Euergetes, is thought to contain a series of instructions from the chief financial official in Alexandria (*dioikētēs*) to an official in charge of nome finances (*oikonomos*). Its literary connections to earlier Egyptian instructions (of the Pharaoh establishing the proper code of conduct for officials and a sense of ‘justice’ between the state and its subjects) should be taken seriously, although the mention of difficult times suggests that the text was a specific attempt at restoring order after a period of civil unrest linked to a war and, perhaps, poor Nile flooding.⁶⁵ The allusion to soldiers

⁶³ E. Bresciani, ‘Registrazione catastale e ideologia politica nell’Egitto tolemaico. A completamento di “la spedizione di Tolemeo II in Siria in un ostrakon demotico inedito da Karnak”’, *Egitto e vicino oriente* 6 (1983), 15–31; S. M. Burstein, *The Hellenistic Age from the Battle of Ipsos to the Death of Kleopatra VII* (Cambridge, 1985), 122–3.

⁶⁴ There are, of course, many other texts one could discuss in this context, not the least of which is Ps.-Aristotle’s *Oikonomika*, clearly a type of blueprint for the royal economy. See Aperghis, *The Seleukid Royal Economy* [n. 5], 129.

⁶⁵ Cf. the remarks of Crawford, ‘The Good Official’ [n. 44].

who have abandoned their duties reinforces this view. The long text covers many aspects of the royal economy from the maintenance of canals, to sowing, to the registration and care of cattle. The shipment of grain to the capital and the production of fruit trees are also given prominence. The text gives us a (static) picture of the bureaucracy and the central state's expectations of compliance and reporting.

The second text is known as the 'Revenue Laws Papyrus' (*P. Rev.*) and dates to the reign of Ptolemy II. The best-preserved section of the text deals with the production, the organization and the pricing of oil crops—sesame, castor, safflower among others (olive oil was not included in the regulations contained in *P. Rev.*). On the basis of early translations of this text, it was thought that the entire process, from seed loans to survey of the fields, to tax collection, to the setting of the price of the raw material and its delivery to state factories, was centrally planned and controlled. The careful analysis by Bingen has shown, however,⁶⁶ that the text is not, in fact, a systematic treatment of the collection of the royal revenues at all but, rather, a compendium of seven separate 'laws' (*nomoi*) issued by Ptolemy II Philadelphus governing a range of topics concerned with royal revenue, from tax farming to the oil crops and other key industries. The connection between the principles in the text and the rural economy is far more tenuous, and the ability of the state to plan the economy was far less than some earlier interpretations have suggested. Be that as it may, the demand for cash payments in bronze that *P. Rev.* suggests was important to the monetizing process.

In summation, Ptolemaic governance involved massive and systematic reform. Pharaonic ideology was combined with new signals, new fiscal institutions, and bargaining. In all of this coinage played a key role.

5. MONEY AND THE PTOLEMAIC STATE

Ptolemaic fiscal control of Egypt differed from earlier states in its demand for cash, but it took some time, presumably, for coinage and the idea of coinage to take hold in the *chora*. Yet Egyptians switched to

⁶⁶ *Le Papyrus Revenue-Laws* [n. 24].

the new system almost, so it seems, without a flinch,⁶⁷ even if the circulation of coinage fell short of the nominal amount of the taxes in money demanded by the Ptolemaic fiscal system.⁶⁸ The Ptolemaic state's demand for tax payments in coin was the principal engine of Ptolemaic monetization. The single most important tax, known in early Ptolemaic demotic sources as the yoke tax and subsequently as the salt tax, was assessed per capita. Every person, with notable exemptions for certain professions, was liable for this tax and the assessment of the tax meant that everyone was implicated in the economy in coin. The *apomoira* tax on vineyards raised money for temples as well as for the cult of Arsinoe II.⁶⁹ A whole host of small taxes on professions and transactions was also collected in coin, either silver or bronze.⁷⁰ Coinage may not have transformed the Egyptian countryside but it must have affected social relationships to some degree. The Ptolemaic taxation system utilized tax farmers and banks, both new fiscal institutions with which the rural population had to deal. The establishment of state banks was surely one of the key 'political strategies' of the early Ptolemaic state.⁷¹ Banks replaced the traditional economic function of temples as payment centres in areas such as the Thebaid, where tax receipts are documented by the end of the reign of Ptolemy I.

To be sure, the acceptance of coinage by Egyptians involved not only the Ptolemaic requirement that certain taxes be collected in coin, it also entailed the active willingness of the population to put faith in coins as a medium of exchange.⁷² The availability of coinage for tax payments and in private transactions, of course, depended on circulation, a technical problem that I cannot tackle here.⁷³ The

⁶⁷ Rowlandson, 'Money Use' [n. 37], 154.

⁶⁸ Von Reden, *Money* [n. 26].

⁶⁹ W. Clarysse and K. Vandorpe, 'The Ptolemaic Apomoira', in H. Melaerts (ed.), *Le Culte du souverain dans l'Égypte ptolémaïque au IIIe siècle avant notre ère. Actes du colloque international, Bruxelles 10 mai 1995* (Leuven, 1998), 5–42.

⁷⁰ See von Reden, *Money* [n. 26], for the details and the connections of bronze coin types to specific tax payments.

⁷¹ S. von Reden, 'The Politics of Monetization in Third-century BC Egypt', in A. Meadows and K. Shipton (eds.), *Money and its Uses in the Ancient Greek World* (Oxford, 2001), 66 n. 10.

⁷² Von Reden, 'The Politics' [n. 71].

⁷³ See the excellent book on the history of small coinage by T. J. Sargent and F. R. Velde, *The Big Problem of Small Change* (Princeton, 2002). Cf. von Reden, *Money* [n. 26], 157.

accounting system was monetized, although payments could be rendered in kind. Certain taxes were calculated in terms of coin, but often they, and wages, were paid in kind.⁷⁴ The Ptolemaic monetization of the economy allowed for an easier conversion of crops into cash, and the interconvertibility of different crops for the payment of rent.

6. EGYPTIAN PRACTICE

The question of Egyptian practice, or the adaptation of coinage not only in taxation and also in small private transactions, is really a matter of assessing the degree to which the royal economy had penetrated into village and household economies. Samuel has stressed the traditional peasant mentality that clung to barter transactions, with little resort to market or 'public' transactions, and thus little use for coinage.⁷⁵ Two levels were in place, even during the second century when bronze coins were used for small transactions. On the one hand the Ptolemaic coinage system was fully embedded in practice as a unit of account. On the other hand, Egyptian peasants were more engaged with social relationships in their village that used barter to establish relative values of goods to be exchanged when needed.

While the introduction of silver currency in Egypt by the Ptolemies was a century old by the time our second-century texts were written, the practice of using silver as the standard of exchange had by no means overwhelmed the long-established practice of reckoning in kind, and indeed, may even have receded to some extent after the first influx of Greeks into the countryside.⁷⁶

Thus we may say that by the second century BC, coinage had penetrated into most Egyptian households, but coins never became a kind of multipurpose money. It remained, rather, one means of payment, and it never fully replaced the natural economy.⁷⁷ Furthermore, many (perhaps even most) of Egyptian sales from the Ptolemaic

⁷⁴ *P. Tebt.* IV, p. 2; von Reden, 'The Politics' [n. 71], 70–1.

⁷⁵ Samuel, 'The Money Economy' [n. 28].

⁷⁶ *Ibid.* 202.

⁷⁷ Cf. Bingen, *Le Papyrus Revenue-Laws* [n. 24], 212.

period were probably not cash sales at all, but transfers of rights within families, and without, therefore, the need to draw up a written document. Many of the preserved written documents of sale were also not cash sales, but transfers of rights.⁷⁸ In other words, even though the language of these contracts expresses the fact that a satisfactory 'price' had been paid by the 'purchaser,' the documents could be used for a wide variety of transfers of property rights, from proper sales that involved a transfer of cash to intra-family transfers that conveyed rights without payment. On the other side of the coin, as it were, are undocumented cash sales. These would include, for example, the sale of animals that are extremely scarce in the surviving Ptolemaic record for reasons I have laid out elsewhere.⁷⁹ Egyptian marriage 'contracts' were also monetized, but they had been since the sixth century BC.⁸⁰ They express a cash sum that was payable to the woman upon divorce, and these marriage 'contracts' specified the value of the dowry in terms of silver and under the Ptolemies in Ptolemaic coinage. Demotic documents, therefore and perhaps surprisingly, are probably not good gauges of cash transactions in Egyptian villages and towns. On the other hand, the account papyri from the archive of Menches, a village scribe living at the end of the second century BC, show us the extensive use of cash exacted from and paid out to both private persons and officials in the course of the day-to-day operations of the land survey in a Fayyum village.⁸¹

Lending at interest appears to have been an institution late in coming in Egypt, known c.900 BC, and thus documented far earlier in the Near East.⁸² While this is strictly speaking true with respect to loan contracts, loans with interest are well known before this date

⁷⁸ For one cash sale of land purchased at a public auction see *P. Hausw. 16* (Edfu, 221–220 BC), discussed by Manning, 'The Auction of Pharaoh', in *Gold of Praise. Studies in Honor of Edward F. Wente* (Chicago, 1999), 277–84.

⁷⁹ Manning, 'A Ptolemaic Agreement concerning a Donkey with an Unusual Warranty Clause. The Strange Case of P. dem. Princ. 1 (inv. 7524)', *Enchoria* 28 (2002–3), 46–61.

⁸⁰ See E. Lüddeckens, *Ägyptische Eheverträge*, *Ägyptologische Abhandlungen* 1 (Wiesbaden, 1960), 289–321, on monetary values expressed in demotic marriage contracts.

⁸¹ A. Verhoogt, *Regaling Officials in Ptolemaic Egypt*, P. L. Bat. 32 (Leiden, 2005).

⁸² M. van de Mierop, 'The Invention of Interest', in W. N. Goetzmann and K. Geert Rouwenhorst (eds.), *The Origins of Value. The Financial Innovations that Created Modern Capital Markets* (Oxford, 2005), 17–30.

from the New Kingdom village of Deir el-Medina.⁸³ Loan contracts in demotic Egyptian are known from the early Persian period, but their paucity cannot be used to assess how common written loan contracts were at the time. In general loans in kind and in cash are among the most common contract types in demotic, and loans in kind are still the majority of preserved loan contracts of the Ptolemaic period. The majority of these are from the Thebaid and dated to the second century BC but the distribution can in no way demonstrate secular trends in private lending, i.e. we cannot use the increase number of documented loans in the second century BC to suggest that private loans became more common in the later Ptolemaic period.

A group of demotic Egyptian papyri from Asyut, now in the British Museum, that does provide valuable insights into an Egyptian village in Upper Egypt preserves the oral transcript and supporting documentary evidence from a dispute between two half-brothers over the inheritance of two small plots of land that occurred in the early second century BC before judges in the temple of the local god.⁸⁴ During the course of the oral proceedings, a complete list of the property of the priestly family is listed. All of this property is real property or shares of offices (priesthoods or scribes). Nothing in this reveals much about the new Ptolemaic economy in coin, and we can only guess if items such as revenue from local storehouses was generated in coin or in kind.

An important archive revealing much about lending in practice in the Egyptian countryside is the late-second-century BC archive of Dionysios son of Kephthalas.⁸⁵ Naphthali Lewis has made a good case that Dionysios, who came from a Graeco-Egyptian military family, utilized his social connections within the military to lend money and grain. Far from being in a debt trap as was supposed,

⁸³ e.g. *P. Turin PR 9*, mentioning a loan of grain with 50 per cent interest. On the history of lending in Egypt see B. Menu, 'Modalités et réglementation du prêt en Égypte à l'époque de la première domination perse', in *Recherches sur l'histoire juridique, économique et sociale de l'ancienne Égypte*, Bibliothèque d'études 122 (Cairo, 1998), ii. 385–99.

⁸⁴ Manning, *Land and Power* [n. 4], 201–5.

⁸⁵ E. Boswinkel and P. W. Pestman, *Les Archives privées de Dionysios, fils de Kephthalas*, *Papyrologica Lugduno-Batava* 22 (Leiden, 1982); N. Lewis, *Greeks in Ptolemaic Egypt. Case Studies in the Social History of the Hellenistic World* (Oxford, 1986), 124–39.

Dionysios was rather a ‘master of sharp practice’.⁸⁶ Dionysios owned and rented land in the area around the garrison town at Akoris, but it is his role as a lender that is the dominant feature of the papers that have come down to us. Two-thirds of the archive is devoted to his lending activities, and most of the loans were grain loans. In three cases, money loans were repayable in kind. Since the interest rate on loans in kind was traditionally set at 50 per cent of the loan, it seems there was incentive, intentional or not, to lend in kind rather than in cash, and convert the grain to cash when and if necessary.⁸⁷ In both the case of the Asyut priests and Dionysios, access to real assets either through the temple or the new royal economy that privileged soldiers and state officials allowed persons to convert hard assets to liquid ones.⁸⁸ It is obvious enough to say, and hardly surprising, that elites took advantage of economic opportunities as they presented themselves. Soldiers receiving salaries could be instruments of monetization, but as Bingen has shown,⁸⁹ access to land, and in particular to the all-important wheat crop, was only an ad hoc and irregular feature of the royal economy, and it could not apply to the entire Greek immigrant population. In Bingen’s view, the Greek *mentalité* of a monetary economy came straight up against an ancient agricultural regime that was only partly altered by the new institutions within the royal economy. The credit market still relied on personal contacts and trust between individuals within a family, or within the same status group, as the Dionysios archive shows.

The Ptolemies exacted a tax on property transfers. This transfer tax, known as the *enkuklion* in Greek documents, was in fact a continuation of an Egyptian tax on transfers that was in the control of local temples. The tax has been studied recently by Depauw in the publication of an early Ptolemaic demotic family archive from

⁸⁶ Lewis, *Greeks* [n. 85], 131.

⁸⁷ For some cases of variable interest rates in loans in kind see K. Vandorpe, ‘Interest in Ptolemaic Loans of Seed-Corn from the “House of Hathor” (Pathyris)’, in *Egyptian Religion, the Last Thousand Years. Studies Dedicated to the Memory of Jan Quaegebeur*, *Orientalia Lovaniensia Analecta* 84–5 (Leuven, 1998), 1459–68.

⁸⁸ For loans in kind and in money for the military community at Pathyris in Upper Egypt see the important discussion by K. Vandorpe, *The Bilingual Family Archive of Dryton, his Wife Apollonia and their Daughter Senmouthis*, *Collectanea Hellenistica* 4 (Brussels, 2002), 105–217.

⁸⁹ ‘Les Tensions structurelles’ [n. 45].

Thebes.⁹⁰ A complex document (much remains obscure) from Thebes dated to 291 BC hints that taxes, in this case funerary taxes, were already being farmed in Thebes in the very early Ptolemaic period.⁹¹ If the current understanding of this text is correct, it provides important documentary evidence that either the Ptolemaic system was established quite early in the south, or, in my view more likely, the Ptolemaic system continued earlier economic institutions. The history of the transfer tax and related structures (banks, tax farmers, receipts) shows the mechanisms of Ptolemaic economic reform begun by Ptolemy II.

Much attention has been paid to the effect of the monetary economy on lower strata of society. Such is the case with the surety documents from the Fayyum in which small amounts of cash were paid to guarantee that work would be performed in certain industries such as beer making.⁹² Mummification was a cash business, and Egyptian temples also raised cash that is accounted for by the Ptolemaic official known as the *praktor*, in charge of temple finances, and the *lesonis*, a temple priest internally charged with fiduciary responsible of the temple to the state. If the third-century BC archive of Milon from Edfu is any guide, industrial activities of Egyptian temples (*inter alia* beer making and the manufacturing of linen and papyrus) in general were vital generators of cash, with officials such as the *lesonis* personally liable for shortfalls in expected income.⁹³

7. CONCLUSIONS

The economic power of the state is historically the crucial element in the history of monetization and, as the Ptolemaic case shows, state

⁹⁰ M. Depauw, *A Companion to Demotic Studies*, Papyrologica Bruxellensia 28 (Brussels, 2000).

⁹¹ The text is *P. BM 10528*, originally published in S. R. K. Glanville, *A Theban Archive of the Reign of Ptolemy I Soter*, Catalogue of Demotic Papyri in the British Museum I (London, 1939). It was republished and discussed by Depauw, *Companion* [n. 90], 70–4.

⁹² Bingen, 'Économie grecque' [n. 36].

⁹³ On this archive see the fine overview of W. Clarysse, 'The Archive of the Praktor Milon', in K. Vandorpe and W. Clarysse (eds.), *Edfu, an Egyptian Provincial Capital in the Ptolemaic Period* (Brussels, 2003), 17–27.

power to demand taxes in coin and payments into state banks were keys to the process. Yet the agricultural sector, overwhelmingly the largest, remained by and large a commodity economy. The creation of the Greek urban centres of Alexandria and Ptolemais, both minimally documented, must have played the key role in the increased monetization of the economy, as did the revitalization of the nome capitals within the Ptolemaic bureaucratic structure. Despite the new Greek fiscal institutions of the Ptolemies (banking, tax farming, public auctions), the very limited credit market outside friendship cliques created a barrier to the circulation of coin. The cash *mentalité* reflected in Ptolemaic accounting was thorough, but the private use of coinage appears to have been, like much else in Ptolemaic Egypt, a matter of degree as well as a matter of taste, and was highly variable in time and in space. Indeed Ptolemaic banks operated in both coin and in kind.⁹⁴

Both Alan Samuel and Dominic Rathbone argued that the monetized economy did not affect the traditional rural economy.⁹⁵ Samuel concluded, 'the fundamentally non-coinage orientation of the vast majority peasant activity in Egypt made coin-oriented segments of the administration of lesser importance in the aggregate of official activity, and significant rather to that very small body of Greek-speaking members of the population who actually had to do with commerce.'⁹⁶ There may well have been, for the third century BC especially, a regional difference between the newly exploited area of the Fayyum, and the Thebaid, which was still dominated by ancient temple estates. The types of taxes also varied regionally.⁹⁷ While we cannot be sure, the extensive documentary evidence for wine (not only in the Fayyum) and fruit tree production is, in my view, a good proxy measure of the reach of the Ptolemaic economy in coin into the countryside.

The history of coinage under the Ptolemies probably tracks rather closely the history of other Ptolemaic state institutions.⁹⁸ Given the

⁹⁴ R. Bogaert, 'Les Opérations en nature des banques en Égypte gréco-romaine', *Ancient Society* 19 (1998), 213–24.

⁹⁵ Samuel, 'The Money Economy' [n. 28], Rathbone, 'The Ancient Economy' [n. 27].

⁹⁶ A. E. Samuel, *The Shifting Sands of History: Interpretations of Ptolemaic Egypt* (Lanham, Md., 1989), 63.

⁹⁷ On the impressive range of taxes see Préaux, *L'Économie royale* [n. 24], 591–5; Muhs, *Tax Receipts* [n. 12], for the Thebaid.

⁹⁸ See von Reden, *Money* [n. 26], for the details of monetary integration and disintegration.

elite and state-centred bias of the documents, this is perhaps no surprise. But the use of coinage highlights both the process of Ptolemaic state formation, a desire for homogeneity and predictability by the state, and the flip side of this, the variable adaptation of the new rules by the population. It does appear to be the case, as Samuel has argued, that on one hand elites (Greeks, Greek-speaking members of the bureaucracy, soldiers, and Egyptian priests) were more likely to buy into the Ptolemaic system and its institutions than were peasant farmers. But we must remember that this dichotomy was not one that distinguished Greeks from non-Greeks entirely. As we have seen in the Milon archive from third-century BC Edfu, Egyptian priests in the south were fully involved in the cash economy. Temple building projects there, beginning with the great Horus temple at Edfu in 237 BC, may have stimulated, in conjunction with the new tax and bank system, increased circulation of coin through the cycle of wage payments. Whatever the extent of private cash transactions, however, the Ptolemaicization of Egypt, including the acceptance of coins as a medium of exchange, and their use in general accounting of state revenue and payments, was both successful and thorough by the end of the third century BC. The supply of coins (we must always remember that there is no native silver mined in Egypt) lagged behind the use of coins as a unit of account and as a symbol of royal sovereignty. The persistence of the natural economy may also have allowed many to disguise private economic activity, but we will never know the extent of it. The codification of coinage by the Ptolemaic state was, nevertheless, an important institutional shift in the economic history of Egypt, and the Ptolemaic case provides one more example that coinage was a 'public symbol of political sovereignty'.⁹⁹

⁹⁹ B. G. Carruthers, 'The Sociology of Money and Credit,' in N. J. Smelser and R. Swedberg (eds.), *The Handbook of Economic Sociology*, 2nd edn. (Princeton, 2005), 355–78.

6

The Demand for Money in the Late Roman Republic

David B. Hollander

1. INTRODUCTION

Late in 43 BC news of the proscriptions reached Cicero at his estate in Tusculum. He and his brother Quintus set out for Astura from which they intended to sail to Macedonia and meet up with Brutus. But on the road Quintus became worried about his lack of funds (*aporia*) and decided to return home, ‘pack up’, and then rejoin Marcus. The brothers parted tearfully and, a few days later, betrayed by his servants, Quintus was captured and killed.¹ The lesson was clear: prominent men would be wise to keep large sums of money handy as a precaution. The future emperor Galba, during his retirement in the early years of Nero’s reign, reportedly never went anywhere ‘without the escort of a second carriage containing 10,000 gold pieces.’²

The thoughts expressed in this chapter appear in a different form as parts of chs. 2, 5, and 6 in my book *Money in the Late Roman Republic* (Leiden, 2007). I wish to thank the Center for the Ancient Mediterranean at Columbia University for organizing the conference on ‘The Nature of Ancient Money’ at which the paper that has become this chapter was first presented, as well as the conference participants themselves and the anonymous readers who provided much useful criticism. Translations of Latin come from the Loeb Classical Library.

¹ Plu. *Cic.* 47.

² Suet. *Galba* 8.

Even when not in danger of proscription or prosecution, politicians needed cash to function effectively. Farmers, however, had very different monetary needs. Their chief danger (and opportunity) was food shortage. Republican agricultural writers emphasize that the prudent farmer must always maintain stores of his produce. Cato declares that 'it is well for the master to have a well-built barn and storage room...so that he may hold his products for good prices',³ while Varro notes that 'products which have been stored quite a long time will not only pay interest on the storage, but even double the profit if they are marketed at the right time'.⁴ Given the nature of ancient agriculture, it was hardly a risky speculation for estate owners to anticipate an eventual rise in the price of basic foodstuffs. Fear of famine would prompt smallholders to follow a similar storage strategy. Furthermore, since some commodities functioned as money in the rural economy,⁵ coinage was not as important there.

It is no great revelation to observe that people in different professions had different monetary needs, but this simple fact has yet to be fully exploited with respect to the ancient economy. Greek and Roman authors tell us at least as much about the money and assets individuals held (or sought to hold) as they do about their transactions. In this chapter I focus on ancient money *at rest*. I suggest that by examining the demand for money within the context of the demand for other assets, we can better understand the development of the Roman economy, particularly in the Late Republic. I begin by reviewing the debate over the size of the Republican coin supply and the role Quantity Theory has played in the interpretation of those estimates. I then discuss the theory of money demand and argue that it provides a better framework within which to evaluate changes in the volume of coinage in circulation. I conclude by applying money demand theory to the Late Republican evidence.

³ Cato, *Agr.* 3. 2.

⁴ Varro, *Agr.* 1. 69. 1.

⁵ Cato suggests that the lending and borrowing of agricultural commodities was common in rural areas (*Agr.* 5. 3–4). He also indicates that the *villicus* might pay for part-time agricultural labour with a share of the produce rather than coinage (*Agr.* 136).

2. THE VOLUME OF COINAGE IN THE LATE REPUBLIC

The hunt for coin supply figures began in the early 1970s with the pioneering work of Michael Crawford, who made the first serious attempt to estimate production levels. In his *Roman Republican Coinage* Crawford used figures gathered from a selected group of twenty-four large hoards to extrapolate production figures from known obverse die counts and other estimates of die numbers. He began by observing the frequency in the hoards of those coins for which die studies had already been completed (if a reverse die count had been done, Crawford multiplied that figure by 0.8 or 0.9, depending on the issue's date, to arrive at an approximate number of obverse dies).⁶ From these ratios (total known obverse dies divided by number of coins found in the selected hoards) Crawford generated multipliers with which he could calculate obverse die numbers for all the other issues.⁷ For example, the number of coins of a particular issue dating from between 84 and 58 BC found in the selected hoards would be multiplied by two to arrive at a total number of obverse dies for that issue. Then, having assumed that the average Republican die produced around 30,000 coins, Crawford was able to calculate production figures for the period from 157 to 50 BC.⁸ By adding up these annual figures and factoring in an attrition rate (due to hoarding, destruction, and the accidental loss of coins) it was then possible to graph the development of the Roman coin supply over time. Keith Hopkins did just this in his well-known 'Taxes and Trade' article.⁹ Assuming that on average there was an annual loss of about 2 per cent of the coinage in circulation he calculated that 'the money supply at Rome grew substantially, perhaps tenfold' in the Late Republic.¹⁰

A number of scholars have raised doubts about the coin production calculations described above, but T. V. Buttrey has provided the most comprehensive critique.¹¹ First he argued that Crawford's

⁶ Crawford, *RRC* 640–72. ⁷ *Ibid.* 672–3. ⁸ *Ibid.* 694–707.

⁹ K. Hopkins, 'Taxes and Trade in the Roman Empire (200 B.C.–A.D. 400)', *JRS* 70 (1980), 107.

¹⁰ *Ibid.* 107 and 109 fig. 2.

¹¹ T. V. Buttrey, 'Calculating Ancient Coin Production: Facts and Fantasies', *NC* 153 (1993), 335–51, *id.* and D. Cooper, 'Calculating Ancient Coin Production II: Why

method for calculating the number of dies per issue was faulty since he used a 'series of elaborate extrapolations from a very small base'.¹² Secondly, he maintained that it was impossible to know how many coins were produced per die, calling Crawford's estimate only a 'guess',¹³ and pointing out that several factors beyond simple wear and tear govern the use of dies.¹⁴ Thirdly, he asserted that there was no way to know the attrition rate or the coins-per-die ratio because they were 'fundamental variables' not constants.¹⁵ Buttrey concluded that 'we do not know, and cannot know, the quantity of coin produced at any time under the Roman Republic'.¹⁶

While absolute figures may be beyond reach, *relative* figures are not. Neither Crawford nor Hopkins claimed to have calculated exact numbers. Crawford claimed only to have 'the right order of magnitude' for obverse dies,¹⁷ and Hopkins was concerned above all with the shape of his money supply graph. He pointed out that there is no reason to believe that the coins-per-die average changed significantly from the second to the first century BC and noted that 'any reasonable constant loss rate and any reasonable constant average number of coins minted per die' produced a graph with essentially the same shape.¹⁸ It is true that more die counts would improve the accuracy of production estimates but, as some have already observed, this will take a considerable amount of time and effort given the huge

It Cannot Be Done', *NC* 154 (1994), 341–52, and id. and S. E. Buttrey, 'Calculating Ancient Coin Production, Again', *AJN* 2nd ser. 9 (1997), 113–35. See also: C. A. Hersh, 'Notes on the Chronology and Interpretation of the Roman Coinage: Some Comments on Crawford's *Roman Republican Coinage*', *NC* 137 (1977), 19–36, B. W. Frier, 'Roman Coinage and Army Pay: Techniques for Evaluating Statistics', *Numismatica e Antichità Classiche* 10 (1981), 285–95, E. Lo Cascio, 'Spesa militare, spesa dello stato e volume delle emissioni nella tarda Repubblica', *AIIN* 29 (1982), 75–97, and T. R. Volk, 'Mint Output and Coin Hoards', *Numismatica Lovaniensia* 7 (1987), 141–222.

¹² T. V. Buttrey, 'Calculating' [n. 11], 347.

¹³ *Ibid.* 347.

¹⁴ Buttrey and Cooper, 'Calculating' [n. 11], 343.

¹⁵ T. V. Buttrey, 'Calculating' [n. 11], 347.

¹⁶ *Ibid.* 350–1.

¹⁷ Hopkins, 'Taxes and Trade' [n. 9], 107: 'alternate rates of loss, 1 per cent or 3 per cent per year, even of 5 per cent per year, do not radically change the shape of the growth curve'.

¹⁸ K. Hopkins, 'Rome, Taxes, Rents and Trade', *Kodai* 6/7 (1995/6), 53. K. Verboven, '54–44 BCE: Financial Crisis or Monetary Crisis?' in *CM*, 68 fig. 4, helpfully illustrates the latter claim.

quantity and variety of Roman coins that survive.¹⁹ In the meantime it is worth mentioning that two studies have subsequently reaffirmed Crawford's results with respect to both the extrapolation of obverse die counts and the overall trend in coin production.²⁰

Hoardings provide another way to gauge the supply of Roman coinage. Dirk Backendorf used data generated from Italian hoards to produce a new estimate, one not based on guesses about attrition and production rates. He observed that the hoard evidence reflects the product of the Roman mint, the coins, rather than the means of production, i.e. the dies,²¹ and that some basic principles allow one to work backwards from the hoards to the general coin supply. First of all, through the hoard evidence one can graph a coin-type's life in circulation. This 'life-curve' has a rather distinct shape.²² In the years immediately following their production the coins spread quickly and begin to appear more often and in larger quantities in the hoards. However as attrition takes its toll over the years the coin-type is found in hoards less frequently and in fewer numbers. Two factors affect the size of the initial peak in the 'life-curve': the size of the particular issue and the size of the general population of coins into which it is introduced. As Backendorf describes it: 'If a small issue of coins causes a large increase . . . the money supply, to which this issue is added, must have been small. If a substantially larger issue later causes a considerably smaller increase . . . the money supply must have become larger in the meantime.'²³

The attrition rate of a coin-type, which governs the later portion of its 'life-curve', need not be calculated since it is already reflected in the hoard evidence. The sequence of hoards along with their internal structure provide the data to construct aggregate 'life-curves' for

¹⁹ Crawford, *RRC* 641, and F. de Callatay, 'Calculating Ancient Coin Production: Seeking a Balance', *NC* 155 (1995), 290.

²⁰ De Callatay, *ibid.* 292–3, uses early cistophoric coinage to show that, while 'the data from hoards are not identical to the die counts . . . it seems hard not to recognize a close general similarity'. K. Lockyear, 'Hoard Structure and Coin Production in Antiquity—an Empirical Investigation', *NC* 159 (1999), 241–2, argues that, 'although Crawford's figures are incorrect in detail, they are correct in their general trends'. He suggests that 'the increase in the total coinage pool was between five- and ten-fold'.

²¹ D. Backendorf, *Römische Münzschätze des zweiten und ersten Jahrhunderts v. Chr. vom Italienischen Festland* (Berlin, 1998), 202.

²² *Ibid.* 538–40.

²³ *Ibid.* 202.

coin-types by period, and these data reflect production levels and the money supply during each of these periods. Thus Backendorf was able to reconstruct (relatively) these quantities for the period 150 to 25 BC. He concluded that the coin supply of Italy fluctuated very much as Crawford and Hopkins suggested it did, i.e. that there was a massive increase in the latter half of the second century, that production diminished slightly towards the end of the first quarter of the first century but soon recovered and rose to even higher levels by 50 BC.²⁴ Backendorf's methods and calculations are complex, so it is worth mentioning that even Buttrey has endorsed his findings, stating 'I accept that he is correct.'²⁵

While precise figures remain beyond our grasp, it is clear that there was a considerable growth in the supply of Roman silver coinage in the Late Republic. In 50 BC there was at least five times and perhaps as much as ten times the number of denarii in circulation as there had been a hundred years earlier. What impact might such an increase have had on the Roman economy?

3. QUANTITY THEORY

Those who have sought to understand the consequences of this large increase in the supply of Roman coins have generally turned to Quantity Theory, which posits a close relationship between money supply and prices in an economy. While the general idea of such a relationship may go back to antiquity,²⁶ Quantity Theory owes its modern formulation to Irving Fisher and his equation, $MV = PT$, i.e. that the money supply (M) multiplied by its velocity (V) is equal to the price level (P) multiplied by the number of transactions (T). If Roman M grew rapidly in the last century of the Republic, it must have had a considerable effect on some or all of the other variables in this equation. Because it is hard to measure T , the number of transactions, it is usually replaced in the equation by Y (or Q), the

²⁴ Ibid. 542.

²⁵ T. V. Buttrey, 'The Content and Meaning of Coin Hoards', *JRA* 12 (1999), 532.

²⁶ C. Nicolet, 'Les Variations des prix et la "théorie quantitative de la monnaie" à Rome, de Cicéron à Pline l'Ancien', *Annales ESC* 26 (1971), 1203–27.

total output of the economy.²⁷ Y is not equal to T since some transactions can involve no new output (e.g. selling used goods or land, financial transactions, etc.). Therefore V in this revised equation must become the ‘income velocity’ rather than the ‘transactions velocity’ of money.²⁸

M , P , and Y can all be determined fairly easily for modern economies and can be estimated for some historical periods. V , however, presents certain problems and is difficult to measure except in terms of M , P , and Y . Indeed, the exchange equation is often written $V = \frac{PY}{M}$ and is thus considered the definition of velocity.²⁹ However, economist Richard Selden warns: ‘The term “velocity of money” is a misnomer if taken literally. Economists are interested not in the speed and direction of money as it moves through space but in a quite different idea—the frequency with which money is spent.’³⁰ The income velocity of money is best defined as ‘the number of times a [monetary unit] enters someone’s income in a given period of time’³¹ or ‘the number of times per year that the nominal money supply turns over in financing aggregate spending or income’.³² As we shall see, however, the nature of V in the exchange equation continues to cause difficulties for economic historians.

In ‘Taxes and Trade’ Hopkins used Quantity Theory to explore the implications for the Roman economy of a large increase in the money supply. He assumed that the Roman money supply (M) increased greatly from 157 to 50 BC but that prices (P) had remained steady. The price equation, he argued, tells us that under these circumstances something must have happened to either V or Q (or both) in order for equilibrium to be restored. That is, either the velocity of money dropped or the quantity of goods produced increased or, and this is Hopkins’s conclusion, both occurred.

²⁷ F. S. Mishkin, *The Economics of Money, Banking, and Financial Markets*, 3rd edn. (New York, 1992), 524.

²⁸ N. G. Mankiw, *Macroeconomics*, 2nd edn. (New York, 1994), 147.

²⁹ Mishkin, *Economics*, [n. 27], 605.

³⁰ R. T. Selden, ‘Monetary Velocity in the United States’, in M. Friedman (ed.), *Studies in the Quantity Theory of Money* (Chicago, 1956), 234.

³¹ Mankiw, *Macroeconomics* [n. 28], 148.

³² S. Fischer, R. Dornbusch, and R. Schmalensee, *Introduction to Macroeconomics* (New York, 1988), 303.

With respect to the velocity of money, Hopkins reasoned thus:

the speed at which money circulated (V) probably slowed down in this period, for three reasons: the state treasuries must have kept huge sums in reserve and even stored money as treasure; so too did private individuals and professional bankers; thirdly, the greater distance which separated tax-payers and tax-spenders left considerable amounts of cash idle in transit.³³

At the same time, however, Hopkins suggested that 'money percolated into a myriad of transactions which had previously been embedded in the subsistence economy'. This statement seems to imply that the velocity of money increased in some respects since it had to 'move faster' if it was to be used in all these new transactions. However Hopkins was almost certainly referring to the fact that monetization, 'more people using [money] for more activities',³⁴ causes Q to rise since only the goods and services paid for with money figure in the calculation of Q . That this was his intended meaning is clear from the fact that he couples the phenomenon of monetization with 'the substantial rise in the volume of trade in an expanded area'³⁵ which also involves an increase in Q . Though he does believe V decreased, Hopkins seems to argue that the rise in M was chiefly counteracted by the rise of Q .

There are several difficulties involved in this (or any) application of Quantity Theory to the Roman economy. One involves the way in which the Roman money supply grew. Rome's conquests in the late Republic certainly caused an increase in the Roman money supply (M) since the taking of spoils and the imposition of taxes and indemnities on new provinces allowed Rome to mint more coins, but the total output of the Roman Empire (Q) would also rise even before one factored in the effects of an increase in M . To see why this is so, it is necessary to recognize that Roman expansion did not simply increase the Roman money supply, it caused monetary systems to *merge*:

$$M_{E2} = M_{E1} + M_P = \frac{P_E Q_E}{V_E} + \frac{P_P Q_P}{V_P}$$

³³ Hopkins, 'Taxes and Trade' [n. 9], 109–10.

³⁴ *Ibid.* 110.

³⁵ *Ibid.*

In this equation M_{E1} represents an initial Roman money supply while M_{E2} represents that supply following the integration of some new province and its money, M_P , into the Roman monetary system. Assuming no difference in price levels or velocity between the Empire and its new territory (i.e. $V_E = V_P$ and $P_E = P_P$) then:

$$M_{E2} = \frac{P(Q_E + Q_P)}{V}$$

Thus, as the Empire grew, the aggregate output of new territories employing Roman coinage was added to Rome's initial Q , causing it to rise. The transactions of provincials, once accomplished with local civic coins, became part of Roman output since they were now made with denarii.

Of course, these equations simplify matters somewhat. Roman coinage did not immediately replace local coinage in every conquered territory. In some provinces local coinage persisted for decades and even centuries. In other provinces hybrid money supplies emerged. However, in the second and first centuries BC the use of the denarius spread throughout Italy,³⁶ to Sicily (c.200)³⁷ and then to Africa (c.146),³⁸ Macedonia (early first century),³⁹ Gaul (after 83),⁴⁰ Spain (c.70),⁴¹ Asia Minor (after 50),⁴² and Southern Greece (40s).⁴³ In these regions and others small amounts of Roman coinage began

³⁶ A. Travaglini, 'Presenza di moneta romana repubblicana in Puglia', in C. Marangio (ed.), *La Puglia in età repubblicana; Atti del I convegno di studi sulla Puglia romana, Mesagne, 20–22 marzo 1986* (Galatina, 1988), 65–76 at 76, argues that the denarius only became the principal means of circulation in Apulia during the first century BC.

³⁷ M. H. Crawford, 'Sicily', in A. M. Burnett and M. H. Crawford (eds.), *The Coinage of the Roman World in the Late Republic: Proceedings of a Colloquium Held at the British Museum* (Oxford, 1987), 43.

³⁸ A. M. Burnett, 'Africa', in Burnett and Crawford, *Coinage of the Roman World*, 175, and A. M. Burnett, M. Amandry, and P. P. Ripollès (eds.), *Roman Provincial Coinage* (London, 1992), i. 182.

³⁹ I. Touratsoglou, 'Macedonia', in Burnett and Crawford, *Coinage of the Roman World* [n. 38], 54.

⁴⁰ M. H. Crawford, *Coinage and Money under the Roman Republic. Italy and the Mediterranean Economy* (London, 1985), 165.

⁴¹ Hopkins, 'Taxes and Trade' [n. 9], 108, and R. C. Knapp, 'Spain', in Burnett and Crawford, *Coinage of the Roman World* [n. 38], 23.

⁴² P. Kinns, 'Asia Minor', in Burnett and Crawford, *ibid.* 113.

⁴³ M. J. Price, 'Southern Greece', in Burnett and Crawford, *ibid.* 99.

to arrive even earlier. Hopkins was certainly aware of this issue. He concedes, for example, that 'some part of the growth in Roman silver coins was simply a replacement for the coinage of the conquered', but insists that 'there was a real increase in the money supply in the Republican period of imperial expansion in the western Mediterranean'.⁴⁴ While this may be true, the only increases in *Q* of which we can be absolutely certain through the application of Quantity Theory must have occurred concomitantly with, rather than as a result of, the rise of *M*.⁴⁵

Another issue, raised by Koenraad Verboven, concerns the role of non-Roman money-stocks circulating in the Mediterranean world.⁴⁶ Should such money be included in estimates of the Roman money supply? Can the volume of such issues be estimated to the same extent as Roman coins? What about uncoined silver and gold? Verboven notes that large payments were made with gold bullion and correctly observes that 'we have no idea of how the supply of gold bullion evolved in the Late Republic'.⁴⁷ Silver bullion poses similar problems.

Finally there is the problem of velocity about which, as Hopkins noted, 'we know virtually nothing'⁴⁸ since it is so difficult to measure. The concept of velocity is, furthermore, counterintuitive and thus prone to confusion and misuse.⁴⁹ In his article on the use and abuse

⁴⁴ Hopkins, 'Taxes and Trade' [n. 9], 108.

⁴⁵ When Hopkins revisited the topic of 'Taxes and Trade' he dropped the argument based on Quantity Theory and declared that 'the whole argument of coin circulation was not vital to my thesis'. See K. Hopkins, 'Rome, Taxes' [n. 18], 54.

⁴⁶ K. Verboven, 'Caritas Nummorum. Deflation in the Late Roman Republic?', *MBAH* 16/2 (1997), 44.

⁴⁷ *Ibid.* 67.

⁴⁸ Hopkins, 'Rome, Taxes' [n. 18], 62. R. W. Goldsmith, *Premodern Financial Systems* (Cambridge, 1987), 41–2, estimated on rather slender grounds a velocity of circulation for the Empire at the death of Augustus of 2.5 to 3.0. See also W. V. Harris, 'Between Archaic and Modern: Problems in Roman Economic History', in *id.* (ed.), *The Inscribed Economy: Production and Distribution in the Roman Empire in the Light of Instrumentum Domesticum* (Ann Arbor, 1993), 20–1: 'As for the speed at which Roman money circulated, no one, so far, has demonstrated the truth of any general proposition.'

⁴⁹ See discussions of velocity in Verboven, 'Caritas Nummorum' [n. 46], 42, and D. O. Flynn, 'Use and Misuse of the Quantity Theory of Money in Early Modern Historiography', in E. Van Cauwenberghe and F. Irsigler (eds.), *Minting. Monetary Circulation and Exchange Rates: Akten des 8th International Economic History Congress*

of Quantity Theory Dennis Flynn advises historians to turn instead to the 'demand-for-money-to-hold' concept which is the foundation of modern monetary reasoning.⁵⁰ Demand Theory, as I will show below, offers a way around the problem of velocity.

4. THE DEMAND FOR MONEY

Soon after Fisher developed his exchange equation, A. C. Pigou adapted it to create a new equation ($M^d = kPY$) defining the demand for money.⁵¹ He replaced the idea of money's velocity of circulation with the variable k which represents 'the proportion of resources' kept in the form of money.⁵² Instead of talking about how many transactions are made within an economy, he looked at how much money people want to hold. It is true that k is merely the reciprocal of V ($V = \frac{1}{k}$), but it is much more convenient to think in terms of the demand for money than its velocity. This change in perspective provides a more useful theoretical framework for examining the process of monetization and the relationship between prices, output, and the money supply in the Late Republic. Demand theory posits that money is just one of many forms in which wealth can be held and that an individual's demand for money will

(Trier, 1984), 403. Lockyear, 'Hoard Structure' [n. 20], 242–3, illustrates the potential for confusion. He notes that according to the 'classical economist's view of money' (which he rejects), the increase in the Republican money supply should have caused either inflation or a decrease in velocity. He argues that the 'little evidence we have suggests neither happened, and thus we must be looking at a large-scale growth in the use of coinage in this period, and . . . that the functions of coinage in Roman Italy . . . must have expanded'. But the growth in the use of money and the expansion of coin functions, by increasing demand for coinage, would both cause velocity to decrease!

⁵⁰ J. J. McCusker and J. C. Riley, 'Money Supply, Economic Growth and the Quantity Theory of Money: France, 1650–1788', in Van Cauwenberghe and Irsigler, *Minting* [n. 49], 270–1 and *passim*, examining a period with much better economic data, reached the same conclusion as Flynn.

⁵¹ Note that the exponent in this equation should be understood to mean 'the demand for' M rather than 'to the d power'.

⁵² See A. C. Pigou, 'The Value of Money', *Quarterly Journal of Economics* 32 (1917), 38–65, reprinted in E. Dean (ed.), *The Controversy over the Quantity Theory of Money* (Lexington, 1965), 29–48.

depend on the utility and potential returns offered by a range of assets. Note, however, that this theory makes no assumptions about *how* people choose to allocate their resources (which will obviously vary tremendously from culture to culture) but merely supposes that, given finite wealth and a market economy, those choices will have predictable effects on prices, supply, and the demand for money.⁵³

The theory of the demand for money, Milton Friedman noted in 1956, is 'a general approach rather than a label for a well-defined theory'.⁵⁴ Most of the problems discussed in modern monetary theory are either irrelevant or inapplicable to the Roman world, irrelevant in that they involve financial assets and institutions unknown to antiquity (or indeed even the recent past) and inapplicable because we lack sufficient data to apply to the appropriate equations. However, money demand theory is, in essence, the study of the economic behaviour of individuals and while we cannot quantify that behaviour, our knowledge of their habits and practices with respect to coinage and commodities can help us speculate intelligently about Roman demand. Money demand theory provides us with a set of questions to ask about Roman assets and economic conditions. The answers to these questions will, in turn, allow us to gauge the level of demand for Roman coinage and how it changed in the Late Republic.

The basic idea behind demand theory is as follows: individuals and firms decide how much money they want to hold or, more precisely, what proportion of their assets they wish to hold as money. Keynes

⁵³ S. von Reden, 'Money in the Ancient Economy: A Survey of Recent Research', *Klio* 84 (2002), 141, claims that 'modern economic and monetary theory is now regarded by most scholars as unhelpful for understanding money in the ancient world'. If so, it is unfortunate. While many statistical and quantitative tools of modern economics are inapplicable to ancient economies, they can still serve as a guide, indicating likely parameters. R. P. Saller, 'Framing the Debate over Growth in the Ancient Economy', in W. Scheidel and S. von Reden (eds.), *The Ancient Economy* (New York, 2002), 251–69, provides a good example of the way in which modern economic theory can inform the debate over growth in the Roman economy. P. Temin, 'A Market Economy in the Early Roman Empire', *JRS* 91 (2001), 169–81, presents the most compelling argument for applying macroeconomics to the Roman economy: the Romans had a market economy. While Temin focuses primarily on the early Empire, there is plenty of evidence for variable prices, instrumental behaviour, and the role of supply and demand in forming prices from the Late Republic as well.

⁵⁴ Friedman, *Studies* [n. 30], 3.

divided the factors governing this decision into three categories: transactions, precautionary, and speculative motives.⁵⁵

The transactions motive for holding money rests on the function of money as a means of payment or exchange. It refers to the idea that people hold money (at least in part) in order to make transactions.⁵⁶ For example, 'lunch money' is money held for a transactions motive (i.e. to buy one's lunch). The transactions demand for money is limited first and foremost by wealth. One's money holdings cannot exceed one's total resources. But within that limit, an individual's transactions demand for money is determined by his or her need to make money payments as well as the costs and benefits of holding money. Money makes it easier to purchase goods and services because, since it is a medium of exchange, its use incurs no (or fewer) transaction costs.⁵⁷ Holding money also makes purchasing more convenient by obviating the need to waste time converting other assets into money.⁵⁸ Thus money provides 'transactions facilitating services.'⁵⁹ However, holding money also has its drawbacks: the 'opportunity cost' of money, the interest you might have earned on other assets. Because of this opportunity cost, economists generally believe that the transactions motive is negatively related to interest rates since the higher interests rates are, the more one loses by holding money.⁶⁰

Since one cannot always predict one's level of expenditure, people also hold money for precautionary motives as 'a cushion against unexpected need' or in case of unexpected opportunity.⁶¹ Thus the precautionary demand for money refers to the 'stock of money held to pay unpredictable expenses,'⁶² so that one does not have to borrow

⁵⁵ J. M. Keynes, *The General Theory of Employment, Interest and Money* (New York, 1936), 170–2.

⁵⁶ Mishkin, *Economics* [n. 27], 531.

⁵⁷ The concept of transaction costs should be understood as extending well beyond any actual fee charged by a party to a transaction. It includes the time one has to spend to accomplish the transaction, and the wear and tear it involves. See D. E. W. Laidler, *The Demand for Money: Theories, Evidence and Problems* (New York, 1985), 61–2.

⁵⁸ A. Serletis, *The Demand for Money: Theoretical and Empirical Approaches* (Boston, 2001), 67.

⁵⁹ *Ibid.* 78.

⁶⁰ Mishkin, *Economics* [n. 27], 538–9.

⁶¹ *Ibid.* 532.

⁶² I. B. Tucker, *Economics for Today* (Minneapolis and St Paul, 1997), 656.

or convert other assets into money in order to pay those expenses. Precautionary demand increases when ‘uncertainty about the level of future transactions grows’.⁶³

The speculative motive for holding money, finally, is closely related to money’s role as a store of wealth.⁶⁴ As Apostolos Serletis notes, ‘people hold money as part of their portfolio of assets and... the demand for money depends on the return and risk offered by money and by other assets that people can hold instead of money’.⁶⁵

5. DEMAND IN THE LATE REPUBLIC

Late Republican literary and archaeological sources allow us to make reasonable guesses about the *relative* levels of demand for coinage among rural and urban residents, traders, and imperial and local government. Farmers, as I have already suggested, had the least demand for coinage for transactions. The tendency for farmers to diversify production and rigorously exploit the resources of their own land limited the number of transactions they needed to make. Since some transactions could be made with the key commodities (grain, oil, wine, etc.),⁶⁶ the transaction costs of ‘in kind’ exchange must have been low. The ‘transactions facilitating’ properties of money in rural areas were not much greater than those of the main agricultural commodities. Other drawbacks to holding coinage, such as the ease with which it could be stolen and the general lawlessness of rural Italy, must have also played a role in limiting demand.

At Rome and in other urban areas the demand for money for transactions must have been very high. The urban poor needed money to pay for food, shelter, and clothing. Even those who received free grain from the state and had liberal patrons would need to buy some food and other goods.⁶⁷ The poor paid in advance and frequently

⁶³ Mishkin, *Economics* [n. 27], 539 n. 9.

⁶⁴ *Ibid.* 532.

⁶⁵ Serletis, *Demand* [n. 58], 79.

⁶⁶ See e.g. Cato, *Agr.* 5. 3–4 and 136.

⁶⁷ K. Verboven, *The Economy of Friends. Economic Aspects of Amicitia and Patronage in the Late Republic* (Brussels, 2002), 114, emphasizes the limits of patronage both in terms of the overall percentage of the population that might receive assistance and the extent of that assistance.

for their lodgings.⁶⁸ Rents were high, particularly in Rome. While most wealthy Romans probably lived in their own houses and possessed rural estates which could provide them with food and some clothing, they also purchased many luxury goods in urban markets. Coinage was both a luxury good (in the 'asset demand' sense)⁶⁹ and the chief means of acquiring other luxuries. There is, of course, ample evidence for a marked increase in the consumption of luxury goods in the Late Republic.⁷⁰ For all urban dwellers, transactions balances must have constituted a relatively high proportion of total wealth.

More difficult to gauge is the level of transactions demand among those engaged in commerce. In some cases traders needed coinage to facilitate exchange in the marketplace (to buy and sell their wares), to pay *portoria*, harbour fees, and no doubt also to rent storage space for their goods. But traders had access to financial instruments and institutions that would help limit their demand for coinage.⁷¹ It is also clear that some transactions were accomplished by means of commodities instead of cash.⁷² Traders were certainly the most financially sophisticated class and would have been the most comfortable (and adept) at making use of devices which limited their need for coinage. Studies of modern economies have shown that, while monetization initially leads to an increase in the demand for

⁶⁸ B. W. Frier, 'The Rental Market in Early Imperial Rome', *JRS* 67 (1977), 34–5.

⁶⁹ Mishkin, *Economics* [n. 27], 96: 'an asset is a luxury if its wealth elasticity is great than 1, and as wealth grows, the quantity demanded of this asset grows more than proportionally'.

⁷⁰ e.g. Macrobius, *Sat.* 3. 17. 1–13; Pliny, *HN* 14. 95–6; 33. 141–2. See also D. Daube, 'The Protection of the Non-Tipper', in D. Daube (ed.), *Roman Law: Linguistic, Social and Philosophical Aspects* (Edinburgh, 1969), 124–5, and G. Clemente, 'Le leggi sul lusso e la società romana tra III e II secolo a.C.', in A. Giardina and A. Schiavone (eds.), *Società romana e produzione schiavistica* (Bari, 1981), i. 2.

⁷¹ For the role of *collegia* in the Late Republic see N. K. Rauh, *The Sacred Bonds of Commerce: Religion, Economy, and Trade at Hellenistic Delos, 166–87 B.C.* (Amsterdam, 1993), 251–87.

⁷² According to Diodorus (5. 26. 3), Italian traders bought slaves with wine in Gaul, while Sallust (*Iug.* 44) has traders in North Africa exchanging wine and other goods for soldiers' slaves and cattle during the war with Jugurtha. Republican-era descriptions of long-distance trade tend to describe it in terms of an exchange of commodities (see e.g. Polybius 4. 38). Unidirectional flows were apparently noteworthy as when Caesar (*B. Gall.* 4. 2) mentions that the Germans 'give access to traders rather to secure purchasers for what they have captured in war than to satisfy any craving for imports'.

money, as people become more financially sophisticated their demand for money actually decreases.⁷³ The same is likely to have been true of Roman traders if not to the same degree that it has been for modern Western economies. Thus commercial demand probably exceeded rural demand but would not have approached urban levels.

The transactions demand for coinage must have been quite high for both the Roman government and municipalities. Rome needed coins to pay soldiers, officials, and contractors while municipalities faced similar expenses. For cities there were many advantages to holding coinage and even more to actually producing it. Coinage made transactions and accounting easier while minting coinage provided profits (through the emission of fiduciary bronze coins) and prestige (to those who controlled the designs). Government transactions demand probably rivalled urban demand, though the state did make some payments in kind.

Because the precautionary demand for money is closely related to the transactions demand,⁷⁴ it seems likely that the same relative differences in demand existed between the different sectors of the Roman economy. Thus farmers will have had smaller precautionary balances than city dwellers, not because their income and expenses were more predictable but because the proportion of unexpected expenditure requiring coinage rather than other assets was smaller.⁷⁵ Similarly the level of precautionary demand from traders would have been higher than that of farmers though not as high as urban demand. The Roman government and elite may constitute exceptions to this scheme. Since the state always had the power to raise taxes, create new sources of revenue, confiscate property, and, indeed, mint (or debase) its own coins, it did not necessarily have to keep precautionary money balances commensurate with its level of uncertainty. Nevertheless, the *aerarium sanctius* did seem to function

⁷³ L. Jonung, 'The Long-Run Demand for Money—A Wicksellian Approach', *Scandinavian Journal of Economics* 80 (1978), 216, and M. D. Bordo and L. Jonung, 'The Long Run Behavior of the Income Velocity of Money in Five Advanced Countries, 1870–1975: An Institutional Approach', *Economic Inquiry* 19 (1981), 98–9.

⁷⁴ Laidler, *Demand* [n. 57], 64–9, and Mishkin, *Economics* [n. 27], 538–9.

⁷⁵ Urban and rural dwellers undoubtedly faced *different* kinds of problems and uncertainties but there does not seem to be any reason to believe that life in one region was by nature more uncertain.

as Rome's 'precautionary treasury'.⁷⁶ The elite, on the other hand, may have had considerable precautionary demand for coinage since, as Willem Jongman has recently argued, they faced 'the need to alleviate the complexities and unpredictability of property transfers from one generation to the next'.⁷⁷

Turning now to speculative demand, it is evident that, for farmers, diversified holdings of agricultural commodities held clear advantages over coinage. Such considerations undoubtedly limited rural demand. In the cities agricultural commodities had less of an advantage over coinage. The urban poor, of course, would not hold speculative balances since the primary limit to money demand is wealth. For others the higher cost of urban real estate meant that storing goods in the city was more expensive, diminishing the potential returns from price increases. Wealthy Romans did possess large stores of wine and other commodities but it is not clear that they were speculative economic (as distinct from social or political) investments.⁷⁸ Slaves and real estate were undoubtedly the most popular assets among the upper classes. Slaves were a somewhat risky investment but could be quite profitable.⁷⁹ Land, both urban and rural, would provide a regular and relatively predictable flow of rents and could easily be resold for a profit in Rome's vigorous real estate market. From the time of the Gracchi onwards, political, social, and military instability caused the price of land to fluctuate wildly. Those in a position to take advantage of these fluctuations became quite wealthy.⁸⁰

It is unlikely that the government had any speculative motives for holding money since they had far more effective means of gaining wealth (e.g. imperialism and taxation). Indeed, the Roman state willingly gave up opportunities to profit from the speculative use of coinage.⁸¹

⁷⁶ C. T. Barlow, 'The *Sanctius Aerarium* and the *Argento Publico* Coinage', *American Journal of Philology* 98 (1977), 290.

⁷⁷ W. Jongman, 'A Golden Age: Death, Money Supply and Social Succession in the Roman Empire', in Lo Cascio, *CM* 191.

⁷⁸ For large holdings of wine see Pliny, *HN* 14. 95–6, Cic. *Phil.* 2. 66.

⁷⁹ Plu. *Cat. Mai.* 21. 7.

⁸⁰ e.g. Crassus and Chrysogonus: Plu. *Crass.* 2 and Cic. *Rosc. Am. passim*.

⁸¹ The state let *publicani* hold on to some of its cash balances without paying interest (Cic. 2 *Verr.* 3. 168).

Speculative motives, of course, formed the very foundation of the commercial enterprise whether one thinks in terms of the lone trader moving from market to market or of large companies bidding for contracts to supply Roman armies. Traders profited from the opportunities afforded them by price fluctuations or regional variations in supply and demand as well as, occasionally, artificial shortages of their own creation.⁸² To take advantage of these opportunities presumably often required coinage. Thus the speculative demand for money must have been high among traders although, again, limited by the available financial devices and institutions.

6. CHANGES IN DEMAND

The preceding discussion has suggested a general pattern of demand in the Roman world: relatively little demand for coinage in the rural areas and much higher (if varying) levels of demand elsewhere. Could the overall level of demand have changed from the mid-second to the mid-first century as the supply of coinage increased? Several different factors might bring about such a change in demand: the level of demand in a particular sector of the economy might increase or decrease (e.g. as rural areas become more monetized, their demand for coinage grows),⁸³ the relative size of different sectors might change (e.g. a general shift of population from an area of low demand to one of high demand would increase aggregate demand),⁸⁴ or conditions affecting the demand motives might change (e.g. a slave revolt might cause precautionary balances to rise across the board).⁸⁵ Indeed, all

⁸² e.g. Livy 38. 35. 5.

⁸³ A. G. Chandavarkar, 'Monetization of Developing Economies', *International Monetary Fund Staff Papers* 24 (1977), 706–7.

⁸⁴ Some modern studies of long-term changes in velocity/demand use urbanization or the proportion of the labour force engaged in non-agricultural pursuits as a proxy variable for monetization. See Bordo and Jonung, 'Long Run Behavior' [n. 73], 104–7, and Jonung, 'Long-Run Demand' [n. 73], 224. For some reservations see Chandavarkar, 'Monetization' [n. 83], 674.

⁸⁵ Friedman, *Studies* [n. 30], 9, notes that periods of war increase the demand for money. Increased security, whether it is the result of peace, economic stability, or welfare programs, has the opposite effect. See Bordo and Jonung, 'Long Run Behavior' [n. 73], 197; Jonung, 'Long-Run Demand' [n. 73], 228–9.

these factors, I believe, contributed to a substantial increase in the aggregate level of Roman demand for coinage in the last century of the Republic.

The ongoing monetization of the countryside would also have driven up demand in the rural areas. While scholars have thus far paid little attention to the problem of change in monetization in the Late Republic, two factors suggest that rural demand for coinage grew in this period. First, increased urban demand for foodstuffs must have contributed to the monetization of Italy as local markets became integrated into Rome's supply network.⁸⁶ Secondly, the settlement on Italian land of veterans who had become accustomed to the regular use of coinage during their military service would also increase demand in the agricultural sector.⁸⁷

Governmental transactions demand probably also rose dramatically in the Late Republic, with payments in coin assuming a larger proportion of total expenses. This is one way to interpret the substantial expansion in the minting of Roman coins in this period.⁸⁸ The growing cost of the *annona*, whose needs could no longer be met solely through taxation in kind,⁸⁹ army pay rises,⁹⁰ as well as general increases in public building and other cash-intensive activities, also indicate greater demand.

Changes in the relative sizes of different sectors of the economy also resulted in an overall increase in demand. Late Republican

⁸⁶ See N. Morley, *Metropolis and Hinterland: The City of Rome and the Italian Economy, 200 B.C.–A. D. 200* (Cambridge, 1996), 142 and 174.

⁸⁷ D. B. Hollander, 'Veterans, Agriculture, and Monetization in the Late Roman Republic', in J.-J. Aubert and Z. Varhelyi (eds.), *A Tall Order: Writing the Social History of the Ancient World. Essays in Honor of William V. Harris*, *Beiträge zur Altertumskunde* 216 (Munich, 2005), 229–39.

⁸⁸ Obviously the production of 'free coinage' on any major scale would undermine this argument. Cic. *Att.* 8. 7. 3 remains the only Republican evidence for it but, as Verboven, '54–44 BCE' [n. 18], 51 n. 10, points out, 'Cicero was at this time proconsul with a military command in Campania, and so hardly qualifies as an ordinary citizen.' See also D. Foraboschi, 'Free coinage e scarsezza di moneta', in Lo Cascio, *CM* 231–44.

⁸⁹ G. Rickman, *The Corn Supply of Ancient Rome* (Oxford, 1980), 45, and F. Meijer, 'The Financial Aspects of the *Leges Frumentariae* of 123–58 BC', *MBAH* 9/2 (1990), 14–23.

⁹⁰ For Caesar's pay rise: Suet. *Iul.* 26. Gaius Gracchus effectively increased soldiers' salaries by abolishing deductions for clothing: Plu. *C. Gracch.* 5.

urbanization,⁹¹ increased long-distance trade,⁹² and the enlargement of the Empire and its administrative responsibilities would have driven up the aggregate demand of Roman cities, officials, and merchants.

Finally, changes in political and military conditions also had a direct impact on demand. These factors probably caused a huge increase in precautionary demand in the first century. It has long been recognized that the hoard evidence reflects the level of violence,⁹³ but hoards also reflect changes in the demand for coinage. The increase in the level of uncertainty in Italy from the second century to the first was enormous. Although the Romans were involved in many conflicts in the second century, Italy itself was relatively well insulated from them. For example, the violence surrounding the deaths of the Gracchi and the destruction of Fregellae was relatively brief and isolated. By contrast, in the first century Italy witnessed the Social War, the Civil War between Marius and Sulla, the slave revolt of Spartacus, rampant piracy, the Catilinarian Conspiracy, the beginnings of the Civil War between Caesar and Pompey, proscriptions, confiscations, and frequent talk of the cancellation of debts. When one's physical safety and property rights are both regularly threatened, the acceptability and ease of transport associated with coinage make it even more desirable as an asset. The violence and uncertainty of the first century must have brought about a dramatic increase in precautionary balances.

Overall speculative demand will also have risen considerably from the second century to the first. As coinage came to play a more important role in politics, one might easily earn substantial profits through high interest loans to candidates and defendants in need of cash with which to bribe voters or jurors.⁹⁴ The more important role

⁹¹ Morley, *Metropolis* [n. 86], 39, suggests that 'in the last two centuries BC... the population of Rome grew from about 200,000 to about a million'.

⁹² Hopkins, 'Taxes and Trade' [n. 9], 105, D. P. S. Peacock and D. F. Williams, *Amphorae and the Roman Economy: An Introductory Guide* (London, 1986), 25, A. J. Parker, *Ancient Shipwrecks of the Mediterranean and the Roman Provinces* (Oxford, 1992), 30, and G. Woolf, 'Imperialism, Empire and the Integration of the Roman Economy', *World Archaeology* 23 (1992), 289.

⁹³ M. H. Crawford, 'Coin Hoards and the Pattern of Violence in the Late Republic', *Papers of the British School at Rome* 37 (1969), 76–81.

⁹⁴ For a discussion of the elaborate machinery of electoral corruption involving *divisores*, *sequestres*, and *sodales* see A. Lintott, 'Electoral Bribery in the Roman Republic', *JRS* 80 (1990), 1–16.

of private wealth in financing armies, games and other public events, and institutions gave new opportunities to bankers, elite financiers, and traders. Client kings, embassies, and provincial cities might also be desperate for cash.⁹⁵ Interest rates probably rose in the weeks leading up to an election as well as during other periods of political uncertainty.⁹⁶

While there are many good reasons to suppose that the demand for coinage grew sharply in the Late Republic, two factors that may have limited this growth need to be considered: the increasing presence of false coins in circulation; and the development and spread of more sophisticated financial institutions and practices.

The Late Republic probably witnessed a substantial increase in the circulation of forged Roman coins, although difficulties related to the identification and dating of such coins make it impossible to pinpoint the beginning of the trend.⁹⁷ The existence of a significant quantity of false coins in circulation had serious consequences. First of all, it increased transaction costs since coins had to be tested. Secondly, the circulation of such coins would make many people feel uneasy about coined money in general. Forgers took advantage of those who were new to, and therefore more unfamiliar with, coinage. For them monetization meant more opportunities for fraud and deception. The state's own 'monetary manipulations'

⁹⁵ There are many examples but it may suffice to mention that a *lex Gabinia*, possibly of 67 BC, made it illegal to loan money to provincials (Cic. *Att.* 5. 21. 12 and 6. 2. 7).

⁹⁶ Cicero (*Att.* 4. 15. 7) reports in the summer of 57 BC that *ambitus* had caused interest rates to double in a very short period of time: *ardet ambitus... faenus ex triente Id. Quint. factum erat bessibus*.

⁹⁷ A. M. Burnett, *Coinage in the Roman World* (London, 1987), 97, dates the phenomenon to the first century BC while M. H. Crawford, 'Money and Exchange in the Roman World', *JRS* 60 (1970), 45, argues for the arrival of large quantities of plated coins in the second century BC. Forgeries turn up quite frequently during excavations but rarely appear in hoards. See A. M. Burnett, 'The Currency of Italy from the Hannibalic War to the Reign of Augustus', *AJN* 29 (1982), 136; Burnett, *Coinage*, 100; and M. H. Crawford, 'Plated Coins—False Coins', *NC* 7/8 (1968), 55. This makes such coins harder to date though it suggests that Romans were quick to notice them. If the *nummularii* were involved in testing coins, their appearance in the Late Republic may be no coincidence. E. Lo Cascio, 'How Did the Romans View Their Coinage and Its Function?', in C. E. King and D. G. Wigg (eds.), *Coin Finds and Coin Use in the Roman World* (Berlin, 1996), 275–6, links the rise in false coins to the state's own 'large-scale monetary manipulations'. As the intrinsic value of a coin diverges from its official value, there is more profit in forgery.

(e.g. the progressive reduction in the weight of the *as*)⁹⁸ would also contribute to this unease and may have caused some to resist the trend towards monetization.⁹⁹

The development and spread of financial institutions and instruments may also have put a brake on the rising demand for money since they provided ‘methods of economizing on money balances’.¹⁰⁰ As C. T. Barlow put it, there was ‘a tremendous expansion of Roman banking and moneylending’ in the Late Republic.¹⁰¹ *Permutatio* permitted long-distance transactions without the physical transport of coinage,¹⁰² while the presence of bankers at auctions facilitated exchange on a more local level.¹⁰³ But the Romans did not possess the more ‘advanced’ financial devices such as credit cards and transmissible cheques,¹⁰⁴ which some economists believe responsible for the decline in the demand for money in the US and elsewhere in the

⁹⁸ As Crawford notes, ‘the weight standard of the bronze coinage of the last two centuries of the Republic goes up and down like a yo-yo’, ‘Paestum and Rome—The Form and Function of a Subsidiary Coinage’, in *La monetazione di bronzo di Poseidonia-Paestum. Atti del III Convegno del Centro di Studi Numismatici* (Rome, 1973), 50. The revaluation of the denarius from 10 *asses* to 16 around 141 BC must also have disturbed some would-be users of coinage.

⁹⁹ However, the Gratidianus incident of 85 BC suggests that the Romans managed to alleviate at least some worries about the coinage. It seems impossible to determine exactly what Gratidianus did, but it is clear that in response to some monetary crisis (Cic. *Off.* 3. 80 states that ‘iactabatur enim temporibus illis nummus sic, ut nemo posset scire, quod haberet’), he acted to restore confidence in Roman coinage (according to Pliny, *HN* 33. 132, ‘ars facta denarios probare’). See M. H. Crawford, ‘The Edict of M. Marius Gratidianus’, *Proceedings of the Cambridge Philological Society* 14 (1968), 1–14, E. Lo Cascio, ‘Carbone, Druso e Gratidiano: la gestione della *res nummaria* a Roma tra la Lex Papiria e la Lex Cornelia’, *Athenaeum* 57 (1979), 215–38, C. T. Barlow, ‘The Roman Government and the Roman Economy, 92–80 B.C.’, *American Journal of Philology* 101 (1980), 202–19, and K. Verboven, ‘The Monetary Enactments of M. Marius Gratidianus’, *Studies in Latin Literature and Roman History* 7 (1994), 117–31.

¹⁰⁰ Bordo and Jonung, ‘Long Run Behavior’ [n. 73], 98.

¹⁰¹ C. T. Barlow, ‘Bankers, Moneylenders and Interest Rates in the Roman Republic’ (Ph.D. Thesis, University of North Carolina, Chapel Hill, 1978), 233. See also J. Andreau, ‘Histoire des métiers bancaires et évolution économique’, *Opus* 3 (1984), 99–114, and J. Andreau, *Banking and Business in the Roman World* (Cambridge, 1999), 147.

¹⁰² Cicero, for example, used *permutatio* to provide cash for his son during his stay in Athens (*Att.* 12. 24. 1, 12. 27. 2, and 15. 15).

¹⁰³ Andreau, *Banking and Business* [n. 101], 133.

¹⁰⁴ *Ibid.* 42–3.

latter half of the twentieth century.¹⁰⁵ Furthermore it is not clear how far the use of Roman financial instruments extended beyond the sphere of traders and the very wealthy. Anand Chandavarkar has argued that rural populations are slow to take advantage of the opportunities afforded by new financial institutions: ‘the short-run impact of monetization... is more likely to be an increase in the demand for currency rather than increased bank deposits... because the transition from transactions in kind to transactions in currency is psychologically and institutionally easier than that from barter to bank money, which involves a quantum jump in institutional and behavioral patterns.’¹⁰⁶ On the whole, therefore, it is unlikely that the growth of banking and related professions in the Late Republic had much effect on the demand for coinage outside the realm of traders and the elite.¹⁰⁷

7. CONCLUSION

The general trend of increased monetization and rising demand for coinage in the Late Republic has important consequences for our understanding of how the Roman economy developed. To illustrate this, let us return to the problem posed by Hopkins in ‘Taxes and Trade.’ If, instead of working with $P = \frac{MV}{Q}$, we use the money demand function, $M^d = kPY$, and assume that demand for money equals supply,¹⁰⁸ the equation becomes $M = kPY$. M rose dramatically in the Late Republic, perhaps to five or ten times its initial volume. What about prices? There is little evidence for prices in

¹⁰⁵ Bordo and Jonung, ‘Long Run Behavior’ [n. 73], 98.

¹⁰⁶ Chandavarkar, ‘Monetization’ [n. 83], 706–7.

¹⁰⁷ W. V. Harris, ‘A Revisionist View of Roman Money’, *JRS* 96 (2006), 18, suggests that ‘a large, and probably increasing, proportion of their [the wealthy’s] sizeable financial transactions was being carried out wholly or mainly by means of documents’ in the Late Republic. Traders too may have come to rely more heavily on financial instruments during this period. There is, however, no indication that other groups within Roman society also had greater recourse to credit-based transactions. Given the violence and disorder of the first century BC, the role of credit in the transactions of the lower classes may well have diminished.

¹⁰⁸ The existence of ‘free coinage’ and the phenomena of municipal and provincial mints suggest that this is a plausible assumption.

this period and, since commodities often experienced large short-term price swings and unusual prices were the ones most likely to be recorded, surviving prices must be used cautiously. Crawford suggests a 'remarkably slow' inflation rate for the second century,¹⁰⁹ while Howgego points to 'the progressive abandonment of small denominations' as a sign of 'general, but not necessarily continuous' inflation.¹¹⁰ Here I will follow Burnett who estimated that 'from the second century BC to the first century BC prices approximately doubled'.¹¹¹ Thus, if M rose by a factor of five to ten while P only doubled, then either k or Y or both had to rise.¹¹² This is almost exactly the problem Hopkins posed except that instead of velocity (V) we are considering k , the proportion of income people choose to hold in the form of money. Hopkins conceded that velocity decreased (i.e. k increased) but he seems to have underestimated the magnitude of its change (particularly with respect to precautionary motives). Based on the factors I have set out above, it is likely that k rose sharply in the Late Republic. How much did k increase? Let us explore a few possible scenarios, beginning with a conservative estimate for the increase in M of five times its initial volume and a doubling of Y (due to the merger of monetary systems as the zone in which the denarius circulated grew, not per capita growth).¹¹³ Under this scenario an increase in k of only 25 per cent would balance the equation. Given the strong reasons there are to suppose a considerable increase in k , there would seem to be no room in this scenario for any per capita growth in Y . Larger estimates for the growth of the zone of circulation (aggregate growth in Y) would actually require k to fall. So, for example, if Y increased threefold due to aggregate growth from 150 to 50 BC, and during this period M grew by a factor of five and prices doubled, then k would have to drop 16 per cent.

¹⁰⁹ Crawford, *Coinage and Money* [n. 40], 177.

¹¹⁰ C. Howgego, *Ancient History from Coins* (London, 1995), 122.

¹¹¹ Burnett, *Coinage in the Roman World* [n. 97], 108.

¹¹² J. E. Stiglitz, *Economics* (New York, 1997), 747: 'What actually happens when the money supply is increased (assuming prices are fixed) is a combination of changed holdings of money and changed output.'

¹¹³ This increase in Y is aggregate growth, i.e. the additional output of people in newly integrated regions of the Empire now conducting transactions with denarii instead of their pre-conquest currency. It is not per capita growth. On the difference between the two, see Saller, 'Framing the Debate' [n. 53], 258.

In fact, only a scenario featuring a very optimistic estimate for the increase in the money supply combined with a very conservative estimate for aggregate growth of Y leaves any room for both the increase in k that must have occurred and some per capita economic growth. For example, if M grew by a factor of ten and Y doubled due to aggregate growth, then k could more than double and still accommodate a 10 per cent per capita growth in Y over the century. This does not, however, seem to be a likely set of circumstances, especially with respect to aggregate growth. After all, in the period in question, the use of the denarius spread to Africa and Macedonia as well as parts of Italy, Spain, and Gaul. Without much better data on coin circulation and economic conditions, it is hard to gauge the implications for aggregate growth of the incorporation of these regions into the zone of denarius circulation. A threefold increase in Y due to aggregate growth seems somewhat more plausible. Such an increase in Y coupled with a moderate estimate for increase in M of seven to eight times initial volume yields an increase in k ranging from 16 to 33 per cent. Again, hardly any room remains for per capita growth.¹¹⁴ In the early Empire, as the volume of coinage continued to rise and political turmoil receded (reducing precautionary balances), per capita growth may be somewhat more likely but that issue is beyond the scope of this chapter.

In conclusion, I hope to have demonstrated that we may gain better insight into the Roman economy by looking at coinage in context. Coins were just one of many assets available to the Romans. In some areas and circumstances it was not necessarily even the preferred means of exchange. By investigating asset demand in detail, identifying different sets of practices and changes in behaviour over time, we can better evaluate the consequences of changes in the volume of coinage.

¹¹⁴ Saller, *ibid.* 251–69, argues on other grounds against the possibility of such growth during this period, suggesting instead ‘less than 0.1% per year, and even that rate . . . not sustained’. He points out the need for ‘sustained technological improvement’ and ‘human capital investment’ to achieve ‘sustained economic growth’.

Money and Prices in the Early Roman Empire

David Kessler and Peter Temin

Money serves as a medium of exchange and a standard unit in which prices and debts can be expressed.¹ Most research on the extent of monetization in the Roman world has focused on the first function of money, a medium of exchange. Hopkins's famous article on taxes and trade argued that money was needed throughout the Roman Empire to pay taxes; Duncan-Jones inferred geographically limited coin usage from the location of coin hoards.² This chapter examines the second function of money, its role as a standard of value. We argue that monetization in the sense of using monetary measures was virtually universal in the early Roman Empire. This assertion verges on the obvious in view of recent compilations of Roman prices.³ We go further to make the stronger and less obvious claim that there was unified monetary integration across the whole Mediterranean in the early Roman Empire. We make this argument through an examination of wheat prices.

¹ Sometimes a third function, a store of value, is added, but this is not relevant here. See, e.g. K. Greene, *The Archaeology of the Roman Economy* (Berkeley, 1986), 50–1. This definition of money can be found in almost any elementary economics text.

² K. Hopkins, 'Taxes and Trade in the Roman Empire (200 B.C.–A.D. 400)', *JRS* 70 (1980), 101–25; R. Duncan-Jones, 'The Denarii of Septimius Severus and the Mobility of Roman Coin', *NC* 161 (2001), 75–89.

³ R. Duncan-Jones, *The Economy of the Roman Empire: Quantitative Studies*, 2nd edn. (Cambridge, 1982); H.-J. Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne im römischen Ägypten bis zum Regierungsantritt Diokletians* (St Katharinen, 1991); D. Rathbone, 'Prices and Price Formation in Roman Egypt', in *PPF* 183–244.

We approach the issue of monetization from a new angle, emphasizing the role of money in supplying a unit of account. This leads us to look for Roman uses of this unit. In other words, we look for Roman prices instead of Roman coins. Monetization in this view is measured by the extent to which people used prices to keep track of their activities. This may appear less direct than analysing coins, but it is not. We are interested in monetization as an aspect of Roman society, and we focus on how the Romans used money instead of asking how much money they had. The use of prices is our index of monetization.

We assume that coins were used as money in the ancient world. Some historians have seen coins as symbols of imperial power or as art objects. These characteristics may be important for the question of which coins were used, but they do not approach the question why the ancients minted coins in the first place. Perhaps Roman emperors spread Roman coins widely to symbolize their suzerainty, but with coins came the practice of using money to value commodities and services. Actually, this practice preceded coins in the East and became more accurate and prevalent with coins. Uniform *sestertii*—linked to earlier *drachmae* in the East—encouraged the use of prices in transactions. Consistent valuations and ease of payment (the first function of money) encouraged the growth of trade.⁴

Prices were used widely in Rome, and the letters and accounts of the time are full of references to them. Unhappily for the modern scholar, the prices almost always are for goods or services that are unique, ranging from dinner parties to monuments. The accounts reveal that people thought in terms of prices, but they do not provide a data-set with which to examine prices. Prices for a uniform commodity are needed for that purpose. Wheat is the obvious candidate for such a price because wheat was both uniform and universal. Rathbone used the price of wheat in Roman Egypt to measure inflation.⁵ We compare wheat prices across space rather than through time to demonstrate market integration around the Mediterranean. Market integration indicates widespread monetization, which facilitated trade by providing a standard unit of account. Just as the euro promotes European trade today, the wide use of *sestertii* and *drachmae* encouraged trade throughout the Roman Mediterranean.

⁴ Schaps, *IC*.

⁵ Rathbone, 'Prices' [n. 3], 191–2.

Despite the availability of Roman price evidence, it is difficult to find comparable prices for many locations. We take our sample to be a set of wheat prices listed by Rickman in his account of the wheat supply for the city of Rome.⁶ This is a small sample of prices, but we think it is a good one for three reasons. First, Rickman searched the literature for mentions of wheat prices in outlying areas. Second, he compared prices in these outlying areas with prices in Rome, and we use these roughly contemporaneous comparisons in our work. Third, we are not aware of another attempt to provide a set of prices for a uniform commodity in many different parts of the late Roman Republic and early Roman Empire.

We proceed in three steps. We first explain this small data-set and its strengths and weaknesses, construct a graph showing the relation of wheat prices in Rome to those elsewhere around the Mediterranean, and present our hypothesis in terms of the graph. Then we ask if this graph could be a fluke, that is, a chance result of putting together prices that in fact were not the result of an integrated market. If not, then the collection of prices from distant places would reveal nascent monetization (since prices were used) but not comprehensive monetization (that would encourage trade). There would be no relationship between the various prices. This test requires a short introduction to statistics that tries to be informative without being too technical. Finally, we discuss a variety of objections to this finding that might be raised, showing that they do not vitiate our results.

DATA AND HYPOTHESIS

We collected wheat prices from varied locations, as reported by Rickman. More prices come to light all the time, but we thought that this familiar sample would provide a way to examine monetary integration at least provisionally. Our requirements were price pairs in outlying locations and in Rome at roughly the same time. We found six price pairs in almost two centuries ranging from the Late

⁶ G. Rickman, *The Corn Supply of Ancient Rome* (Oxford, 1980), 143–55.

Republic to the early Empire. This is not an overwhelming amount of evidence, but it is enough to test whether the patterns in the data are random or not. In each case the Roman price was subtracted from the price at the distant location to give a price differential. Wheat prices at Rome were subject to slow inflation according to Rickman, a view that has been supported by Duncan-Jones.⁷

We describe the price observations in the order of their distance from Rome, which we calculated as straight-line distances on a map. This of course is only an approximation to the actual distance that wheat travelled; we emphasize the approximate nature of our data since this randomness reduces the possibility of finding evidence of comprehensive monetization. The closest price was from Sicily and came from Cicero's *Verrine Orations*. One of his accusations was that Verres did not transact business at the market price, even though he acknowledged its level in a letter (Cicero, 2 *Verr.* 3. 189). This observation, like most of the others, reports the prevailing local price in round numbers. Since the observation is general rather than the record of any transaction, it is likely to be only approximate. This casual quality of the data militates against finding any systematic relationship between prices. It introduces noise into any relationship of the prices being paid because of the unknown difference between the reported averages and actual prices. We analyse the effects of this noise on our test below.

The second price came from Polybius (34. 8. 7) in his discussion of conditions in Lusitania. As before, this is a general statement about the prevailing price. While it is good to have an average, the casual quality of the averaging process again adds noise into any comparison of prices in different places.

The third price comes from the Po Valley in Italy; it is another observation by Polybius (2. 15. 1). While this observation is closer to Rome than the first two prices, we have made an exception to our general rule. The Po valley was linked to Rome by rivers rather than sea. Diocletian's *Price Edict* fixed river transport prices at five times the level of sea transport, and we consider the cost of transport from the Po valley to have been five times as expensive as its actual distance if taken by sea. This evidence, however, dates from over a century later

⁷ Duncan-Jones, *The Economy of the Roman Empire* [n. 3].

than any of the prices we observed. We assumed the ratio of sea and river transport costs remained constant over time—which others have argued—and we included the Po valley in our data by multiplying the distance from Rome by five.⁸ Despite our small sample, we have enough data to test the usefulness of this assumption.

The fourth price comes from an official intervention in the local market. An inscription records that the wheat price in Pisidian Antioch was high in a time of scarcity (*L'Année Épigraphique* (1925), no. 126b). The normal price was eight or nine *asses* per *modius*; the acceptable limit price was one denarius per *modius*.⁹ This inscription reveals several important aspects of the Mediterranean wheat market in addition to reporting the normal price. The need to damp down famine prices indicates that local markets were subject to local scarcities; they were not so well linked that wheat from elsewhere would be brought in instantly in response to a local shortage. The apparent success of such interventions, in this case limiting the price to double its normal range, indicates that many famines were not severe.

For Egypt, we preserve the spirit of Rickman's data but improve on it, since Rathbone has reworked the sale prices that Rickman took from Duncan-Jones. We averaged seven Egyptian prices from the 'famine' of 45–47 BC to get a price for Egypt. Rathbone argued that these prices were unusual, but the previous discussion suggests that they may not be far from average.¹⁰ We of course cannot know how unusual these prices were, and any special conditions introduce noise into our data. The Egyptian prices also come from agricultural areas, not from a Mediterranean port. The purported famine would have raised the price, but using country prices would have depressed it compared to those at a port. These offsets introduce added uncertainty into the accuracy of this observation since there is no reason to expect them to be exact offsets. The average of Rathbone's seven prices was seven *drachmae* per *artaba*. These prices in Egyptian

⁸ Greene, *Archaeology* [n. 1], 40.

⁹ W. M. Ramsay, 'Studies in the "Roman Province Galatia" VI—Some Inscriptions of Colonial Caesarea Antiochea', *JRS* 14 (1924), 172–205 at 180.

¹⁰ Rathbone, 'Prices' [n. 3], 193, 217. The prices ranged from 4.4 to 8.8 *drachmae* per *artaba*, averaging 7.5.

currency and units were converted to HS per *modius* by following Duncan-Jones and dividing by 4.5.¹¹

Our final observation, from distant Palestine, is taken from Tenney Frank's *Economic Survey*; it too is an average of a few actual transactions.¹² All these prices were compared with roughly contemporaneous prices at Rome. Rickman argued that the price of wheat at Rome was between three and four HS per *modius* in the Late Republic, rising to five to six HS in the early Empire. Duncan-Jones confirmed the general price level; Rathbone confirmed the inflation, at least for Egypt where the data are more abundant. The order of observations turns out to be almost chronological even though the order of exposition was by distance.

The prices and the differences between the prices at Rome and the local prices are shown in Table 7.1. The price differences are graphed against the distance from Rome in Fig. 7.1. It is readily apparent that prices were lower outside Rome than in Rome itself; the price differences are all negative. This difference has been noted before.¹³ It also looks as if the price differential between various locales and Rome became more negative as the locales were further from Rome. In other words, wheat prices everywhere were lower than in Rome and lowest at the furthest reaches of the Mediterranean, that is, at places furthest from Rome.

What could have produced such a pattern? We suggest that the whole Mediterranean basin was monetized in the sense that money provided a standard of value for wheat and presumably other goods as well. This standardization of the monetary unit, taking into account the different currencies in the East, promoted the development of a unified market for wheat, along the lines suggested by Schaps.¹⁴

¹¹ Duncan-Jones, *Economy of the Roman Empire* [n. 3], 372. For information about transport within Egypt, although not its cost, see A. Bülow-Jacobsen, 'The Traffic on the Road and the Provisioning of the Station', in H. Cuvigny (ed.), *La Route de Myos Hormos* (Cairo, 2003), ii. 399–426.

¹² F. Heichelheim, 'Roman Syria', in T. Frank, *An Economic Survey of Ancient Rome* (Baltimore, 1938), iv. 181–3. Heichelheim recorded only the 'average price', not individual transactions.

¹³ P. Garnsey, e.g., observed casually and without apparent need for documentation that oil and wine cost more in Rome than elsewhere: *Cities, Peasants and Food in Classical Antiquity* (Cambridge, 1998), 241.

¹⁴ Schaps, *IC*.

TABLE 7.1. *Distance and prices for grain*

Region	Distance from Rome (km)	Rome price (HS)	Province price (HS)	Distance-from-Rome 'discount' (HS)	Year
Sicily (<i>Sicilia</i> province)	427	4.00 HS ^a	2.00–3.00 HS ^b	–1.50	77 BC
Spain (<i>Lusitania</i> province)	1,363	3.00–4.00 HS ^a	1 HS ^c	–2.50	150 BC
Po valley (<i>Italia</i> province), by river	1,510	3.00–4.00 HS ^a	0.5 HS ^d	–3.00	150 BC
Asia Minor (city of Pisidian Antioch)	1,724	5.00–6.00 HS ^a	2.00–2.25 HS ^e	–3.13	AD 80s
Egypt (Region of the Fayum)	1,953	5.00–6.00 HS ^a	1.5 HS ^f	–4.00	20 BC–AD 56
Palestine	2,298	5.00–6.00 HS ^a	2.00–2.50 HS ^g	–3.25	AD 15

Sources: ^a Rickman, *Corn Supply* [n. 6], 153–4.

^b Cicero, 2 *Verr.* 3. 189.

^c Polyb. 34. 8. 7.

^d Polyb. 2. 15.

^e *L'Année Épigraphique* (1925), no. 126b.

^f *P. Mich.* II 1271.1.8–38.

^g Heichelheim, 'Roman Syria' [n. 12], 181 and 183.

If there had been a unified wheat market, how would it have worked? The main centre of consumption would have been in Rome, where the largest number of potential consumers lived and the Roman government was located. In other words, Rome was where the largest excess supplies and demands for wheat would have come together and where the price of wheat consequently would have been set. The price would be lower in exporting regions in view of the transport costs to Rome. They would vary over time as supplies fluctuated due to harvests across the Roman world, storms affected the probability of successful transportation, and government actions altered the value of the currency. Normal variations in supplies and demands elsewhere in the Empire would have affected the price in Rome, although most fluctuations would have been small relative to the total production and the consumption at Rome. Most places outside Rome would have had an excess supply of wheat, and

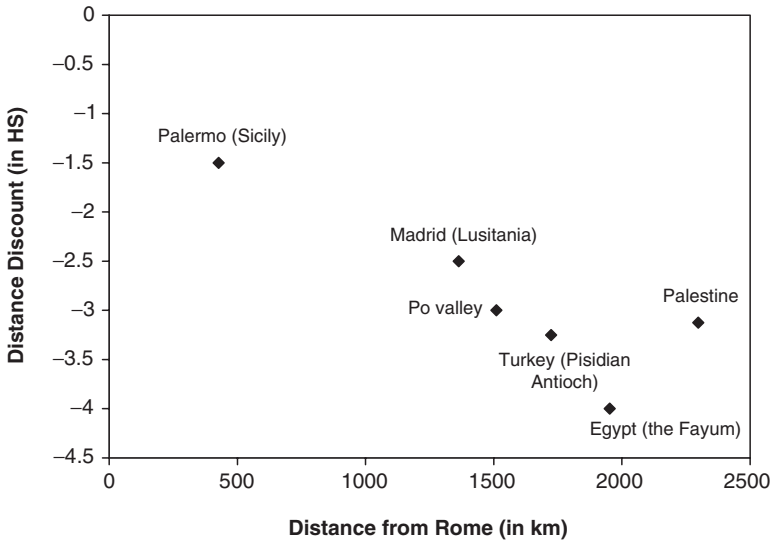


Figure 7.1. Plot of distance and Roman distance discount.

the price would have been set in Rome where the excess supplies and the largest excess demand came together. When local places were isolated, there could be excess local demand as well as excess local supply, that is, local famines as well as local gluts.

Under these circumstances, wheat outside Rome would be valued by what it was worth in Rome. Wheat at Palermo in Sicily, for example, normally would be worth less than wheat in Rome because it would have to be transported to Rome to be sold. The price of wheat in Sicily would be the price of wheat in Rome less the cost of getting wheat from Sicily to Rome. This would be true almost always, but there undoubtedly were circumstances when it was not. If storms prevented the shipment of grain to Rome, the Sicilian price might temporarily deviate from the level set by the price in Rome. If a harvest failure in Sicily created a local famine, the price of wheat in Sicily would rise above the level indicated by the Roman price until new wheat supplies could be brought in. In the absence of extreme events such as these, a unified market would keep Sicilian prices near the Roman price less the transportation cost.

The market is an abstraction; it is misleading to say the market would determine Sicilian prices. More correctly, competition would

TABLE 7.2. *Distance discount regression results*

	<i>N</i>	<i>α</i>	<i>β</i>	<i>R</i> ²
Distance discount	6	-1.10 (2.2)	-0.001 (3.9)	0.79
Distance discount (no Po valley)	5	-1.16 (2.0)	-0.001 (3.4)	0.79
Log distance discount	6	-6.14 (2.8)	-1.25 (4.1)	0.81
Log distance discount (no Po valley)	5	-6.04 (2.7)	-1.25 (4.1)	0.85

Note: The dependent variable is the price discount. Coefficients are negative because provincial prices were lower than Roman ones. Absolute values of t-statistics are below coefficients.

Source: Table 7.1.

determine Sicilian prices if there was a unified market. If the Sicilian price of wheat rose above the Roman level minus transportation costs, merchants would not buy wheat in Sicily to sell in Rome. The amount of wheat demanded in Sicily would fall, and the price consequently would fall as well. If the Sicilian price of wheat fell below the Roman level minus transportation costs, merchants would increase the amount of wheat they would try to buy in Sicily, for they could make an unusually high profit by taking it to Rome and selling it there. Merchants would bid against each other, raising the Sicilian price.

Wheat at Lusitania in Spain would be worth less than wheat at Palermo because it was further from Rome. The cost of transporting wheat from Spain to Rome was larger than the cost of bringing it from Sicily, and the price of wheat in Spain correspondingly would be lower. The reasoning is exactly like that for Sicily, only the transport cost is different. But while each price is compared to that in Rome, the price in Spain would be lower than the price in Sicily if there were a unified market. In fact, wheat around the Mediterranean would be worth less than the price at Rome, by an amount less depending on the distance from Rome. We do not know the transport cost in any detail, but we are reasonably sure that it rose with distance. If there was a unified wheat market, therefore, the price of wheat would have decreased as one moved further and further from Rome.

All this presumes monetization and information about prices throughout the Mediterranean. The comparisons assume that there were monetary units in which prices could be compared. In fact, most of the observations were in the same monetary units, and the others were translated to these units by a standard exchange

rate. The anticipation of profits from trade presupposes that the value of the wheat could be compared with the value of other goods and services and traded for them. Without monetization, there can be only the simplest kind of trade because the opportunities are very hard to evaluate.

This hypothetical account of trade sounds impossibly modern. But if it is not an accurate picture of the Roman world, we need to think of the relevant alternative. Phrased differently, what is the alternative to this view? If there were not a unified currency or market, if there were only independent local currencies and markets, then we would not expect to find any relationship between local and Roman prices. Prices in local prices and markets would be determined by local conditions. The prices might move together at some times, if storms around the Mediterranean caused simultaneous harvest failures everywhere or currency debasements caused prices to rise everywhere, but the prices would not in general be related one to another. Any single identity of prices could be a coincidence, and it is impossible to say if similar miners' wages in Egypt and Dacia were the result of coincidence, government regulation, or a market for miners.¹⁵ If we could find several wheat prices in different places, however, we could test whether the pattern we find is due to coincidence or an underlying market process.

The question is not whether one or the other of these ideal types was observed, either that there was a single monetary area and an efficient market or that there were no factors unifying separate local moneys and markets. It is rather whether the historical experience lies closer to one end of a continuum than the other. There must have been at least occasional local shortages and famines. The question then is whether the normal state of affairs was one of interconnected currencies and markets, so that prices in different places typically were related, or one of separated and independent currencies and markets. In the latter case, we should not observe any systematic relationship between the location and the price of grain. If the economies in these places had not been monetized, of course, we would not have observed any prices at all.

¹⁵ H. Cuvigny, 'The Amount of Wages Paid to the Quarry-Workers at Mons Claudianus', *JRS* 86 (1996), 139–45.

2. A TEST OF MARKET INTEGRATION

It may appear as if the picture in Fig. 7.1 could only *suggest* such a story. It seems like a tiny bit of evidence on which to hang such a grand story of universal monetization and market integration. There is, however, a statistical technique that can be used to evaluate how likely it is that a picture like Fig. 7.1 could arise by chance. In other words, we can test the probability that the separate areas of the early Roman Empire were isolated and out of economic connection with Rome. Their prices would have been determined by local conditions, including perhaps the degree of monetization. There would have been no connection between the distance to Rome and the level of local prices.

This statistical technique is known as regression analysis. In this type of analysis we can evaluate the likelihood that there is a relation between the local price and the distance from Rome. We start by trying to draw a line that relates the price difference between the local price and the Roman price to the distance from Rome. We then adjust the line to make it the best description of the data in the sense that it minimizes the squared distance of the individual observations from the line. (We use the square of the distance to minimize the distance from points both above and below the line and to simplify the mathematics.) This process is known as regression analysis or the method of least squares, and the resulting 'least-squares' line is the regression line. It is shown in Fig. 7.2.

One of the values of regression analysis is that it generates tests of the hypotheses being tested. We can ask if an apparent relationship between the price discount and the distance from Rome is illusory, a result of observing only a few prices, rather than the result of a systematic process. In order to draw this line, we assumed that there was a relationship between the distance from Rome and the price discount. Regression analysis provides a test as to whether there is such an association in the data. This test tells us how unlikely it is for us to find a line like the one shown in Fig. 7.2 by chance. Assume that the prices we gathered from Rickman were randomly drawn from an underlying distribution of price observations. In another world, different prices would have survived from this same distribution. Taking account of the random quality of the observations we

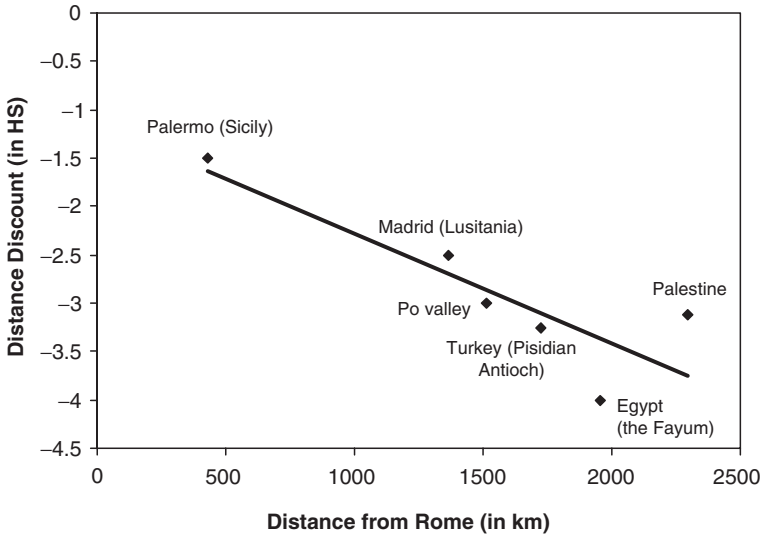


Figure 7.2. Relationship between distance and Roman distance discount.

actually have, how unlikely is it for us to find the line in Fig. 7.2 by chance?

Regression analysis acknowledges that the slope of the line in Fig. 7.2 is not known with certainty. It is the best line that can be drawn with the data at hand, but it is subject to errors deriving from the incomplete sampling of the underlying distribution. In the jargon of regression analysis, the slope of the line has a standard error. If all the points in Figs. 7.1 and 7.2 lay in a straight line, then the slope of the regression line would be clear, and the standard error of the slope would be close to zero. If the points are spread out as they are in the figures here, then the line is not known as clearly, and there is a chance that the line has no slope at all, that is, that there is no relationship between the distance from Rome and the price difference.

The test is to compare the size of the slope, the coefficient in the regression, with the size of its standard error. If the coefficient is large relative to the standard error, then it is unlikely that the line was a random finding without support in the price data. On the other hand, if the coefficient is small relative to its standard error, then it is possible that even though the regression line has a slope, there is no

underlying relationship between the price and distance. Statisticians call this ratio a t-statistic, and they have calculated tables that can translate t-statistics into probabilities that the line is observed by chance.

The tables take account of degrees of freedom, that is, the number of observations minus the number of coefficients. It takes two variables to define a line, its slope, and its position (height in the figures). With six observations and two variables, there are four degrees of freedom. Omitting the observation with river transport reduces the number of observations by one and the degrees of freedom to three. The t-statistic has to be larger with such few degrees of freedom than with more degrees of freedom to show that a given regression line is unlikely to be the result of chance.

One might think that the data—composed of only a few, badly observed values—are too poor for statistical analysis. Nothing could be further from the truth. Statistics are the best way of distinguishing signal from noise; they are particularly useful when there is a lot of noise in the system. They give us a precise sense of how unlikely it is that any putative pattern we think we observe would have been generated by random processes, that is, how unlikely it is that what looks like a pattern actually is noise. The value of statistics is that we can test a formal hypothesis, namely that wheat prices around the Mediterranean Sea were related in a simple way to those at Rome. We also can derive an explicit probability that this hypothesis is true, given the observations we have.

In particular, errors in variables are a common problem in doing regressions. We often hypothesize a relationship between two variables—like the price in Rome and the price in Egypt—but cannot observe one or the other of them precisely. We then use a proxy such as the occasional price that happens to be mentioned in a surviving document, as we have done here for most of our prices. The errors introduced by such a procedure have been studied, and their effects are well known. The added uncertainty introduced by using imperfect proxies reduces the explanatory power of regressions and tends to result in coefficients and t-statistics that are near zero; the addition of noise through imperfect observations makes the results look more like noise. The well-known scarcity of Roman prices makes it very hard to find a pattern in them. When a pattern is found, however, it indicates that there is a strong relationship between the prices.

The price differentials are graphed against the distance to Rome in Fig. 7.1. The results are quite striking; prices were lower in places further from Rome, and the price differentials appear almost proportional to the distance from Rome. These prices come from all over the Mediterranean and from various times in the Late Republic and early Empire. If there were not a unified monetary system or if there were not a unified grain market, there would be no reason to expect a pattern in these prices. Even if there was a unified market, our inability to find more prices or more accurate transportation costs might have obscured any true relationship among the prices. Yet Fig. 7.1 reveals a clear picture.

While the graph is clear, a statistical test is needed to tell if the observed pattern could be the result of chance. Accordingly we ran regressions of the price differential on the distance from Rome, with the results shown in Fig. 7.2 and Table 7.2. There are four separate regressions in the table. Since the transportation from the Po valley was by river rather than sea, we were not sure that the correction for the relative cost of transport was accurate, and we tried the regressions both with and without the Po valley data point. In addition, we expressed the distance in logarithms to measure the proportional change in it to allow the relationship between price and distance to be non-linear.

Each row of Table 7.2 contains the result of a separate regression. The first two columns identify the regression by whether we used the distance or its log and whether we included the Po valley. The next two columns give the coefficients resulting from the regression with the relevant t-statistics below them in parentheses.¹⁶ There are two columns because a straight line is defined by two parameters, a constant and a slope. The first column gives the constant. It measures the difference between the price in Rome and elsewhere that was not related to distance. The second column gives the slope of the line in Fig. 7.2. It measures the rate at which the discount from the price in Rome grew as distance from Rome increased.

¹⁶ The sizes of the coefficients rise when we use logarithms since the logarithm of a number typically is smaller than the number. T-statistics are the same sign as the coefficient, but we have reversed the signs of the t-statistics in Table 7.2 to make the description more intuitive.

How can we be sure that the price discount increased with distance? The t-statistics below the coefficients indicate that it is highly unlikely that there is no relationship between the local price and the distance from Rome. They are all larger than three. A t-statistic above three indicates that there is less than one chance in twenty that the observed relationship between distance and price differentials was due to chance.¹⁷ In other words, we confirm with very high probability that there was a unified wheat market that extended from one end to the other of the Mediterranean Sea, that transport costs were roughly proportional to distance, and that the effects of distance were larger than the idiosyncratic influences of particular markets, currencies, and places. This level of confidence is taken as conclusive in most economic and medical tests done today.

The R^2 shown in the final column measures the share of the variance of the price differentials that is explained by these simple regressions. Using the price differentials themselves, the regression explains almost four-fifths of the variation. Using logarithms of distance, the regressions explain even more. This result confirms the impression in Fig. 7.2 that distance from Rome is a powerful explanatory factor in determining wheat prices around the Roman Mediterranean.

The constant terms in these regressions were different from zero in the regressions for price discounts. They were not estimated as precisely as the relationship between distance and the price differentials, so we cannot be as sure that they are not the result of chance (as indicated by smaller t-statistics). The constant terms suggest that there were some costs to bring wheat to Rome that were not proportional to distance, albeit smaller and less well observed. These other costs include *portoria*, that is, tariffs on trade from the provinces, as well as the costs of transshipping wheat from seagoing ships.¹⁸ Their

¹⁷ In the more precise language normally used for regressions, the probability of observing the coefficients in the table if there were no relationship between the price of wheat and the distance from Rome is less than 5 per cent in all four regressions. The 5 per cent value of the t-statistic for four degrees of freedom (six observations) is 2.8; for three degrees of freedom (five observations), 3.2. Higher t-statistics indicate lower probabilities that the observed relationship is the result of chance.

¹⁸ S. J. de Laet, *Portorium: étude sur l'organisation douanière chez les romains, surtout à l'époque du haut-empire* (Bruges, 1949); J. France, *Quadragesima Galliarum: l'organisation douanière des provinces alpestres, gauloises et germaniques de l'Empire romain* (Rome, 2001).

presence does not detract from the effect of distance or the evidence in favour of a unified wheat market. The constants are negative because tariffs and port costs decreased the price of wheat outside Rome.

It does not make a big difference whether the Po valley is included or not. Without this observation, the standard error of the slope coefficient is slightly larger, making the t-statistic slightly smaller. The required t-statistic to show the probability that the slope is not zero also rises due to the fewer degrees of freedom. Nonetheless, the probability that there was no relationship between price and distance from Rome is still less than one in twenty. The slope of the line and the percentage of the price variation that is explained by distance do not change. As can be seen in Fig. 7.2, the observation for the Po valley lies close to the regression line; removing it does not change the line.

This graph and these regressions provide powerful evidence for the existence of extensive monetization and unified wheat markets in the Late Republic and early Empire. Other authors have inferred the existence of such markets from isolated observations, but we have demonstrated the existence of a relationship between prices in far-flung places that almost certainly is not the result of chance. Such a relationship could exist only where the standard of value, money, was used throughout the Mediterranean.

3. POSSIBLE OBJECTIONS

We discuss in this section possible objections that can be raised to this test and our conclusion. The first objection is that prices were low outside Rome because coined money was scarce, not because transport to Rome was costly. This alternative cannot explain the prices in Table 7.1. Coins may have been scarce in Lusitania at the time of Polybius, but coins were abundant in the eastern Mediterranean where the monetized Greek economy preceded the Roman one. Wheat prices there were lower than in Lusitania, as can be seen from the figures. Distance from Rome is a much better predictor of prices than coin scarcity.

A second objection is that the prices are unrepresentative because they are notional, biased because the observers had political motives, or unrepresentative due to price fluctuations. We acknowledge that

such errors in the price observations may have been present, although Polybius was a very careful historian, not liable to falsify his evidence to make a rhetorical point. As noted already, such errors in recording the 'true' prices introduce noise into the relationship between the price differential and distance from Rome. If there was a great deal of this distortion, any existing relationship might be obscured. Since we find such a relation, it means that the relationship between distance and price was a strong one, visible even through the noise introduced by casual or distorted price observations.

More formally, we can think of the observed prices being determined by the true prevailing prices, which we observe with an error due to our approximation. Then the dependent variable we used in the regression is the true price differential plus an error. That error would add onto the error of the regression and result in a lower t -statistic and R^2 . Given that they both are large, we conclude that this rough assumption in fact is quite good, that the observed prices appear to represent prevailing prices in a reasonable fashion.

Another, related objection is that prices fluctuated during the year and observations may have come from different seasons. Again, this source of noise strengthens our results because the seasonal price variation introduces another source of noise into the hypothesized relationship. We suspect that the casual nature of the price observations has helped us here. Travellers were told of the prevailing price, not sometimes the extreme price that obtains just before the harvest comes in and sometimes the low price following the harvest. The result appears to be a consistent set of prices. Phrased differently, we regard the few prices that have survived for two millennia as quite random, but it is perverse to insist that any pattern we find has to be spurious. There does not seem to be a reason to throw out evidence from the ancient world on the grounds that it must be random.

Yet another objection to the use of these prices is that the argument is circular: we assume the data are sound because they support the hypothesis, but the test of the hypothesis requires the data to be sound. Not at all. We assume that the prices we observe are drawn from a distribution of prices in the early Roman Empire (and Late Republic). We do not assume they are accurate or come from a particular kind of investigation or a particular time of year (as in the previous paragraph). In fact, we only assume that they are prices.

Given that we are sampling from the population of wheat prices, the t-statistic tells us whether there is a relationship between price and distance. There is no more circularity here than in any statistical test of a hypothesis.

Another objection is that the sample is tiny, only six price pairs. This small sample is unfortunate, but no barrier to the test of our hypothesis. As we said above, the standard errors and t-statistics are corrected for degrees of freedom. Having few observations makes it easier to reject hypotheses, but it does not affect the validity of the test. We would, of course, like to have many more prices, but there are not more to be found at this time. Perhaps our analysis of these few prices will stimulate other historians to find more price pairs and to provide more evidence for or against our hypothesis.

A little thought experiment might be useful here. Imagine that we discover a steady stream of new wheat prices from various locations. If they all lie near the regression line in Fig. 7.2, they provide more evidence for our hypothesis. Prices that do not lie near the regression line, however, indicate that the locations in question were isolated from the general Mediterranean wheat market or the main currency area at the times of the price observations. If we only find a few such observations, that would enrich the historical record without vitiating the hypothesis of a generally unified market. If we found a lot of such prices, that would suggest that conditions where markets were isolated were more prevalent than times when they were integrated. The Roman world in that case would be monetized, but not composed of a unified monetary system.

We remarked earlier that imperial officials often intervened in the market for wheat. If the government was administering prices, then the prices might not be the result of market forces at all. To check this possibility, we searched for price interventions in Rome. The government repeatedly attempted to avoid the hardships of price spikes when supplies ran short. In 74 BC, the government sold grain cheaply to offset the loss of wheat in Sicilian floods. In 57 BC Pompey negotiated extra purchases himself, sailing from province to province in search of wheat. In 24 BC Augustus gave 400 HS apiece to 250,000 people, allowing them to purchase wheat that was temporarily expensive. In AD 19 Tiberius placed a price ceiling on grain and offered to compensate merchants two HS per *modius*, suggesting that the

price before his intervention was at least two HS above the price he thought people could bear. In AD 64 Nero set another price ceiling for wheat, this time at three HS per *modius*.¹⁹

Government interventions such as these are summarized in Table 7.3. It is clear that the government intervened in the wheat market from time to time, particularly under Augustus. It also is clear, even from what must be a partial list, that these interventions were intermittent. If we assume that these interventions are only half the actual actions, the others being unrecorded in our sources, the years in which there were interventions were still clearly a minority. The market for wheat was allowed to work on its own in most years. In addition, if traders expected the government to interfere when famine loomed, they might have been discouraged from trying to corner the market in adversity. Government intervention therefore may have dampened speculation and made the underlying pattern of prices easier to see.

The largest government activity in the wheat market was the *annona*. The government gave 60 *modii* per year to each male head of a household in Rome. The number of households receiving this largesse is unclear, but it is generally thought to be between 200,000 and 250,000 during the reign of Augustus.²⁰ If the population of Rome was around one million people, the *annona* used between half and a quarter of the wheat imported into Rome. More than half the wheat imported to Rome at the time of Augustus therefore was imported privately. Sirks argued that the share of grain imported into Rome for the *annona* was even smaller, only around 15 per cent, making the private share correspondingly larger.²¹

The government also obtained the wheat for the *annona* privately. They let contracts to *societates* to provide wheat, and they offered

¹⁹ P. Garnsey, *Famine and Food Supply in the Graeco-Roman World* (Cambridge, 1988), 195–222; Rickman, *Corn Supply* [n. 6], 150–4.

²⁰ C. Virlouvet, *Tessera frumentaria: les procédures de distribution du blé public à la fin de la République et au début de l'Empire* (Rome, 1995); Garnsey, *Cities, Peasants* [n. 13], 236.

²¹ B. Sirks, *Food for Rome* (Amsterdam, 1991), 21. W. M. Jongman argues that the *annona* provided bare subsistence for half the free population of Rome, that is, less than half of total wheat imports: 'Consumption in the Early Roman Empire', in R. P. Saller, I. Morris, and W. Scheidel (eds.), *The Cambridge Economic History of the Greco-Roman World* (Cambridge, forthcoming).

TABLE 7.3. *Selected government interventions in the grain market*

Date	Intervention Type	Source
138 BC	Rising prices lead tribunes to seek extra grain supplies	Obsequens 22 (142).
100 BC	Fear of shortage leads Senate to seek extra grain stock	M. H. Crawford, <i>RRC</i> ii. 74, 616
75 BC	1½ <i>modii</i> distributed free per man given shortage	Cicero, <i>Planc.</i> 64. Cicero, 2 <i>Verr.</i> 3. 215
74 BC	Aedile distributes grain at 1 AS per <i>modius</i>	Pliny, <i>Hist. nat.</i> 18.16
66 BC	Pompey tours Sicily, Africa, and Sardinia to secure extra grain in his capacity as grain commissioner	Cicero, <i>Imp. Pomp.</i> 34
62 BC	Cato's Lex Porcia raises grain outlay to 30 million HS or adds that much to the budget	Plutarch, <i>Cato Min.</i> 26. 1
58–56 BC	Cicero appoints Pompey for grain supply, price falls	Cicero, <i>Dom.</i> 10–12, 14–18; <i>Att.</i> 4. 1; Cassius Dio 39. 9. 3, 24. 1; Cicero, <i>Q. fr.</i> 2. 5; <i>Har. resp.</i> 31; Plutarch, <i>Pomp.</i> 49. 4–50. 2
49 BC	Caesar distributes grain to starving Romans during the civil war (Garnsey, <i>Cities, Peasants</i> , 202)	Cicero, <i>Att.</i> 7. 9. 2, 4; 9. 9. 4; <i>Fam.</i> 14. 7. 3; Appian, <i>Bell. civ.</i> 2. 48; Cassius Dio 41. 16. 1
29 BC	Augustus gives 400 HS to 250,000 people	<i>Res gest.</i> 15
24 BC	Augustus gives 400 HS to 250,000 people	<i>Res gest.</i> 15
23 BC	Augustus gives money and '12 rations' to 250,000 people; Tiberius also helps, and Suetonius says he 'skilfully regulated the difficulties of the grain supply and relieved the scarcity of grain at Ostia and in the city'	<i>Res gest.</i> 15; Suetonius, <i>Tib.</i> 8
22 BC	Augustus gives grain to many	<i>Res gest.</i> 5
18 BC	Augustus gives grain to at least 100,000	<i>Res gest.</i> 18
11 BC	Augustus gives 400 HS to 250,000 people	<i>Res gest.</i> 15
5 BC	Augustus gives 240 HS to 320,000 people	<i>Res gest.</i> 15
2 BC	Augustus gives 240 HS to 200,000 people	<i>Res gest.</i> 15
AD 6	Augustus gives grain to many; also expels some foreigners from the city to alleviate the crisis (Garnsey, <i>Cities, Peasants</i> , 221)	Cassius Dio 55. 22. 3
AD 19	Tiberius imposes price ceiling, gives dealers + 2 HS	Tacitus, <i>Ann.</i> 2. 87
AD 51	Claudius encourages merchants to sail in winter (Garnsey, 223)	Tacitus, <i>Ann.</i> 12. 43
AD 64	Nero fixes price at 3 HS, <i>annona</i> suspended	Tacitus, <i>Ann.</i> 15. 39
AD 189	Commodus engages in price-fixing	Herodian 1. 12. 2–4; Cassius Dio 72. 13. 2

inducements for private merchants to participate in this process. Claudius rewarded private merchants who used their own ships, carrying at least 10,000 *modii*, to import grain to Rome for the *annona* for five years. If the merchant was a citizen, he would be exempt from the *lex Papia Poppaea*, which penalized the childless. If the merchant were a woman, she could make a will without the intervention of a male tutor. And if the merchant was not a citizen, he would be granted citizenship. Hadrian extended these rewards by exempting any merchant devoting the greater part of his resources to the *annona* from compulsory services imposed by municipal authorities.²²

The wheat market in Rome consequently was a mixture of public and private activity. There was enough private activity to provide work for many merchants and shippers who would gather wheat from the far corners of the Mediterranean. But the public presence means that the price of wheat in Rome may have been distorted by the *annona*. We have discussed price variation already, and government actions probably stabilized prices more than they destabilized them. The presence of so much free wheat in Rome, however, may have decreased the price of wheat in that city at all times. If this price was received by importers, then the graphs and regressions record the proper relation between Roman and provincial prices. If the price we observe was different from the price paid to importers, this would change the constant in the regression and move the line in Fig. 7.2 up or down. It would not affect the relationship in Table 7.2 or the slope of the line in Fig. 7.2 (unless of course the officials of the *annona* paid different prices for wheat from different places—for which there is no evidence at all).

Coming back to monetary conditions, there is evidence of inflation in the early Roman Empire. The pay of soldiers was increased in infrequent large jumps, and wheat prices in Egypt rose.²³ We used the price difference between Roman and provincial prices in order to avoid problems of inflation. As shown in Table 7.1, we take account of inflation in Rome. While the incomplete evidence on inflation suggests there were a few jumps in prices, it is more likely that they

²² E. Badian, *Publicans and Sinners* (Oxford, 1972); Garnsey, *Famine and Food Supply* [n. 19], 234; Sirks, *Food for Rome* [n. 21], 63.

²³ G. R. Watson, *The Roman Soldier* (Ithaca, NY, 1969), 89–92; Rathbone, 'Prices' [n. 3].

were drifting upward more or less steadily. In any case, the use of a price difference insulates our test from an inflationary bias.

Turning to the other variable, distance, we acknowledge that a straight-line distance is only a rough approximation to the actual distance travelled by wheat on its way to Rome. This defect of the data however is an advantage for our test; it biases our test toward rejecting our hypothesis. The approximate nature of the distance estimate introduces another kind of error in the variables. Since this is our independent variable, the effect is slightly different from the effect of an error in observing the price. Any error in observing distance has the effect of reducing the size of the resulting coefficient. Since the slope of the regression line is large, as can be seen in Fig. 7.2, straight-line distances appear to give a good representation of the comparative distance from Rome despite the waywardness of any specific voyage to the capital city.

Finally, this is a very simple model of Roman monetization and trade. We have argued that there was a single monetary system and a single wheat market across the whole Mediterranean. We tested this hypothesis with a simple regression and few degrees of freedom. Why should any ancient historian believe such a simple model and test? We argue that the purpose of a model is to provide an overall view of money and trade in Rome. It does not explain every detail; instead it provides an overview that can help our thinking. There are only a few observations because that is all we have. If we studied more recent times, we would have more data, but we do the best we can with ancient history. As we said above, we hope that our exploration will stimulate ancient historians to search for added price observations. We will be as interested as any reader to see if this simple model survives a test with more data.

4. CONCLUSION

We have argued here that the early Roman Empire was thoroughly monetized. We do not argue that people everywhere had adequate supplies of Roman coins, but rather that people throughout the Empire used a single monetary standard to value their activities.

This single monetary standard was based on *sestertii* in the western Empire and on *drachmae* in the eastern Empire, with a fixed exchange rate between them. The result was to create a single currency area like the euro zone today. Whether or not all regions had adequate supplies of coin, the survival of prices from all corners of the Empire indicate that the Roman economy was thoroughly monetized.

We argued also that this monetization set the conditions for market integration by reducing the transactions cost of trading across large distances. This allowed a single market for wheat to emerge, whose existence we could verify from surviving prices. The enormous size of Rome also encouraged the growth of trade, since all the residents of the capital needed to eat. Food must have travelled around the Mediterranean for aeons before the Roman conquest.²⁴ The quantities shipped were too small, however, to make a unified market. Only when the Romans imposed a political settlement on the area and created a unified monetary system could trade expand enough to unify prices across the Mediterranean.

²⁴ P. Temin, 'Mediterranean Trade in Biblical Times', in R. Findlay et al. (eds.), *Eli Heckscher: International Trade and Economic History* (Cambridge, Mass., 2006).

The Function of Gold Coinage in the Monetary Economy of the Roman Empire

Elio Lo Cascio

The issuing of a regular gold coinage, which started with Caesar¹ and was linked by a fixed relationship to the other components of the Roman monetary system, may well be considered the most important turning point in Roman monetary history from the beginning of the denarius coinage at the end of the third century BC to the final dissolution of the system in the third century AD. Until Caesar, as has been pointed out, ‘bullion was used to make payments in some contexts’,² but these payments seem to have been on the whole from the state and to the state and did not involve the relationships between private actors. Therefore, I am not sure to what extent we are allowed to say that ‘bullion should . . . be reckoned as having made a contribution to the supply of money’.³ And the spasmodic issues of gold coinage before Caesar, during the Hannibalic War or the Civil Wars, seem to have produced gold ingots in the form of gold coin, rather than actual pieces of money.⁴ It was only with the establishment of

¹ Crawford, *RRC* nos. 452/1; 456/1 a and b; 460/1; 466: see now M. C. Molinari, ‘Gli aurei a nome di Giulio Cesare e Aulo Irzio’, *RIN* 104 (2003), 165–253.

² C. Howgego, ‘The Supply and Use of Money in the Roman World’, *JRS* 82 (1992), 1–31 at 10.

³ *Ibid.* 10. The radical difference with the new state of affairs with Caesar is underlined by e.g. R. Wolters, *Nummi signati. Untersuchungen zur römischen Münzprägung und Geldwirtschaft* (Munich, 1999), 42, 45–6.

⁴ *RRC* nos. 28/1 and 2; 29/1 and 2; 44/2, 3, and 4; 50/1; 72/2; 88/1; 105/2; 106/2; 359/1; 367/2; 375/1; 381/1a and b; 402/1a and b; cf. M. H. Crawford, *Coinage and Money under the Roman Republic. Italy and the Mediterranean Economy* (London

a regular issue of gold coinage and hence of a fixed relationship, in terms of value, between the new gold coin and the other components of the Roman monetary system, that gold coin ceased to be *merx* and became actual money, *pretium*, to use the concepts and terms of the jurist Paulus in his remarks on the nature of coined money, which are to be found in the famous passage of the *Digest* about the 'logical' origin of money as a means of exchange and about its present nature.⁵ Paulus says that it is the issuing authority, that is the state, that creates money through the *forma publica* which is put on the coins, and that the value of the coin depends on this *forma publica* and not on its *substantia*. The monetary system could work smoothly, ever since the Sullan *lex Cornelia testamentaria nummaria* or *de falsis* forbade the rejection of a coin which carried the *forma publica*, the mark of the state, and later on, the *vultus*, the face, of the emperor.⁶

The regular issue of *aurei* added enormously to the stock of money. Suffice it to point to the data collected by Duncan-Jones in his *Money and Government in the Roman Empire* and in more recent publications on the composition of stray finds all over the Empire.⁷ In terms of face-value, gold coinage constitutes a much higher proportion of the whole than silver coinage—in some regions reaching the proportion of 70 per cent. In Pompeii gold coinage makes up 61 per cent of the total coin finds, whereas silver denominations

1985), 52–60 and 188; for the gold stater of T. Quinctius Flamininus (*RRC* no. 548/1) issued presumably in Greece, see in particular M. R. Alfvöldi, 'Der Stater des T. Quinctius Flamininus', *Numismatische Zeitschrift* 98 (1984), 19–26.

⁵ *Dig.* 18. 1. 1 *pr.* (Paulus 33 *ad ed.*): Lo Cascio, 'Teoria e politica monetaria a Roma tra III e IV d.C.', in A. Giardina (ed.), *Società romana e impero tardoantico* (Rome, 1986), i. 535–57, 779–801, and references there; see also Lo Cascio, 'How Did the Romans View their Coinage and Its Function?', in C. E. King and D. G. Wigg (eds.), *Coin Finds and Coin Use in the Roman World, The Thirteenth Oxford Symposium on Coinage and Coinage History* 25.–27. 3. 1993, *Studien zu Fundmünzen der Antike* 10 (Berlin, 1996), 273–87, and references there.

⁶ [Paul.] *Sent.* 5. 25. 1: 'Lege Cornelia testamentaria (tenetur) . . . qui . . . vultu . . . principum signatam monetam praeter adulterinam reprobaverit'; see Lo Cascio, 'Carbone, Druso e Gratiadiano: la gestione della *res nummaria* a Roma tra la *lex Papiria* e la *lex Cornelia*', *Athenaeum* 57 (1979), 215–38; id., *Intervento in AIIN* 29 (1982), 203–8.

⁷ Duncan-Jones, *MG*; 'Roman Coin Circulation and the Cities of Vesuvius', in *CM* 161–180. See now, for the evidence from Pompeii, the catalogue of finds in M. Taliercio Mensitieri (ed.), *Pompeii. Rinvenimenti monetali nella Regio IX* (Rome, 2005), 179–340.

account for 32 per cent and copper and *aurichalcum* coins for just 7 per cent. These data would suggest that gold coinage, in terms of value, formed by far the majority of coins in circulation, something like 60 per cent. Furthermore, stray finds may underrepresent the proportion of gold coinage actually in circulation, since, given the very high value of single pieces, it was much less likely that anyone would lose a gold coin than a silver or copper one. Again, it is interesting to note that the evidence of hoards, collected by Duncan-Jones, seems to confirm that the proportion of gold coinage in circulation must have been even higher than 60 per cent: 'Gold hoards, making up less than 27 per cent of the hoard total, contribute almost three quarters of the total face value.'⁸ In sum, in terms of its sheer quantity, the role of gold coinage was exceedingly important.

Duncan-Jones himself has attempted a bold estimate of the total money stock in the middle of the second century AD at roughly 20 billion sesterces (12 billion in gold coin)⁹—a volume of coinage not only without parallel in the periods before and after the first two centuries of the Principate, but also exceedingly high by comparison with other 'pre-modern financial systems'. This is especially striking in view of recent estimates of the GDP of the Empire by Goldsmith, Hopkins, and Temin:¹⁰ Goldsmith puts it just under 21 billion sesterces, whereas Hopkins's figure is much more modest, some 9 billion sesterces for the *minimum* GDP, with a proviso that the actual GDP was 'perhaps between a third and a half higher'. Temin's estimate does not fall far behind: 10 billion sesterces, although he criticizes Hopkins for not following 'proper economic reasoning' in making his estimate.¹¹ It is worth noting that Goldsmith himself assessed the total monetary stock at the end of the Augustan period at a much lower figure than the one advanced by Duncan-Jones, 6 to 8

⁸ MG 70. ⁹ MG 170.

¹⁰ R. W. Goldsmith, 'An Estimate of the Size and Structure of the National Product of the Early Roman Empire', *Review of Income and Wealth* 30 (1984), 263–88; Goldsmith, *Premodern Financial Systems. A Historical Comparative Study* (Cambridge, 1987), ch. 4; K. Hopkins, 'Rome, Taxes, Rents and Trade', *Kodai* 6/7 (1995/6), 41–75 (repr. in W. Scheidel and S. von Reden (eds.), *The Ancient Economy* (Edinburgh, 2002), 190–230); P. Temin, 'Estimating GDP in the Early Roman Empire', in Lo Cascio (ed.), *Innovazione tecnica e progresso economico nel mondo romano* (Bari, 2006), 31–54.

¹¹ Temin, 'Estimating'.

billion sesterces. This figure, as Goldsmith observes, 'would imply ratios of three-tenths to four-tenths of total and of three-fifths to four-fifths of monetized national product and velocities of circulation of 2.5 for total and of 1.5 to 2.5 for monetized national product'; this velocity of circulation 'was comparable to those found for some countries in Europe in the fifteenth to seventeenth centuries'.¹²

It does not seem, however, that the estimate by Duncan-Jones is inherently improbable, even if the way in which it is arrived at can be criticized on several grounds.¹³ The analysis of the composition of the Greenland ice cores and lake sediments in Sweden, Switzerland, and Spain, measuring the degree of atmospheric pollution as a result of smelting operations during Roman times in the Northern hemisphere, provides uncontested (though indirect) evidence for an intensely monetized economy.¹⁴

If we accept the high figure proposed by Duncan-Jones, we have to account for it. Why was there so much coined money in the Roman Empire? Why was there so much coined gold? There are several possible, albeit not mutually exclusive, explanations. The first one is that the rate of monetization was much higher than estimated, for example, by Goldsmith (half the total GDP).¹⁵ The second is that the velocity of circulation, most notably of gold coin, was very low: this is the position advocated by Duncan-Jones himself.¹⁶ The third

¹² Goldsmith, *Premodern Financial Systems* [n. 10], 41–2.

¹³ See e.g. Lo Cascio, 'Produzione monetaria, finanza pubblica ed economia nel principato', *Rivista Storica Italiana* 109 (1997), 650–77.

¹⁴ S. Hong, J.-P. Candelone, C. C. Patterson, and C. F. Boutron, 'Greenland Evidence of Hemispheric Lead Pollution Two Millennia Ago by Greek and Roman Civilizations', *Science* 265 (1994), 1841–3; 'History of Ancient Copper Smelting Pollution during Roman and Medieval Times Recorded in Greenland Ice', *Science* 272 (1996), 246–9; S. Hong, J.-P. Candelone, M. Soutif, and C. F. Boutron, 'A Reconstruction of Changes in Copper Production and Copper Emissions to the Atmosphere during the Past 7000 Years', *The Science of Total Environment* 188 (1996), 183–93; I. Renberg, M. W. Persson, and O. Enteryd, 'Pre-industrial Atmospheric Lead Contamination Detected in Swedish Lake Sediments', *Nature* 368 (1994), 323–6; W. Shoty, D. Weiss, P. G. Appleby, A. K. Cheburkin, R. Frei, M. Gloor, J. D. Kramers, S. Reese, and W. O. van der Knaap, 'History of Atmospheric Lead Deposition since 12,370 ¹⁴C yr BP from a Peat Bog, Jura Mountains, Switzerland', *Science* 281 (1998), 1635–40; cf. K. Hopkins, 'On the Political Economy of the Roman Empire', <<http://www.stanford.edu/group/sshi/Conferences/1999-2000/empires/hopkins.pdf>>, accessed 15 June 2007; A. Wilson, 'Machines, Power and the Ancient Economy', *JRS* 92 (2002), 1–32.

¹⁵ Goldsmith, 'An Estimate' [n. 10], 274–5; id., *Premodern Financial Systems* [n. 10], 35.

¹⁶ And by others, including Jongman (see below).

possibility is that the total GDP was higher than was estimated by Goldsmith, and much higher than has been supposed by Hopkins and Temin; it was also probably increasing from the first to the second century AD. The total GDP was higher because the population was more numerous, and/or the per capita income was higher than that estimated by Hopkins, by Temin, and even by Goldsmith.

There are reasons to think that a combination of all three possibilities can explain the high level of the stock of coinage and the major and increasing role that gold coin played. I do not linger on the first possibility. I simply want to point to the very high rate of urbanization of the Roman world, which must certainly have had an important effect in extending the range of monetary transactions in the first place. But the use of money was not limited to urban centres, it extended also to rural *milieux*, as Howgego and De Ligt have shown against Crawford,¹⁷ and was therefore more or less ubiquitous: already at the beginning of the Principate barter and the use of bits of silver for exchange transactions were for Strabo peculiarities of barbarian and backward areas such as Lusitania and Dalmatia.¹⁸ Literary, epigraphic, and papyrological evidence shows to what a great extent monetary transactions involved all strata of society. And the fragments of the Roman jurists cannot properly be justified or understood, unless the use of coinage was a fact of daily life.

As to the second possibility (a very low velocity of circulation, especially of gold coin), it must be pointed out that, given its high unitary value, gold coin certainly represented an important store of value. Goldsmith has rightly pointed out that 'it must be taken into account that a substantial proportion of the coins, particularly of *aurei*, was kept not as a means of exchange but as stores of wealth, and was rarely turned over. The velocity of circulation of the coins not thesaurized, particularly of subsidiary coins, was therefore considerably higher' than the ratio calculated by him.¹⁹ Duncan-Jones has tried to find positive arguments in favour of the notion that gold

¹⁷ Howgego, 'The Supply' [n. 2], 20–2; L. De Ligt, 'Demand, Supply, Distribution: the Roman Peasantry between Town and Countryside', *MBAH* 9/2 (1990), 24–56 at 33–43; 10/1 (1991), 33–7; against M. H. Crawford, 'Money and Exchange in the Roman World', *JRS* 60 (1970), 40–8 at 45.

¹⁸ Strabo 3. 3. 7; 7. 5. 5.

¹⁹ Goldsmith, *Premodern Financial Systems* [n. 10], 41–2.

coins did not circulate, because market exchange, especially over long distances, was comparatively unimportant. He argues that the different composition of hoards in different regions of the Empire suggests that gold coin did not move very much between them.²⁰ Moreover, the weight-loss of gold coinage was low, not only in comparison with silver coin, but also with the gold coin of more recent periods. Duncan-Jones compares the loss in weight in the Roman *aureus* and that of the English sovereign of the nineteenth century, whose weight is comparable to that of the *aureus*. He suggests that since the English sovereign 'was alloyed for hardness' it was to be expected that 'for a given weight-loss it should have circulated more than the *aureus*.'²¹ It turns out that the weight-loss of the sovereign is in fact higher than the weight-loss of the *aurei* found in certain regions of the Empire, even if it is more or less the same as that of the *aurei* found in other regions.

However, neither of these arguments seems to be really cogent. First, the composition of hoards does not in fact vary substantially from one area of the Empire to the next, and this is true both for silver and for gold (the comparison made by Duncan-Jones between the hoards of Rome, Diarbekir, and Liberchies²² does not indicate much regional differentiation, but rather its limits). This strongly suggests that coin did travel from one area of the Empire to the other as a part of long-distance trade, whether driven by the exaction of taxes according to the model of Hopkins, or by different market conditions in the different regions of the Empire. On the other hand, the admittedly limited rate of weight-loss especially of gold coin certainly points to a slow circulation-speed, but it would not be legitimate to infer from this that market exchanges over long distances were on the whole unimportant. Coin itself certainly did travel to a certain extent, and it is almost banal to observe that the bigger the sum to be conveyed, the easier it was to transfer it as gold rather than as silver coin. As has been forcefully argued by Hopkins, 'rich

²⁰ Duncan-Jones, *MG* 173–4.

²¹ R. Duncan-Jones, 'Weight-Loss as an Index of Coin-Wear in Currency of the Roman Principate', in G. Depeyrot, T. Hackens, and G. Moucharte (eds.), *Rythmes de la production monétaire de l'antiquité à nos jours* (Louvain, 1987), 235–54; id. *MG* ch. 13, esp. 192, table 13.12.

²² Duncan-Jones, *MG* 173–4.

Romans, or merchants, or the government, when they wanted to move money from one region to another, as part of the balancing of supply and need, would have found it far more sensible to move small amounts of gold coin than large amounts of silver coin.²³ And there are snippets of information from our sources that seem to confirm this. For example, according to Suetonius, the prospective emperor Galba, who evidently did not feel himself safe, always took with himself when travelling a cart with one million sesterces in *aurei*, the amount of the minimum census qualification for belonging to the *ordo senatorius*.²⁴ The reason why he always took *gold* coin is evidently that one million sesterces in gold coin weighed a little less than 80 kg of metal, whereas the same amount of money in *silver* coin would have weighed a little less than one ton of silver.²⁵

But in view of the risks involved, the transfer of coin was altogether to be avoided whenever possible in favour of the sophisticated and original credit mechanisms for settling accounts attested in epigraphic and papyrological evidence recently studied by Camodeca and Rathbone.²⁶ Paradoxically the limited rate of weight-loss may be considered as evidence for the widespread use of these devices: it could mean that the monetary economy in so far as it was supported by credit²⁷ was more developed than conceded by Duncan-Jones, and that gold coin kept its function as store of value specifically for this reason, as a security for loans. The Empire constituted a single monetary area, and that not only fostered the creation of an economic space which was to some extent integrated, but also opened wider opportunities for credit transfers, boosted by the reliability of the trading system and the trust that this promoted between economic actors.²⁸

²³ Hopkins, 'Rome, Taxes' [n. 10], cited from Scheidel and von Reden, *The Ancient Economy*, 228.

²⁴ Suet. *Galb.* 8.

²⁵ So S. Mrozek, 'Salarium in auro', *Bulletin de la Société Française de Numismatique* (1973), 335–6.

²⁶ G. Camodeca, 'Il credito negli archivi campani: il caso di Puteoli e di Herculaneum', in Lo Cascio (ed.), *CM* 69–98; D. Rathbone, 'The Financing of Maritime Commerce in the Roman Empire, I–II AD', *CM* 197–229.

²⁷ See now, forcefully, W. V. Harris, 'A Revisionist View of Roman Money', *JRS* 96 (2006), 1–24.

²⁸ See Lo Cascio, 'Il *denarius* e gli scambi intermediterranei', in G. Urso (ed.), *Moneta mercanti banchieri. I precedenti greci e romani dell'Euro* (Pisa, 2003), 147–65;

Nor can we think, with Wim Jongman, that the main reason to hold large reserves in cash, and specifically in gold coin, was to facilitate hereditary transfers of property among the elite. This scholar, starting from the astonishing size of the monetary stock in gold, but also adopting a 'minimalist' view of the performance of the Roman economy (for instance in terms of GDP), maintains that the quantity of coined gold was much larger than what was required by market exchange. 'Coin stocks, and stocks of gold coin in particular, were quite simply too large to be explained by the transaction motive.' And therefore he concludes that coin stocks and in particular stocks of gold coin were so substantial 'because of what the economist calls the precautionary and speculative motives', and chiefly of the former: 'an important reason for rich Romans to hold large reserves in cash was the need to alleviate the complexities and unpredictability of property transfers from one generation to the next', 'complexities' and 'unpredictability' depending, in essence, on the one hand, on the demographic regime, with a very high death-rate, on the other hand, on the importance of dowry and the absence of a right of primogeniture, since 'cash balances could be used to facilitate the division of an inheritance among several heirs'. In short, according to Jongman, coined gold was used, by a very restricted elite, as a 'store of value'; and it was only used as a 'means of exchange' by a very limited portion of the Roman population in order to buy and sell 'capital assets' rather than 'consumer goods and services'.²⁹

It seems to me that the admittedly ingenious theory advanced by Jongman is based on a presupposition which has to be demonstrated, that is, the limited performance of the Roman economy in comparison with other pre-industrial economies. And it considers just one of the possible uses of the *aureus*. It is obvious that gold coin, given the very high value of a single piece, could effectively fulfil the function of store of value and be used more easily than silver to buy capital assets. In this connection, the anecdote that Suetonius tells about the

id., 'La "New Institutional Economics" e l'economia imperiale romana', in M. Pani (ed.), *Storia romana e storia moderna. Fasi in prospettiva* (Bari, 2005), 69–83; id., 'The State and the Economy', forthcoming in *The Cambridge Economic History of the Greek and Roman Worlds*.

²⁹ W. Jongman, 'A Golden Age. Death, Money Supply and Social Succession in the Roman Empire', in Lo Cascio (ed.), *CM* 181–96.

prospective emperor Galba is revealing. That coined gold was more apt to form the dowry of the women of the elite is again obvious (suffice it to refer to the humorous verses of Martial which show this particular use of coined gold).³⁰ Furthermore, a big hoard such as the one found in the Villa of Boscoreale in the Pompeian countryside may be taken to prove the use of coined gold as a store of value even by the local elite.³¹

In any case, although it is true that gold coin was not so commonly and widely used in market exchange as it would have been in the Late Empire, according to the forceful arguments of Jairus Banaji,³² we do not have compelling reasons for assuming, as is commonly done, that the *aureus* was only the coin of imperial largesse or the coin of the private munificence, which gave prestige both to the donor and to the recipient. Even if it is undeniable that, in certain periods, gold coin could have been, for many of its users, the coin to hoard in order to safeguard their assets, it is likewise undeniable that gold coin represented the kind of money more appropriate for carrying out transactions of a specific character or magnitude or in which specific social groups were involved. I will just quote a famous passage of the

³⁰ Mart. 11. 23: ‘Nubere Sila mihi nulla non lege parata est; | sed Silam nulla ducere lege volo. | Cum tamen instaret, | “deciens mihi dotis in auro | sponsa dabis” dixi.’

³¹ The ‘Villa della Pisanella’, where the hoard was found, belonged to rich wine producers: it was one of the Pompeian villas in which ‘il capitale stanziato per i quartieri residenziali era uguagliato, e anzi superato, dalla spesa per locali e attrezzature agricole’: so J. H. D’Arms, ‘Ville rustiche e ville di “otium”’, in F. Zevi (ed.), *Pompei 79* (Naples, 1979), 65–86, repr. in J. H. D’Arms, *Romans on the Bay of Naples and Other Essays on Roman Campania* (Bari, 2003), 350–83 at 374; even if one thinks that the hoard was carried there ‘proprio di fronte alla minaccia dell’eruzione’ (so F. Baratte, ‘Il tesoro di Boscoreale’, in *Il tesoro di Boscoreale. Una collezione di argenti da mensa tra cultura ellenistica e mondo romano. Pittura, suppellettili, oggetti vari dalla ‘Pisanella’* (exhibition catalogue) (Milan, 1988), 27–32 at 27; see also Baratte, *Le Trésor d’orfèvrerie romaine de Boscoreale* (Paris, 1985), 12–17), it would be difficult to detach the ownership of the hoard from the ownership of the villa (a possibility adumbrated, but also thought improbable by Baratte, *Trésor* 15). There is no good reason to think that the owner of the hoard was the *argentarius* L. Caecilius Iucundus, or that it belonged to a member of the imperial family. Baratte guesses that the hoard might be ‘une accumulation fortuite, constituée par un commerçant en œuvres d’art, qui aurait rassemblé plusieurs lots disparats’; see also e.g. A. L. Kuttner, *Dynasty and Empire in the Age of Augustus: The Case of the Boscoreale Cups* (Berkeley, 1995), 67.

³² J. Banaji, *Agrarian Change in Late Antiquity. Gold, Labour, and Aristocratic Dominance* (Oxford, 2001).

Satyricon of Petronius.³³ Trimalchio narrates how he was able, although with mixed fortunes, to collect his enormous patrimony and how the dangerous commercial ventures in which he engaged contributed to this result. He tells in particular that, even though he had lost thirty million sesterces in the shipwreck of the ships he had charged with wine, he got other ships built for him, which he charged with wine, pork, broad beans, perfumes, slaves; and he also states that Fortunata, his wife, sold all her things—her jewellery and dresses—so that she was able to give Trimalchio one hundred *aurei*. These *aurei*, Trimalchio observes, were the leaven of his *peculium*: ‘Hoc fuit peculii mei fermentum.’ Just one trip allowed Trimalchio to gain ten million sesterces. Beyond the caricatural elements and the obvious exaggeration in this story, it is reasonably clear that the high unitary value of gold coins reserved them for certain kinds of transactions and probably for specific sectors of the Roman society. Even though few contemporary scholars would be likely to subscribe to the theory put forward by Santo Mazzarino fifty years ago according to which there was, in the early Empire (in the Julio-Claudian age), a sort of strong ideological and social opposition between gold coin and silver coin, the former being the coin of what he called senatorial *luxus*, the latter being (especially after Nero’s reform) the coin of the ‘bourgeoisie’—of that Italic ‘bourgeoisie’ that rose to power with the Flavian Emperors,³⁴ a diversified use of gold coin and silver coin by the different social groups is what we would expect. But that does not mean that gold coin was very rarely used as an effective means of exchange. The most interesting evidence of the wide range of possible uses of gold coin in daily life is perhaps that of Apuleius. From the collection of sources that Walter Scheidel has put at our disposal,³⁵ it emerges that one of the authors, along with Martial, who records valuations in *aurei* more often than in denarii is Apuleius, and he does this repeatedly with reference to commercial transactions. Apuleius is one of the authors who most frequently mentions sums of money, and in this context it is perhaps worthwhile to insist, following Fergus Millar, on the image of a fully monetized economy which

³³ Petr. *Sat.* 76.

³⁴ S. Mazzarino, *L'impero romano* (Rome, 1956), 139–49.

³⁵ <<http://www.stanford.edu/~scheidel/NumIntro.htm>>, accessed 7 June 2007.

emerges from *The Golden Ass*.³⁶ In short, from the evidence of Apuleius it seems legitimate to draw the conclusion that no radical difference in the function of gold and silver coin is discernible, at least in the second century AD and in some of the provinces that were by that time most deeply urbanized.

In any case there is no proof that access to gold coin was barred to the people who did not belong to a restricted elite. Gold coin was available to soldiers. A passage of Josephus shows that the *stipendium* of the soldiers who besieged Jerusalem was paid in *aurei* and denarii;³⁷ Suetonius describes the increase of army pay introduced by Domitian as a *quartum stipendium* of three *aurei* a head;³⁸ and a papyrus reveals that the *viaticum* of a recruit of the fleet, in the second century AD, was paid in *aurei*.³⁹ Watson has reasonably maintained that *donativa*, since they were normally multiples of 25 denarii, must have been paid in gold coin.⁴⁰ But *aurei* could be available also to an admittedly privileged group, which, however, did not belong to the elite, like the *plebs frumentaria* at Rome, which hardly could have used them to buy 'capital assets'. We know from a very well-known passage in Dio's epitome by Xiphilinus⁴¹ that Septimius Severus, for his *decennalia*, distributed to the *plebs frumentaria* and to the soldiers stationed in Rome ten *aurei* a head, spending therefore 200 million sesterces. This piece of information has raised doubts on the part of some scholars⁴²—doubts that I think unjustified. If we accept it as true, we may ask how the recipients of

³⁶ F. Millar, 'The World of the *Golden Ass*', *JRS* 71 (1981), 63–75 (repr. in S. J. Harrison (ed.), *Oxford Readings in the Roman Novel* (Oxford, 1999), 247–68, and in F. Millar, *Rome, the Greek World, and the East* [Chapel Hill, 2004], ii. 313–35).

³⁷ Jos. *BJ* 5. 9. 1–2.

³⁸ Suet. *Dom.* 7. 3.

³⁹ ἔλαβα βιατικὸν παρὰ Καίσαρος χρυσοῦς πρεῖς: *BGU* ii. 423 = *Sel. Pap.* i. 112.

⁴⁰ G. R. Watson, *The Roman Soldier* (London, 1969), 114.

⁴¹ Cass. Dio 76 (77). 1. 1.

⁴² For D. Van Berchem, *Les Distributions de blé et d'argent à la plèbe romaine sous l'Empire* (Geneva, 1939), 163–4, since the whole cost of the *congiarium* was expressed by Dio in terms of silver coins, the *congiarium* must have been distributed in silver coin. A. Daguët-Gagey, *Septime Sévère. Rome, l'Afrique et l'Orient* (Paris, 2000), 331, has maintained (without giving a reason) that the *congiarium* was paid to the *plebs frumentaria* in silver coins, to the soldiers in *aurei*. But this is not what Dio says and the reference in Dio to the *congiarium* promised by Marcus (Cass. Dio 71 (72). 32. 1 (Xiph.)) cannot be taken to suggest that Septimius Severus too would have used silver coins, for the whole of the *congiarium* or for part of it.

the imperial largesse, for example the *plebs frumentaria* of Rome, actually used the huge quantity of *aurei* they received: they did not have presumably 'capital assets' to buy, but they had the possibility of raising the level of their consumption, putting their gold coins into circulation.

It also seems legitimate to assume that the progressive change in the ratio of a pound of coined gold to a pound of coined silver between the first century BC and the Severan age⁴³ not only shows the likely transformation of the silver coin into a partially overvalued coin, but also corresponds, to a certain extent, to a gradual change in the relative value of gold and silver bullion as the result of more intense exploitation of the Spanish and Transylvanian gold mines. This increased production of 'new coin' must have matched the increasing monetization of the Empire and the increase in GDP between the first and the second century AD. One can even contend that newly minted coin was poured into the economy mainly through the excess of public expenditure over the income of the state, and not just to counterbalance coin loss. This excess could have had a positive influence on production and exchange.⁴⁴

By the third century the Roman monetary system disintegrated, after a savage debasement of the silver coinage, which by the time of Claudius Gothicus did not contain more than 1 or 2 per cent of precious metal. Gold coinage was produced at an increasingly lower standard and in the end it was also debased.⁴⁵ But no increase in the level of prices, if we may legitimately generalize the Egyptian data, matches this decrease of the metal value of the coin.⁴⁶ The reasons why that occurred are debated and I cannot discuss them here. If the level of prices remained on the whole stable, the relative price of gold and silver must have gone up in comparison with other goods.

⁴³ Duncan-Jones, *MG* 219, fig. 15.1.

⁴⁴ See Lo Cascio, 'La riforma monetaria di Nerone: l'evidenza dei ripostigli', in *Mélanges de l'École Française de Rome—Antiquité* 92 (1980), 445–70 at 463–7, on the extreme theses of M. K. Thornton; Lo Cascio, 'The State and the Economy' [n. 28].

⁴⁵ J. P. Callu, C. Brenot, J.-N. Barrandon, and J. Poirier, 'Aureus obryziacus', in *L'Or monnayé* (Paris, 1985), i. 80–111; see Lo Cascio, 'Prezzi in oro e prezzi in unità di conto tra il III e IV sec. d. C.', in *PPF* 161–82, and references there.

⁴⁶ Lo Cascio, 'Prezzi' [n. 45]; see also D. W. Rathbone, 'Monetisation, not Price-Inflation, in Third-Century A.D. Egypt?', in King and Wigg (eds.) [n. 5], 321–39; id., 'Prices and Price Formation in Roman Egypt', in *PPF* 183–244, on the data assembled by H.-J. Drexhage, *Preise, Miete/Pachten, Kosten und Löhne im römischen Ägypten bis zum Regierungsantritt Diokletians* (St Katharinen, 1991).

Production of mines simply stopped.⁴⁷ If the quantity of pseudo-silver coin produced by the mint increased exponentially as an effect of the reminting of the old coinage at the new levels of weight and fineness, coined gold in circulation apparently became more and more scarce.⁴⁸ An inflationary trend was instead the immediate effect of Aurelian's monetary reform: prices in units of account multiplied by ten and went on to rise for another century.⁴⁹ Even in this case I do not want to rehearse a problem, which is still hotly debated—whether this price increase can be considered to correspond to a truly inflationary process.⁵⁰ But I should like to point to an interesting development regarding coined gold and its relationship with the other components of the monetary system. With the dissolution of the Roman monetary system in the third century, gold coinage came to occupy a peculiar position within the Roman monetary economy. It was no longer linked through a fixed value relationship to the other denominations and to the unit of account and it became, in a sense, rather *merx* than *pretium*, as is plainly shown by the *edictum de pretiis*, where a maximum price is established for gold bullion and coined gold—and it is the same price.⁵¹ But when

⁴⁷ The very rich silver mines at Rio Tinto, which were perhaps the single most important source for silver in the second century, were abandoned by the years AD 170–180, even if it is certain that they were not exhausted when they were abandoned; the production of silver was perhaps replaced for a few decades (but not further than the beginning of the third century) by the production of the gold mines of the Duerna Valley in north-west Spain: see G. D. B. Jones, 'The Roman Mines at Riotinto', *JRS* 70 (1980), 146–63, esp. 161–3; Wilson, 'Machines, Power' [n. 14], 28–9, and further references there; see also G. Depeyrot and D. Hollard, 'Pénurie d'argent—métal et crise monétaire au III^e siècle après J.-C.', *Histoire et mesure* 2 (1987), 57–85 (to be used with caution); Howego, 'The Supply' [n. 2], 8; and more generally on mining in the third century M. Corbier, 'Coinage, Society and Economy', in *CAH* XII², (2005), 393–439 at 406–7.

⁴⁸ Lo Cascio, 'Dall'antoninianus al "laureato grande": l'evoluzione monetaria del III secolo alla luce della nuova documentazione di età diocleziana', *Opus* 3 (1984), 133–201, and references there.

⁴⁹ *Ibid.*; id., 'Dinamiche economiche e politiche fiscali fra i Severi e Aureliano', in A. Schiavone (ed.), *Storia di Roma* (Turin, 1993), iii/1. 247–82 at 276; id., 'Prezzi in oro' [n. 45]; Rathbone, 'Monetisation' [n. 46]; Rathbone, 'Prices' [n. 46].

⁵⁰ See now M. Corbier, 'Coinage and Taxation: the State's Point of View', in *CAH* XII² (2005), 326–92 at 338–44.

⁵¹ *Edictum Diocletiani et Collegarum de pretiis rerum venalium*, 28.1–2 Giacchero; Lo Cascio, 'Prezzo dell'oro e prezzi delle merci', in *L' 'inflazione' del IV secolo* (Rome, 1993), 155–88; id., 'Aspetti della politica monetaria nel IV secolo', in *Atti del X Convegno Internazionale dell'Accademia Romanistica Costantiniana* (Naples, 1995), 481–502; id., 'Prezzi in oro' [n. 45].

Constantine gave up fixing the 'price' of gold coins—a policy which was to be severely blamed by the *Anonymus de rebus bellicis*,⁵² the *solidus* became, as a standard of value, the basis of the new monetary system, replacing in this role the silver denarius. During the Principate the monetary system had been based on fixed value relations between the various denominations in the various metals and on fixed relations of each denomination with the unit of account (the sesterce). That was no longer so, in the fourth century, in so far, at least, as coined gold was concerned. Even if the issuing authority did not give up the attempt to establish a fixed value relationship between the monetary pieces used in the small transactions and the unit of account and between both and the gold coin, this attempt was always doomed to failure.

In the end the gold coin resumed its function of standard of value, and prices began to be expressed in terms of gold *solidi* (or their subdivisions), but that was achieved only by abandoning the attempt to establish fixed value relations between the various components of the monetary system. This process was accompanied by an enormously increased production of coined gold, which was used by now even in daily transactions. Its proportion in the monetary stock must have increased (and new sources of bullion were in fact used)⁵³ and its velocity of circulation apparently increased as well, as Banaji has shown.⁵⁴ A new monetary and economic scenario had emerged.

⁵² *De reb. bell.* 2. 1–4; see Lo Cascio, 'Teoria e politica' [n. 5], 551–2; A. Giardina (ed.), Anonimo, *Le cose della guerra* (Milan, 1989), pp. xxix–xxx, 51–5; Lo Cascio, 'Aspetti della politica monetaria' [n. 51].

⁵³ Callu et al., 'Aureus obryziacus' [n. 45].

⁵⁴ Banaji, *Agrarian Change* [n. 32].

The Nature of Roman Money

W. V. Harris

1. INTRODUCTION

As Stanley Kubrick and Kirk Douglas's great film *Spartacus* draws to a close, a Roman senator, in the rather plausible guise of Charles Laughton, makes a payment of two million sesterces to a *lanista*, brilliantly if less plausibly impersonated by Peter Ustinov (they both won Oscars). 'Gracchus' hands to Batiatus two smallish sacks, full, evidently, of coins—you might guess that they weighed ten kilos each—and Batiatus hoists them on to his shoulder. But of course in 71 BC it would have taken Hercules to lift a sack containing one million sesterces, which without any packing would have weighed not 10 kilos but 965, just short of a ton. Nonetheless wealthy Romans did sometimes make seven-, even eight-figure, payments. How did they do it?

It has always been generally agreed by scholars that all Roman money consisted of coins. In a recent article¹ I set out some reasons for supposing that the consensus view is badly mistaken. In what follows I shall set out my argument in outline, leaving out some supporting detail but including some evidence about Roman credit and about non-cash payments that I have not used before.²

¹ 'A Revisionist View of Roman Money', *JRS* 96 (2006). This can be found at <www.ingentaconnect.com/content/sprsrroma>, accessed 18 June 2007. A shorter Italian version, 'Una prospettiva revisionista sulla moneta romana', appeared in *Rivista di storia economica*, 2006. The many scholars who have helped me to work on this subject are thanked at the beginning of the *JRS* paper; here I should also like to thank Michael Crawford for two very valuable pages of notes.

² I have indicated the more substantial additions.

There can be no doubt that the consensus view is as I have stated it, and there is no need to multiply citations. It should be said on the other hand that there have been distinct signs since 1992 (the date of an important article by Christopher Howgego),³ that this view has been inspiring less confidence than before. Most intriguing of all is the fact that some outstanding scholars, the late Keith Hopkins, for instance, Dominic Rathbone, and Elio Lo Cascio, *appear* at least to have moved on somewhat from earlier positions.⁴ This is not the place for parsing past scholarship—I intend to concentrate on the evidence and on the models that can be built around it—but it will be important to define exactly what the proposed revisionism consists of.

2. SOME THINGS THAT NEED EXPLAINING

We can start with Charles Laughton's problem—how to make a payment of a million sesterces. Or to take a historical case, how, mechanically speaking, did Cicero pay the three and a half million

³ 'The Supply and Use of Money in the Roman World 200 B.C. to A.D. 300', *JRS* 82 (1992), 1–31 (see esp. 13–15 on the subject of credit: 'purchases on credit could allow many monetary transactions to take place with little actual use of coin', 13).

⁴ For their most recent statements on this subject see Hopkins, 'Rome, Taxes, Rents and Trade', *Kodai* 6–7 (1995–6), 41–75 at 53 (repr. in W. Scheidel and S. von Reden (eds.), *The Ancient Economy* (Edinburgh, 2002), 190–230 at 212), who treated the silver coinage of the Republic as virtually synonymous with the money supply, but then observed (63 = 228) that 'the volume of coins in circulation [in the Roman Empire] was increased by the operation of credit'; Rathbone speaks of 'paper transactions [that] free[d] monetised exchange from the heavy constraint of the supply of coinage' ('The Financing of Maritime Commerce in the Roman Empire, I–II A.D.', in *CM* 197–229 at 226); Lo Cascio, 'Introduzione', in *CM* 5–15 at 13, treats credit as a major element in the Roman financial system, and see 'Il *denarius* e gli scambi intermediterranei', in G. Urso (ed.), *Moneta mercanti banchieri* (Pisa, 2003), 147–65 at 148–9. S. Mrozek, 'Zum Kreditgeld in der frühen römischen Kaiserzeit', *Historia* 34 (1985), 310–23, made an earlier attempt to subvert received doctrine. D. Foraboschi notes ('*Free Coinage* e scarszza di moneta', in *CM* 231–44 at 237–8) that the loans of the Sulpicii (on which see below) added to the money supply, and detects 'credit money' at work in the Roman economy, but draws no large conclusion. D. Jones, *The Bankers of Puteoli: Finance, Trade and Industry in the Roman World* (Stroud, 2006), came out too late to be considered in full here; the author maintains that the Roman money supply consisted of coins and bullion, but was 'supplemented' by credit (252).

sesterces he laid out for his famous house on the Palatine (*Fam.* 5. 6. 2), at a time when Rome had practically no gold coinage? (This was by no means the largest property price we know of in Late Republican Italy; sums in excess of ten million are attested.)⁵ That would have meant packing and carrying some three and a half tons of coins⁶ through the streets of Rome. When C. Albanus bought an estate from C. Pilius for eleven and a half million sesterces (*Cic. Att.* 13. 31. 4), did he physically send him this sum in silver coins?⁷ Without much doubt, these were at least for the most part documentary transactions. The commonest procedure for large property purchases in this period was probably the one casually alluded to by Cicero on another occasion: a Roman knight becomes enamoured of a certain property at Syracuse, and ‘nomina facit, negotium conficit’, ‘he provides the credits [or “bonds”], <and so> completes the purchase’ (*De off.* 3. 59).⁸ This practice is reflected in Cicero’s speeches as well as letters.⁹ One might also buy in instalments: when Cicero bought out the share of the *horti Cluviani* that had gone to another legatee (*Att.* 13. 46. 3), he did so in three payments spread out over nearly a year (*Att.* 16. 2. 1), in effect taking a loan from the seller. None of which is to deny that coins sometimes played a part even in major property transactions, as they most certainly did in smaller ones.¹⁰

Bullion, meanwhile, seems to have been used for making payments only in emergencies or across the frontiers. Scholars have sought for evidence that individuals bought things with gold or silver bullion under the Republic, and have found none; republican coin-hoards

⁵ Clodius paid Scaurus 14.8 million; for this and other cases see I. Shatzman, *Senatorial Wealth and Roman Politics* (Brussels, 1975), 22–4.

⁶ $875,000 \times (\text{say}) 3.86 \text{ g}$ (see Crawford, *RRC*, 594) = 3,377.5 kg.

⁷ $2,875,000 \times 3.86 \text{ g} = 11,097.5 \text{ kg}$. Cf. D. Rathbone, ‘The Financing of Maritime Commerce’ [n. 4], 224.

⁸ The fact that the purchaser was being royally swindled is irrelevant here.

⁹ e.g. *Att.* 12. 47. 1, 13. 29. 1–2, *Caec.* 16 (the text does not, however, exclude the possibility that what Aebutius was promising to do was to pay coin).

¹⁰ It is evident from *Lex Agraria*, line 74 (see M. H. Crawford et al., *Roman Statutes* (London, 1996), i. 175, for discussion of the text), that Romans with property were already in 111 BC familiar with means of paying for real property *other than* by means of ready money (*praesens pecunia*), and they probably had been for some considerable time. The *aerarium* dealt in cash whenever possible, and here the law insisted on it.

virtually never include bullion in the sense of gold or silver bars.¹¹ (There is a marked contrast here with the classical Greek coin hoards described elsewhere in this volume by Kroll.) And as Andraeu points out,¹² the archaeology of the Vesuvian cities, which has produced every imaginable kind of find, has never produced a single ingot of gold or silver. Of course we do have *some* explicit evidence of gold bullion in private hands under the Republic (Cic. *Cluent.* 179), but it was apparently a store of wealth, to be exchanged against more spendable assets in times of emergency.¹³ ‘Gold’ was what a very rich man such as Rabirius gave to a friend such as Cicero who was scurrying into exile (*Rab. Post.* 47), his credit shot—letters of credit might not be honoured if presented by a man in Cicero’s position, and coins once again were bulky—but this has nothing to do with ordinary business life.¹⁴ In imperial times, once again, we sometimes find gold bullion in private hands (e.g. Ulpian in *Dig.* 12. 1. 11.pr.), but it is implicitly *not* counted as *pecunia*, and seldom used in business or property transactions, as far as we know.¹⁵ There was an important exception, which does not invalidate the general conclusion: bullion sometimes had to be used to buy things from across the frontier, the eastern frontier at least: hence it was sometimes on sale at Coptos and Alexandria.¹⁶

In 49 BC, when the credit system tottered under the impact of civil war, nervous creditors began to seek payment *even* of the principal ‘in silver’, i.e. silver coin, and one part of Caesar’s reaction was to ‘forbid anyone to hold more than 15,000 drachmas in silver or gold’ (Dio 41. 38. 1), which would have meant a Maoist revolution—most emphatically

¹¹ M. H. Crawford, *Roman Republican Coin Hoards* (London, 1969), nos. 259 (an unspecified number of gold bars, from a war period in Spain) and 357 (similar, from civil-war Italy).

¹² Below, ch. 10.

¹³ The gold with which Clodia was supposed to have bribed slaves to carry out a murder (*Cael.* 30–1, 51–2) may well have been in the form of *ornamenta* (52). Gold gave the air of luxury and corruption: hence Antony weighed it out to his followers in 44 BC, Cicero says (*Phil.* 3. 10), once again nothing to do with regular commerce.

¹⁴ For Cicero’s attempt to prevent the export of gold and silver from Puteoli in 63 BC, see below, sect. 5.

¹⁵ D. W. Rathbone, ‘The Imperial Finances’, *CAH X²* (1996), 309–23 at 319, says that ‘any lump of gold or silver . . . could be used for exchange’, but gives no examples.

¹⁶ See Rathbone, ‘The Financing of Maritime Commerce’ [n. 4], 223. In much the same way, bullion was used for cross-frontier payments in Tang China: Scheidel, ch. 13 below.

not Caesar's purpose—if gold and silver coins had really been the only form of money. His expectation, in my view, was that the rich would lend, which would leave them with negotiable *nomina*.

There is plenty of evidence that rich and poor alike casually and normally bought everyday items on credit, in many different environments. When Verres' alleged female agent Chelidon (the swallow) was at home accepting bribes on his behalf, her house was full—'some paid cash, others signed tablets (*tabellae*)'.¹⁷ Ovid provides another nice illustration. Girl-friends required gifts, alas, and the poet reveals incidentally that it was no use saying that you happened to be out of cash—a 'littera', that is to say *litterae*, a letter, was enough (*Ars Am.* 1. 428).¹⁸ Which is interesting above all because it is likely to refer to goods sold for hundreds not millions of sesterces.

3. SOME BRIEF REMARKS ABOUT THE NATURE OF MONEY

I shall concentrate in what follows on money's payment function, and in particular its exchange function.¹⁹ This for obvious reasons is the economists' favourite: thus 'the distinguishing feature of money among all assets... is its role as the medium of exchange',²⁰ and money is 'the stock of assets that can be readily used to make transactions'.²¹ It is 'anything that serves as a commonly accepted medium of exchange or means of payment'.²²

In a modern economy the money supply is not limited to the volume of specie issued by the central bank, or to that amount plus the obligations (bonds, notes) issued by the government: matters are more complicated than that, for there is a multiplier effect, created by

¹⁷ 2 *Verr.* 1. 137. This was in Rome of course.

¹⁸ Mrozek, 'Zum Kreditgeld' [n. 4], 311 n. 8, noticed the relevance of this before I did.

¹⁹ On the unit-of-account function see D. Kessler and P. Temin, ch. 7 above.

²⁰ S. Fischer, R. Dornbusch, and R. Schmalensee, *Introduction to Macroeconomics*, 2nd edn. (New York, 1988), 141.

²¹ N. G. Mankiw, *Macroeconomics*, 5th edn. (New York, 2002), 76.

²² P. A. Samuelson and W. D. Nordhaus, *Macroeconomics*, 16th edn. (Boston, 1998), 158.

loans.²³ In other words, a modern nation is normally well supplied with what is sometimes referred to as IOU money,²⁴ loans extended by banks or bank-like institutions. As soon as a partial-reserve or 'fractional reserve' banking system came into being,²⁵ the money supply began to exceed the quantity of currency.

This does not, of course, mean that a monetary system has become 'modern'. By 1776, bank money in Britain already exceeded metallic money. At that time, however—and here the high Roman Empire may possibly have been similar—'coins and tokens remained the only currency handled by the vast majority of the population'.²⁶

'Credit money is just a part of a whole credit structure that extends outside money; it is closely interwoven with a whole system of debts and credits, of claims and obligations, some of which are money, some of which are not, and some of which are on the edge of being money'—so Hicks once wrote,²⁷ and with appropriate caution this can be applied to the Roman economy too. What is it, then, that determines that some lending adds to the money supply while some does not? Some loans create the substance with which you can buy things without diminishing anyone's assets. Which lenders can carry the loans they have made as assets? To take a Roman example, the *coactor argentarius* mentioned by the jurist Scaevola who 'paene totam fortunam in nominibus [habebat]' (*Dig.* 40. 7. 40. 8), what entitled him to count these *nomina* as part of his *fortuna*?

The answer is reasonably clear and is set out in the economics text-books: it is essentially the legal—and we should add, the

²³ Technically the money multiplier in a modern economy is the ratio of the money created by banks to the volume of their reserves (cf. *ibid.* 172). It is 'a ratio that relates the change in the money supply to a given change in the monetary base', F. S. Mishkin, *The Economics of Money, Banking, and Financial Markets* (Boston, 1986), G-8.

²⁴ Fischer et al., *Introduction* [n. 20], 143.

²⁵ *Ibid.* 146-7, 153, Mankiw, *Macroeconomics* [n. 21], 484-5.

²⁶ G. Davies, *A History of Money from Ancient Times to the Present Day* (Cardiff, 1994), 238. Braudel quotes estimates of still higher ratios of paper to metallic money in the eighteenth century; and 'sages at the time said that [paper money] should not be three or more times the value of the mass of metal money' (*Civilization and Capitalism, 15th-18th Century*, ii. *The Wheels of Commerce*, transl. S. Reynolds (London, 1982) (original edn.: *Les Jeux de l'échange* (Paris, 1979), 113, with references).

²⁷ J. Hicks, *Critical Essays in Monetary Theory* (Oxford, 1967), 157-8.

social—capacity of the lender to recover from the debtor.²⁸ No one, I hope, will need convincing that Roman law provided creditors with robust means of protecting themselves,²⁹ which were of course much stronger if a loan was secured.³⁰

Yet this account is excessively simple, in two respects: in a modern economy, loans made by corporations or individuals are not normally considered to add to the money supply, even when they are legally recoverable.³¹ And that makes sense, since a modern banking system controls, or at least attempts to control, the quantity of money, and furthermore such loans are not used as a medium of exchange. In the Roman economy, on the other hand, with no central bank, what determines whether something is money or not has to be the primary characteristic—whether it is readily used as a means of making payments.

Secondly, the history of debt in early modern England suggests that the *moral* obligation of the debtor, combined with his need to maintain his creditworthiness in the eyes of the community, will also have carried weight.³² The Roman debtor's greatest danger continued to be *infamia* (Papinian in *Dig.* 46. 3. 97).³³

Economists are not surprisingly in a certain amount of disaccord about the nature of money. And current debates should have some interest for Roman historians. The mainstream view is that central

²⁸ As L. von Mises succinctly wrote, credit money 'is that sort of money which constitutes a claim against any physical or legal person' (*The Theory of Money and Credit* (New Haven, 1953), 61). Cf. P. Temin, 'A Market Economy in the Early Roman Empire', *JRS* 91 (2001), 169–81 at 174 end.

²⁹ The sanctions on insolvent debtors in the Republican period are described by M. W. Frederiksen, 'Caesar, Cicero and the Problem of Debt', *JRS* 56 (1966), 128–41 at 128–30. For the Empire, briefly, J. A. Crook, *Law and Life of Rome, 90 B.C.–A.D. 212* (London, 1967), 175–8.

³⁰ For a borrower's differential treatment of secured and unsecured debts see for instance Cic. *Att.* 16. 6. 3.

³¹ Mankiw, *Macroeconomics* [n. 21], 485: 'only banks have the legal authority to create assets . . . that are part of the money supply'.

³² *The Economy of Obligation* (London, 1998), 121–72. *De officiis* was of course a favourite text.

³³ And it was by *consuetudo* not statute that you could recover a bank deposit from the banker's *socius*: *Rhet. ad Herennium* 2. 13. 19. See further M. Ioannatou, 'Le Code de l'honneur des paiements: créanciers et débiteurs à la fin de la République romaine', in J. Andreato, J. France, and S. Pittia (eds.), *Mentalités et choix économiques des romains* (Bordeaux, 2004), 87–107.

banks, or central banks plus individual banks, create money, which is thus 'exogenous' to the economic system.³⁴ Others hold that it is 'endogenous', meaning that it is entirely created, by lenders of all kinds, 'in response to the needs of the economic system'.³⁵ So one of the proponents of a view of this kind writes that 'modern money is bank money or [bank] credit issued for the purpose of production'.³⁶ The traditional view is that Roman money was official coinage, hence all in a sense exogenous; I argue that we should include many (not all) recoverable loans, and hence a lot of endogenous money.

When economists define credit-money, they sometimes, admittedly, make matters more complicated than I have made them in this account, but that is because they quite naturally have recent and current conditions in mind, and not the world that existed before the invention of clearing banks. 'A credit money system presupposes the existence of the institutions of private property, contracts, enforcement, and clearing,' says one.³⁷ But historically speaking, as we shall see, the last of these four elements is a wonderful convenience but not in fact a necessity.

In the Roman scheme of things what you paid with was commonly *pecunia*. It is therefore quite important that *pecunia* could have a very wide meaning. Naturally one ought not to press individual texts too hard. Gaius, for instance, remarks that 'the term *pecunia* in this law [Sulla's *Lex Cornelia de sponsu*, if that was its real name] means everything; and so if we stipulate for wine or wheat or a farm or a slave, this law must be observed'.³⁸ But in texts such as this, it is hard to be sure a priori whether the author is arguing *in harmony with* or *against* the general understanding of the term *pecunia*, which is what matters most. In a passage already quoted, Ulpian (*Dig.* 12. 1. 11. pr.)

³⁴ L.-P. Rochon, 'On Money and Endogenous Money: Post-Keynesian and Circulation Approaches', in Rochon and S. Rossi (eds.), *Modern Theories of Money: The Nature and Role of Money in Capitalist Economies* (Cheltenham, 2003), 115–41, can lead one into this debate. For a brief account see G. K. Ingham, *The Nature of Money* (Cambridge, 2004), 52–3.

³⁵ Rochon, *ibid.* 126.

³⁶ *Ibid.* 116.

³⁷ B. J. Moore, *Horizontalists and Verticalists: The Macroeconomics of Credit Money* (Cambridge, 1988), 20.

³⁸ *Inst.* 3. 124. The law limited the amount of *credita pecunia* that an individual might 'sponsor' to the same lender for the same borrower in any given year.

seems to reveal that plate and bullion are not *pecunia* in the ordinary sense of the term, but Hermogenianus' definition included them: 'in the definition of *pecunia* is included not only coinage but everything else both immovable and movable, and whether it is an object or a claim.'³⁹ In another passage Ulpian claims that 'the term *pecunia* includes not only coinage but every kind of money whatsoever, that is, every substance (*omnia corpora*); for no one doubts that substances are also included in the definition of money' (*Dig.* 50. 16. 178).⁴⁰ Clearly it is not Ulpian's intention here to deny that documents could represent money but simply to assert that such things as wine and wheat *could* indeed count.⁴¹

4. ROMAN CREDIT-MONEY

In *The Economy of Obligation: The Culture of Credit and Social Relations in Early Modern England*, Craig Muldrew describes a nation in which credit and debt were fantastically pervasive: 'every household in the country', he writes, 'from those of paupers to the royal household, was to some degree enmeshed within the increasingly complicated webs of credit and obligation'. 'Various instruments of credit were in use by the late sixteenth century...but most credit extended for sales or services seems to have been remarkably informal.'⁴² Merchants, shopkeepers, peerage, gentry, were all heavily involved.⁴³ Muldrew goes on to argue for the very great financial importance of all this credit in relation to the rather limited supply of coinage money.⁴⁴ None of this proves anything about the Roman

³⁹ "'pecuniae" nomine non solum numerata pecunia sed omnes res tam soli quam mobiles et tam corpora quam iura continentur', *Dig.* 50. 16. 222.

⁴⁰ See also Ulpian in *Dig.* 27. 9. 5. 9.

⁴¹ For further observations on the meaning of *pecunia* and χρήματα, see 'A Revisionist View' [n. 1].

⁴² Muldrew, *Economy of Obligation* [n. 32], 95, 96.

⁴³ See *ibid.* 96–8 and *passim* for vivid detail. J. H. Munro, 'The Medieval Origins of the Financial Revolution: Usury, Rentes, and Negotiability', *International History Review* 25 (2003), 505–62, describes and explains the evolution of credit instruments in Britain.

⁴⁴ Muldrew, *Economy*, 98–103.

Empire: but at least we can see how a pre-industrial economy in reasonably good shape can in effect vastly increase its money supply without a central bank or a clearing house for financial obligations.⁴⁵

Muldrew's sources were of course vastly better than ours. Throughout this discussion, in fact, we have to keep in mind what it is reasonable to expect from literary and juristic texts, supplemented by very limited 'archives' (not that they are ever really that) from Pompeii, Egypt, Vindolanda, and so on.

A history of Roman credit might start with a typology, which would resemble the list of different kinds of debt mentioned in the Ephesian Debt Law of 85 BC (*SIG*³ 742),⁴⁶ according to which creditors forgave, as it seems, virtually all types of debt, except that as far as bankers were concerned there was merely to be a moratorium on their loans (and also on the repayment of their deposits). Cancelled debts included (lines 50–2) maritime loans, *cheirographa* (unsecured loans, presumably), *parathekai* (loans secured by portable objects), first and second mortgages, and most interestingly of all debts concerning sales (*kat'onas*) that were in the form of a *homologia* (a legal document acknowledging the receipt of a loan).⁴⁷

But how pervasive was credit in the Roman economy as a whole?⁴⁸ Since it is only possible to gauge the extent of credit-money in order-of-magnitude terms at best, the most illuminating approach is probably to examine various different social milieux one by one (though it will soon become evident that there was more vertical integration in the credit market than has sometimes been realized). I will distinguish the very well-to-do, the decurion class, and the poor but

⁴⁵ P. Temin, 'Financial Intermediation in the Early Roman Empire', *Journal of Economic History* 64 (2004), 705–33, has now shown the crucial economic importance of the Roman credit market.

⁴⁶ = *IGSK XI (Die Inschriften von Ephesos Ia)*, no. 8.

⁴⁷ For this meaning of the word see R. Bogaert, *Banques et banquiers dans les cités grecques* (Leiden, 1968), 251 n. 129. In Italy such a law would also have had to take into account the very widespread practice by which *coactores* gave credit to purchasers at auction sales (see J. Andreau, *Banking and Business in the Roman World* (Cambridge, 1999), 38–9, etc.).

⁴⁸ I shall not consider directly the question, important in other contexts, whether there was much lending for productive investment rather than consumption. For some recent comments see Andreau, *Banking and Business*, 147–8, G. Camodeca, 'Il credito negli archivi campani: il caso di Puteoli e di Herculaneum', in *CM* 69–98 at 81, 83.

solvent masses, without pretending that these are clear labels.⁴⁹ At the end of this section I shall ask how much evidence there is that people actually made payments by means of documents.

Before we even come to private lenders, it will be remembered that cities too sometimes made loans—no reason to think this was at all new at the time of our earliest evidence, which appears to be the Lex Irnitana of AD 91 (ch. 79).⁵⁰ We never get any clear idea of scale, except that Pliny thought the matter worth referring to Trajan (*Ep.* 10. 54–5).⁵¹ Foundations also seem to have lent their capital,⁵² as did temples, at least in Greek cities.⁵³

But these may well be minor phenomena, whereas debt was in fact the lifeblood of the Roman economy, at all levels. The normality of *nomina* (i.e. outstanding loans) among the assets of the rentier class has already been commented on: *nomina* were a completely standard part of the lives of people of property, as well as being an everyday fact of life for great numbers of others.⁵⁴ In a modern economy the standard cautious investment for the well-to-do is, or at least used to be, government bonds; in the virtual absence of bonds, governmental or otherwise,⁵⁵ the Roman well-to-do relied heavily on *nomina*. Describing the credit crisis of AD 33, Tacitus (*Ann.* 6. 16. 3) remarks that *all* senators were more extensively involved in moneylending than the law allowed.⁵⁶ By the Late Republic, virtually every aristocrat whose affairs are attested in the sources lent money, and it was

⁴⁹ The possible relevance of other fundamental distinctions, urban/rural and Graeco-Roman/‘peripheral’, hardly needs emphasizing.

⁵⁰ Tablet VIII C, line 48 (J. Gonzalez, *JRS* 76 (1986), 174).

⁵¹ Howgego, ‘The Supply and Use of Money’ [n. 3], 14 n. 124, has some references to this phenomenon.

⁵² This is argued by R. P. Duncan-Jones, *The Economy of the Roman Empire: Quantitative Studies* (Cambridge, 1974), 133, on the grounds that this was the only way to obtain attested rates of 12 per cent per annum, attested at Bergomum, Opitergium, Ostia, Theveste, and Rome itself, always, however, for small foundations.

⁵³ Howgego, ‘The Supply and Use of Money’ [n. 3], 14 n. 125.

⁵⁴ Cf. *ibid.* 13–15, Duncan-Jones, *MG* 24, A. Tchernia, ‘Remarques sur la crise de 33’, in *CM* 131–46 at 134. For moneylending by *equites* and *publicani* under the Republic see P. A. Brunt, *The Fall of the Roman Republic and Other Essays* (Oxford, 1988), 169.

⁵⁵ Though cities did sometimes borrow: L. Migeotte, *L’Emprunt public dans les cités grecques* (Quebec, 1984), 359, Andreau, *Banking and Business* [n. 47], 124–5.

⁵⁶ The law had, of course, been put through by Caesar in special circumstances, and according to Tacitus had long been a dead letter.

normal for the less illustrious senators to do so too.⁵⁷ Augustus was evidently regarded as something of a stickler for having tried to keep the *equites* up to old-fashioned aristocratic standards by punishing those among them who borrowed money at lower rates of interest in order to lend it at higher ones (Suet. 39).

There is no reason to think that this pattern changed much, if at all. Seneca was simply the most conspicuous of those who lent to the provincials under the early emperors.⁵⁸ Since Augustan times, at least, one assumed that a Roman of means divided his or her investments between land and *faenus*: 'dives agris, dives positus in faenore nummis' ('rich in land, rich in money out at interest') (Horace, *AP* 421). This is too well known to need exhaustive documentation.⁵⁹ Tacitus describes the assets of the Romans who had benefited from the largesse of Nero, people of various social ranks no doubt, as consisting of *agri* and *faenus* (*Hist.* 1. 20. 1). 'Sum quidem prope totus in praediis, aliquid tamen faenero', says Pliny junior ('I am almost entirely in country estates, but I also loan money to some extent') (*Ep.* 3. 19. 8).⁶⁰ Well-to-do Greeks may have been less inhibited than senatorial Romans: according to Dio Chrysostom (7. 104), the rich support themselves by means of tenements, leasing slaves, and by ships, as well as by usury, but in any case they engage in noteworthy quantities of money-lending.⁶¹ Looking back, a law of Constantine remarked with understandable hyperbole that the *veteres*, that is, those of much earlier times, had entrusted 'the

⁵⁷ Shatzman, *Senatorial Wealth* [n. 5], 75–9, summarized the evidence effectively.

⁵⁸ Tac. *Ann.* 13. 42. The famous loans to the Britons amounting to 40 million (nice round sum): Dio 62. 2. 1. Vespasian's father T. Flavius Sabinus is another well-known example (he made loans to the Helvetii: Suet. 1).

⁵⁹ Besides the references in the text see also Petr. *Sat.* 37, 117. 8, Martial 3. 31, 4. 37 (and see further Duncan-Jones, *Economy of the Roman Empire* [n. 52], 21 n. 4, J. Andreau, 'Commerce and Finance', in *CAH XI*² (2000), 769–86: 770). For land and loans as the two forms of investment, this time in Bithynia, see Plin. *Ep.* 10. 54. 1. J. H. D'Arms, *Commerce and Social Standing in Ancient Rome* (Cambridge, Mass., 1981), 105, demonstrated that in such locutions as *agri et nomina* it is quite wrong to think of the loans as being primarily agricultural (though that would not affect my central argument).

⁶⁰ These words show that 'no stigma attached to money-lending' for senators of Pliny's time (Duncan-Jones, *Economy of the Roman Empire*, 21).

⁶¹ Compare Ps.-Plu., *De lib. educ.* 7 = *Mor.* 4b, H. W. Pleket, 'Urban Elites and the Economy in the Greek Cities of the Roman Empire', *MBAH* 3/1 (1984), 3–36 at 14–15. One could encounter such combinations at Ostia and Puteoli; cf. D'Arms, *Commerce* 102.

whole strength of their patrimonies' to lending money—something that was clearly no longer advisable (*CJ* 5. 37. 22. 5a).⁶²

Conversely the rich also borrowed heavily, especially but not only in the Late Republic; once again the phenomenon is too well-known in outline to need documentation.⁶³

How did all this capital behave? Capital markets certainly depended much more on personal ties than modern ones do (usually you borrowed from your acquaintances, not institutions)⁶⁴—as indeed was inevitable in any pre-print or early-print culture in which economic information was scarce and unreliable. Early industrial England was similar in this respect.⁶⁵ How could you judge a complete stranger's creditworthiness? But Seneca, who knew what he was talking about where high finance was concerned, assumes as a matter of course (*Ep.* 119. 1) that anyone who wants to go into commerce will borrow, and will do so through people he calls *intercessores* and/or *proxenetae*, financial agents (it is a sign of the serious limitations of our sources that we have little information about how such people operated).⁶⁶ And loans could cross social boundaries: Cn. Sentius Saturninus, for example, *cos. ord.* 41, lent money to the landowner and moneylender L. Cominius Primus of Herculaneum.⁶⁷

We inevitably come to the problem of banks.⁶⁸ It will not be necessary to spend time discussing who counts as a banker in the Roman world, for Andraeu has dealt satisfactorily with this complex matter and we are merely concerned with who made loans, with what, and to whom. The orthodox view is that Roman bankers

⁶² The date of this comment was 329. Cf. J.-M. Carrié, 'Solidus et crédit: qu'est-ce que l'or a pu changer?', in *CM* 265–79 at 277.

⁶³ Aristocrats as debtors 'to an extraordinary degree': Duncan-Jones, *MG* 24.

⁶⁴ For a recent discussion of how this worked in Cicero's time see J. Andraeu, 'Markets, Fairs and Monetary Loans', in P. Cartledge, E. E. Cohen, and L. Foxhall (eds.), *Money, Labour and Land: Approaches to the Economies of Ancient Greece* (London, 2002), 113–29: 122–8.

⁶⁵ K. Pomeranz, *The Great Divergence* (Princeton, 2000), 179–80.

⁶⁶ See *Dig.* 50. 14, however (where the translator in A. Watson (ed.), *The Digest of Justinian* (1985), misguidedly takes *proxenetae* to mean slave-dealers). Columella simply assumes that interest will be among the expenses of a vineyard owner (3. 3. 9).

⁶⁷ Camodeca, 'Il credito' [n. 48], 95.

⁶⁸ Andraeu above all has taught us (in *La Vie financière dans le monde romain: les métiers de manieurs d'argent (IV^e siècle av. J.-C. - III^e siècle ap. J.-C.)* (Rome, 1987)) that Roman banking institutions varied by time and place; these differences are not brought out here, but in a longer account they would need to be.

seldom if ever had many partners, if any, that they possessed little capital, and that they had little to do with the upper social elite, the wealthiest five or ten thousand let us say.

This orthodoxy probably needs to be modified, if not rejected, in every respect. First, however, it is worth repeating that Roman bankers did indeed lend—much of the extensive evidence was gathered by Andreau.⁶⁹ It can also be demonstrated, in case it needs to be, that classical banks practised fractional reserve banking—for otherwise there would have been no need in the crisis of 85 BC to give the bankers of Ephesus ten years to pay back their depositors.⁷⁰ We have no evidence as to how large their reserves normally were; according to De Roover, medieval bankers typically maintained a reserve ratio as high as 29–30 per cent.⁷¹

It has recently been asserted that ‘any interest gained on [bank] clients’ deposits had to be credited to the account of the client’,⁷² with the implication that it would have been pointless, most of the time, for bankers to loan such funds. But that is extremely misleading: the writer in question failed to notice that what was technically known as a *depositum* was only one kind of bank-deposit, generally non-interest-bearing, whereas if you wanted interest, the form of your bank-deposit would be a loan (there are exceptions and complications that need not concern us in this context).⁷³ Bankers were also able to make payments at a distance,⁷⁴ in other words without the direct use of coins, which meant that other people (bankers too, presumably) afforded them credit. And though it used to be said that bankers did not in any case make *maritime* loans, presumably because of the high risks,⁷⁵ more recently we have learned from a

⁶⁹ Ibid. 550–1, 583–8. But there is considerably more: for Ephesus in 85 BC, for instance, see *SIG*³ 742, lines 55–61.

⁷⁰ *SIG*³ 742, lines 60–1.

⁷¹ R. De Roover, *Money, Banking, and Credit in Mediaeval Bruges* (Cambridge, Mass., 1948), 318.

⁷² S. von Reden, ‘Money in the Ancient Economy: A Survey of Recent Research’, *Klio* 84 (2002), 141–74 at 145, apparently misled by A. Bürge, *Gnomon* 61 (1989), 318–25 at 322.

⁷³ See Andreau, *Banking and Business* [n. 47], 42.

⁷⁴ See e.g. Cic. *Fam.* 2. 17. 4. In Cic. 2 *Verr.* 1. 102 it is implicit that the banker P. Tadius at Athens can make payments at Rome. *Att.* 7. 18. 4 shows that in ordinary circumstances it was possible to make payments from Italy to Greece.

⁷⁵ Andreau, *Vie financière* [n. 68], 603–4; cf. Bogaert, *Banques* [n. 47], 355.

large-scale contract analysed by Lionel Casson that even this limitation could be partly circumvented,⁷⁶ and presumably it often was.⁷⁷

The Roman banking system operated in a largely unregulated fashion,⁷⁸ and many banks apparently consisted of a single principal, usually—one must suppose—with quite limited capital. But our increased knowledge of the operations of the bank of the Sulpicii at Puteoli has led to the conclusion that it had between six and fifteen principal members, or even more, a ‘respectable scale’ indeed for a pre-industrial economy (it is not of course suggested that Puteoli was a typical Roman town).⁷⁹

As far as the elite is concerned, it obviously used banks less than is normally the case in a modern economy. But the current view is seriously misleading. Polybius’ account (31. 27. 6–7) of the manner in which Scipio Aemilianus and other leading Romans made use of a banker at Rome as early as 162 BC seems to show that such men were already entirely familiar with such practices. The evidence, such as it is, suggests that *some* bankers were regularly involved with members of the upper elite: the credit crisis of AD 33 concerned initially and above all senators, and when Tiberius decided to rescue the credit market, he did so by providing 100 million sesterces of loans, not directly, however, but through *mensae* (Tac. *Ann.* 6. 17. 3), which are not, as many interpreters have claimed, ‘specially established’ or

⁷⁶ A banker (a Roman citizen based in the village/modest town of Theadelphia) was involved as an intermediary: see the revised text of P. Vindob. Gr. G 19792 in A. Biscardi, *Actio pecuniae traiecticae*, 2nd edn. (Turin, 1974), 211–14, and in L. Casson, ‘New Light on Maritime Loans: P. Vindob. G 19792 (= SB VI 9571)’, in *Studies in Roman Law in Memory of A. Arthur Schiller* (Leiden, 1986), 11–17 (= SB xiv. 11850) (AD 149). The archive of the Sulpicii, however, contains no maritime loans (Camodeca, ‘Il credito’ [n. 48], 88).

⁷⁷ We do not know who provided the very large maritime loan in the ‘Muziris’ papyrus (P. Vindob. G 40822 = SB xviii. 13167). On maritime loans more generally see Andreau, *Banking and Business* [n. 47], 55–6.

⁷⁸ There were, however, certain rules that an economist would have to approve of, such as the banker’s obligation to produce his *rationes* in court, if required (Ulpian in *Dig.* 2. 13. 4), which was an additional protection for the depositor (see Andreau, *Vie financière* [n. 68], 618, for limitations on this right).

⁷⁹ K. Verboven, ‘L’Organisation des affaires financières des C. Sulpicii de Pouzozoles’, *Cahiers du Centre Gustave-Glotz* 11 (2000), 161–71 at 164 to end; see also Camodeca, ‘Il credito’ [n. 48], 78–9. In favour of calling the Sulpicius firm a ‘bank’ see Camodeca, *ibid.* 74. The documents are in *TPSulp.*

'temporary' banks (nothing of that in the sources), but just 'banks'. It is entirely unsurprising, therefore, that under Claudius, as we now know, slaves of the emperor—for entirely different reasons—lent five- and even six-figure sums to the bank of the Sulpicii.⁸⁰ When Herodes Atticus distributed the five *minai* which he had agreed to pay to each citizen of Athens in virtue of his father's will, he did so through bankers, who were in possession of IOUs (*xumbolaia*) that the citizens' fathers and grandfathers had not paid off to Herodes' family (they were told to deduct these sums from Herodes' gift).⁸¹

It remains most unclear, of course, how large this banking sector really was—not even a useful guess is possible. The geographical distribution of bankers, though it is of course confined to towns (as it has always been!), was really quite wide.⁸² The consensus view, at least in some versions, finds itself in the awkward position of denying that most Roman banking added to the money supply while asserting that the banks of Graeco-Roman Egypt did exactly that—for that is the conclusion of some at least of the scholars who have studied the operations of the banks in Egypt.⁸³ 'Payments received from lessees and from larger-scale buyers of produce such as the *oinopolai* sometimes came in cash and sometimes through a credit transfer through a local bank'—that was in the Arsinoite nome in the mid-third century.⁸⁴ It might be presumed that this was also the case in most if not all provinces with an inheritance of Hellenistic business practices, and the wide scatter of bankers throughout Italy supports the notion that it too should be included.

⁸⁰ See Camodeca, 'Il credito' [n. 48], 87, for references.

⁸¹ Philostratus, *Vit. soph.* 2. 1. 549, with Bogaert, *Banques* [n. 47], 84–5.

⁸² Andreau, *Vie financière* [n. 68], 325, had epigraphical documentation of nineteen towns in the western provinces showing that *argentarii*, *nummularii*, *coactores argentarii*, or *coactores* were active there; for the Greek east see Bogaert, *Banques* [n. 47], esp. 409–10, and id., 'Liste géographique des banques et des banquiers de l'Égypte romaine', *Zeitschrift für Papyrologie und Epigraphik* 109 (1995), 133–73.

⁸³ Von Reden, 'Money' [n. 72], 147, relying on R. S. Bagnall and R. Bogaert, 'Orders of Payment from a Banker's Archive', *Ancient Society* 6 (1975), 79–108, and Bogaert, 'Note sur l'emploi du chèque dans l'Égypte ptolémaïque', *Chronique d'Égypte* 58 (1983), 245–52, both repr. in Bogaert, *Trapezitica Aegyptiaca. Recueil de recherches sur la banque en Égypte gréco-romaine* (Florence, 1994).

⁸⁴ D. W. Rathbone, *Economic Rationalism and Rural Society in Third-century A.D. Egypt* (Cambridge, 1991), 324.

But let us return to credit more generally. The comfortably off, the members of the decurion class⁸⁵ and their economic equivalents among the freedmen—were they too part of the debt economy? If they lived in commercial towns such as Puteoli (Ostia, Aquileia, and so on—we are speaking here of at least twenty or thirty places all across the Empire), the answer is plainly yes.⁸⁶ I take it that all the mechanisms visible in the Murécine documents were employed in all such places, if not on the same scale. These documents are not about small change: the usual scale of a Murécine loan is in the range 10,000–30,000 sesterces; and note that very often the security for such loans was provided by other documents—the commonest kind of security was a *fideiussio*, which therefore had to have a market value just like more concrete forms of security—so here we have negotiable ‘paper’ once again. The chief expert on the Murécine texts, Camodeca, has come round to the view that the house of the Sulpicii ‘played a part in the productive and commercial activities of Puteoli’.⁸⁷ The Egyptian evidence reviewed by van Minnen elsewhere in this book shows that loans could be a major part of the assets of people of the middling sort as well as of the rich. Be it noted, however, that the argument here is not that credit had the same role in the Roman economy as it did in, say, industrializing countries in the nineteenth century, but simply that it was pervasive and institutionalized and added enormously to the money supply.⁸⁸

Let us turn to more modest people, craftsmen and farmers, those with enough assets to survive, but not much if anything in the way of

⁸⁵ In using this label, I have in mind the decurion class as it was before the evasion of office became a large-scale phenomenon.

⁸⁶ It should be remembered how little we know about the financial lives of such places: even Alexandria is largely a mystery in this respect; cf. J. Rowlandson, ‘Money Use among the Peasantry of Ptolemaic and Roman Egypt’, in A. Meadows and K. Shipton (eds.), *Money and its Uses in the Ancient Greek World* (Oxford, 2001), 145–55 at 146.

⁸⁷ ‘Il credito’ [n. 48], 80.

⁸⁸ Finley, *AE* 197, insisted that ancient lending was hardly ever aimed at increasing production, but he did not weigh the Roman evidence or consider the real comparanda, such as England on the eve of the Industrial Revolution. My point in any case is simply that credit-money existed, and in ample amounts. There are, of course, many real obscurities, for instance about the full range of activities of the *coactores* (auction financiers); concerning these see N. K. Rauh, ‘Finance and Estate Sales in Republican Rome’, *Aevum* 63 (1989), 45–76 at 52–4.

surplus. Their use of credit is not crucial to my argument, but a brief detour may be worthwhile. The widespread indebtedness of such people is convincingly attested by Late Republican writers, as far as Italy is concerned.⁸⁹ We can probably take it, *a fortiori*, that the provincials were at least as indebted,⁹⁰ even though our evidence is very fragmentary. Under the Principate, the evidence seems to be even more fragmentary, except in Egypt. There we have documents, and what they suggest to us is something not unlike Muldrew's early-modern England—a world profoundly dependent on credit.⁹¹ Rathbone, as is well known, extrapolated from his analysis of the accounts of a large estate in third-century Egypt: 'the use of credit arrangements [there]... extended the monetisation of the rural economy beyond the limit of the quantity of coin in circulation'.⁹² But much of the credit referred to here did not add to the money supply,⁹³ for the loans in question did not meet the criteria set out in the previous section: though they were legally recoverable, the costs of recovering them would have been prohibitive, hence they could not possibly be used for making payments. The only way in which non-cash payments added to the money supply in this milieu seems to have been through the kind of bank transaction mentioned earlier.

Were other provinces more or less the same in this respect? This is inevitably a matter for conjecture. One might suppose that provinces with sophisticated Hellenistic or Punic traditions would be quite similar, and the combined effects of Roman taxation and periodic bad

⁸⁹ The secondary accounts do not pay enough attention to the rhetorical nature of most of the texts, but popular agitation for *novae tabulae* is reasonably well attested (Caes. *BC* 3. 21, Dio 42. 32; cf. Cic. *Att.* 7. 11. 1, 10. 8. 2, Vell. 2. 68); see also Cic. *Att.* 7. 3. 5, etc.

⁹⁰ See Sall. *Cat.* 40. 1, 41. 1, etc. For the contrast between Italian and generally much worse provincial conditions see my chapter on the Late Republican economy in the forthcoming *Cambridge Economic History of the Greek and Roman Worlds*.

⁹¹ See further Howgego, 'The Supply and Use of Money' [n. 3], 14–15. He appositely alludes to the Tebtunis contracts analysed by L. R. Toepel, 'Studies in the Administrative and Economic History of Tebtunis in the First Century A.D.' (diss. Duke, 1973), according to whom 308 out of 928 contracts registered there in AD 45–46 were 'certainly loans or potentially loans' (312).

⁹² *Economic Rationalism* [n. 84], 327. See further A. K. Bowman, *Egypt after the Pharaohs* (Berkeley and Los Angeles, 1986), 113–17.

⁹³ See the important discussion by J. Andreau and J. Maucourant, 'À propos de la "rationalité économique" dans l'antiquité gréco-romaine', *Topoi* 9 (1999), 47–102 at 68–71.

harvests, combined with a certain amount of entrepreneurial spirit, may have spread the shadow of debt over most of the Latin provinces in Europe as well; but the appropriate evidentiary base is simply not there.

It can be said, however, that the inhabitants of the Roman Empire had multifarious ways of extending and obtaining credit, and that throughout the period under consideration there is no sign of anything worse than one brief and partly artificial shortage of credit, the well-known crisis of AD 33.⁹⁴ In fact nothing we know about Roman interest rates—a subject which admittedly needs some new research—suggests that a shortage of capital was ever one of the economic system's serious weaknesses: the rates available to good quality borrowers never seem to have been strikingly high.⁹⁵ It is no argument against the model outlined in this section that interest rates varied from place to place (Gaius in *Dig.* 13. 4. 3),⁹⁶ in fact that is just what we ought to expect in a system characterized by social lending and slow long-distance communication. Even if interest rates were by some standards high, it may not have been because the system was incapable of creating enough money.

In section 2 we saw a fair amount of evidence for non-coinage payments of sums large and not so large. *Nomina* were transferable, and by the second century BC, if not earlier, were routinely used as a means of payment for other assets.⁹⁷ This fact is recognized in a simple statement by the jurist Pomponius.⁹⁸ The Latin term for the

⁹⁴ This was caused by delation not deflation. It has been suggested to me that the substantial sums lent by Augustus show that he believed that there was a serious shortage of credit, and that is possible; but the loans in question (Suet. *Aug.* 41, Dio 55. 12. 3a) can be explained even better as acts of enlightened self-interest quite natural for an aristocratic Roman used to dealing with *nomina*. It is hard to see how Nero's contribution of 40 million HS to the *aerarium* in 57 (Tac. *Ann.* 13. 31. 2) can have helped the credit market.

⁹⁵ Cf. Andreau, *Banking and Business* [n. 47], 94–8, and also R. W. Goldsmith, *Pre-modern Financial Systems* (Cambridge, 1987), 44.

⁹⁶ There seems to have been a customary rate of interest in some or all provinces (Ulpian in *Dig.* 26. 7. 7. 10 to end; cf. 27. 4. 3. 1). It has been suggested to me that this passage of Gaius refers to *coined* money and attributes to the volume of coined money a crucial role in determining interest rates, but none of this is in the text.

⁹⁷ The earliest mention is in Cato, *De agr.* 149. 2.

⁹⁸ 'quod vendidi non aliter fit accipientis quam si aut pretium nobis solum sit aut satis eo nomine factum vel etiam fidem habuerimus emptori sine ulla satisfactione [i.e. security]', *Dig.* 18. 1. 19. Cf. Ulpian in *Dig.* 50. 16. 187: 'verbum "exactae pecuniae" non solum ad solutionem referendum est, verum etiam ad delegationem'.

procedure by which the payer transferred a *nomen* that was owed to him to the seller was *delegatio*.⁹⁹ There was in fact a market in *nomina*.¹⁰⁰

Clearly it is of considerable importance here, if we are to evaluate the significance of the multiplier effect, to know whether there was commonly serial *delegatio*; in other words, did people commonly make payments by means of *nomina* that had originated not in loans they had made themselves, but in loans made by others which they had accepted as payment?¹⁰¹ We do in fact have a little evidence that by the mid-second century AD (and this may also have been true much earlier) this procedure was entirely standard, for it is referred to in Latin documents from both Egypt (AD 153) and Dacia (AD 162)¹⁰²—and it was so routine that it is referred to in the Dacian document by a mere abbreviation, ‘e.a.q.e.r.p.’.¹⁰³

Private citizens could probably make payments at a distance by means of a *permutatio*, without making a payment with coins.¹⁰⁴ In all these circumstances, it does not seem to make sense to say that in the financial world of Rome ‘there was no negotiable paper’.¹⁰⁵

⁹⁹ ‘The term covers various transactions serving different purposes. The most practical form occurs when a creditor orders his debtor to pay the debt to a third party of whom he himself is a debtor’, A. Berger, *Encyclopedic Dictionary of Roman Law* (Philadelphia, 1953), s.v. The most relevant chapter of the *Digest* is 46. 2, *De novationibus et delegationibus*. The exact meaning of *attributio* in financial contexts need not be debated here. Cf. Rauh, ‘Finance and Estate Sales’ [n. 88], 55, 65–6.

¹⁰⁰ Cic. *Att.* 12. 31. 2, Ulpian in *Dig.* 30. 1. 44. 5 (‘cum chirographa veneunt, nomen venisse videtur’).

¹⁰¹ J. Andreau answers this question negatively when he claims that ‘there was never any circulation of instruments of credit’, ‘Commerce and Finance’ [n. 59], 778 n. 56.

¹⁰² *P. Fouad I.* 45 = *FIRA* III no. 121 = *Ch. L. A.* XLII. 1207; *CIL* iii. 934–5 (no. V) = *FIRA* no. 122 = *IDR* i. 35.

¹⁰³ ‘eive ad quem ea res pertinebit’. What this means is that the lender, one Iulius Alexander, required that the borrower repay the debt (the interestingly modest sum of HS 240) to whoever happened to own the debt on the due date. I am grateful to Elio Lo Cascio for insisting on the importance of the question which these texts seem to answer. Cf. Temin, ‘Financial Intermediation’ [n. 45], 721. *Dig.* 46. 2, by itself, does not seem to settle the question.

¹⁰⁴ When Atticus sent the younger M. Cicero in Athens a certain sum, it was larger than the 80,000 HS of rental income which Cicero senior had transferred to him, quite likely in cash (*Att.* 16. 1. 5); the difference was a non-cash payment by one Cicero to the other via *permutatio*.

¹⁰⁵ Howgego, ‘The Supply and Use of Money’ [n. 3], 3. Andreau, *Banking and Business* [n. 47], 132, similarly says that there were ‘no negotiable bills’, von Reden, ‘Money’ [n. 72], 146, that the Romans possessed ‘nothing comparable to . . . negotiable bills’.

We can add the following material to our dossier.

1. Plautus' audience could understand the lines in the *Asinaria* in which Exaerambus the wine-merchant pays a debt by 'writing *nummi*' ('scribit nummos', 440), but what matters more is that Leonida the seller considered that the sale had taken place when Exaerambus had promised to pay, evidently with the help of a banker (436–8).¹⁰⁶
2. The reference to sales in the Ephesian Debt Law¹⁰⁷ must mean that a considerable number of Ephesians could make purchases on credit—using moneylenders?—and this is much more likely to have been a normal part of their economy than a result of the Mithridatic War.
3. In Horace, *Satires*, 2. 3 (64–76), Damasippus buys old statues by means of credits, naturally.¹⁰⁸ What the poet finds extraordinary is not the procedure but that anyone trusts this particular (representative) debtor.
4. To confirm how far credit could extend into the world of everyday commerce we can cite the funerary monument of a first-century AD *argentarius*, L. Calpurnius Daphnus,¹⁰⁹ which has been acutely analysed by Andreau.¹¹⁰ Daphnus was intimately involved in fishmongering auctions in the capital, no doubt a very profitable business at the luxury and wholesale ends of the trade. How could an *argentarius* be concerned in such a mundane business? Obviously he provided credit for big-ticket purchasers.¹¹¹
5. In the Caecilius Iucundus documents from Pompeii various different verbs are used to indicate that sellers had received money from him: *accepisse*, *persoluta habere*, *numeratos* or *numerata habere*, *soluta habere*. Andreau observed that, while

¹⁰⁶ Cf. C. T. Barlow, 'Bankers, Moneylenders, and Interest Rates in the Roman Republic' (diss. North Carolina, 1978), 77.

¹⁰⁷ Above, sect. 4.

¹⁰⁸ 'scribe decem a Nerio: non est satis; adde Cicutae | nodosi tabulas, centum, mille adde catenas' (69–70). For legal commentary see G. Sacconi, *Ricerche sulla delegazione in diritto romano* (Milan, 1971), 175–6.

¹⁰⁹ *CIL* vi. 9183 (*ILS* 7501); the monument is illustrated in J. Andreau, *Les Affaires de Monsieur Iucundus* (Rome, 1974), figs. 11 and 12.

¹¹⁰ *Vie financière* [n. 68], 111–16.

¹¹¹ Cf. Andreau, *ibid.* 114. For another *argentarius* in cahoots with fishermen see *Cic. De off.* 3. 58. *Suet. Nero* 5 provides further evidence of purchasing through bankers.

these terms mostly seem to be interchangeable (there are two versions of each text), ‘it never happens that *persolvere* and *numerare* are both used in the same document.’ ‘Numerare’ means ‘to pay in cash’, and Andraeu concluded that the word ‘*persolvere*’, meaning ‘to pay through an intermediary’, was used whenever the payment had been paid into the seller’s account.¹¹² A payment had been made but no coins had changed hands.

6. Thür and Rathbone seem to have demonstrated decisively that the commercial loan referred to in the ‘Muziris’ papyrus was made in Alexandria, and Rathbone has argued that the lender himself purchased the merchant’s shipment (which came from India), paying the equivalent of slightly less than seven million HS: ‘this, or most of this, was probably paid through a bank as a paper transaction’.¹¹³
7. In an intriguing article Cuvigny has recently shown that the expression *της τιμης* in Roman documentary papyri refers to purchases for cash.¹¹⁴ She appears to hold that the alternative would normally have been barter, but there is no textual evidence for that—though barter doubtless continued—and on the one occasion when the alternative to *της τιμης* is clearly expressed (in an ostrakon letter from the Mons Claudianus of c.152, *O. Claud. inv.* 5477) that alternative is—credit. I take it that it was not only on the Appianus estate that Roman Egyptians often bought on credit.

5. OTHER KINDS OF MONEY AND NEAR-MONEY

The expression ‘commodity-money’ is sometimes used now to refer to money consisting of coined precious metals, but I shall keep that

¹¹² See below, ch. 10, drawing on Andraeu, *Vie financière*, 574–5. I failed to make use of this argument in ‘A Revisionist View’ [n. 1].

¹¹³ G. Thür, ‘Zum Seedarlehen *kata Mouzeirin* P.Vindob. G40822’, *Tyche* 3 (1988), 229–33, D. Rathbone, ‘The “Muziris” Papyrus (SB XVIII 13167): Financing Roman Trade with India’, *Bulletin. Société archéologique d’Alexandrie* 46 (2001), 39–50 (the words quoted: 49). See further van Minnen’s contribution to this volume, ch. 11 below.

¹¹⁴ H. Cuvigny, ‘*Πέμπειν/ αγοράζειν της τιμης* dans l’épistolographie grecque d’Égypte’, *Chronique d’Égypte* 80 (2005), 270–6. Not available to me when I wrote ‘A Revisionist View’.

category separate and say something first about the use of other commodities as money.¹¹⁵ Definition is not easy. Presumably we should exclude commodities used in barter, but perhaps we should include commodities used to make payments in kind. Textbooks say that commodity-money 'is used as a medium of exchange and is also bought and sold as an ordinary good', and tend to offer gold as an example.¹¹⁶ That seems to exclude the common types of payments in kind we know about in the Roman Empire, which were taxes and rents and not purchases.¹¹⁷ We need not take a position here in the controversy over the relative importance of taxes in kind and taxes paid in money,¹¹⁸ and no one doubts that there was plenty of taxation in kind.¹¹⁹ But payment in kind will not raise any eyebrows or define the system. What matters in the present context is whether commodity-money adds to the money supply. I suppose that the answer is yes, but in a particularly limited and useless way, since the recipient cannot spend it without converting it into some more liquid form (and often cannot even store it permanently, since it may be perishable).¹²⁰

As for coinage, it is not my intent to deny that coinage was much more important in making payments than it ever is in a modern industrial economy.¹²¹ It has already been suggested that a large segment of the population may never have had occasion to use

¹¹⁵ This topic deserves further study: some new research will soon be published by David Hollander, to whose book manuscript I am much indebted. On bankers and commodity-money see J. Andreau, 'Les Comptes bancaires en nature', *Index* 15 (1987), 413–22, repr. in *Patrimoines, échanges et prêts d'argent: l'économie romaine* (Rome, 1997), 189–201; R. Bogaert, 'Les Opérations en nature des banques en Égypte gréco-romaine', *Ancient Society* 19 (1988), 213–24 (repr. in *Trapezitica Aegyptiaca* [n. 83], 397–406); R. A. Coles in *P. Oxy.* 67 (2001), 152 (there was a regular system of transfers).

¹¹⁶ Fischer et al., *Introduction* [n. 20], 142. But Mankiw, *Macroeconomics* [n. 21], 77, differs somewhat.

¹¹⁷ For borrowing and lending in kind in Graeco-Roman Egypt see D. Foraboschi and A. Gara, 'L'economia dei crediti in natura (Egitto)', *Athenaeum* 60 (1982), 69–83.

¹¹⁸ On this matter see among other Duncan-Jones, *MG* 21 etc., Hopkins, 'Rome, Taxes' [n. 4], 55–7 = 215–17, Rathbone, 'The Financing of Maritime Commerce' [n. 4], 224.

¹¹⁹ For taxation in kind in Roman Egypt see most recently Rowlandson, 'Money Use' [n. 86], 147–9.

¹²⁰ Yet some of the Egyptian bank transfers were probably private payments.

¹²¹ But the role of gold and silver coins was still considerable even in advanced countries until the First World War.

money except in kind or in coin. Even if we confine ourselves to large-scale payments, coins were of course of great importance. Real property was sometimes paid for in cash (more on this below). Many provincials paid their taxes in this fashion, and provincial governors evidently received their substantial local allowances in coins (Cic. *Att.* 2. 6. 2 to end), just as soldiers always had to be paid, or at least promised their pay, in the same way. However when Cicero, in sympathy with the Senate, wanted to intervene in the credit market in 63 BC to stem the flow of funds out of Italy, and banned the export of gold and silver, sending a quaestor to Puteoli to put the regulation into effect,¹²² this was partly, I suppose, political theatre, and partly an attempt to prevent the export of the kind of 'emergency gold' referred to earlier (but he may also have been trying to prevent the export of coins).

What is most interesting about the aggregate stock of silver coinage in the Late Republic is that it apparently starts to decrease after about 79 BC, having previously risen steadily for generations,¹²³ though there is no reason to think that there was any major decline in economic activity. Whatever exact motives led the authorities to mint coins, we may presume that this decrease would not have taken place if it had caused serious inconvenience to the well-to-do. The reason why it did not have this effect, I suggest, was that a large, and probably increasing, proportion of their sizeable financial transactions was being carried out wholly or mainly by means of documents.

It may have been normal in large transactions to pay some percentage in coin, according to the circumstances: thus when Cicero, some fifteen years after the purchase of his house on the Palatine, was contemplating another purchase on roughly the same scale (the 'Silius property'), he told Atticus that he wanted to pay in cash (*numerato*) and not by *aestimatio* (12. 25. 1), a procedure which would have permitted the seller to choose any property of Cicero's that he liked, up to the agreed value (the valuation of that property having been carried out by a third party). 'You will squeeze 600,000

¹²² Cic. *Vat.* 12; cf. *Flacc.* 66.

¹²³ K. Hopkins, 'Taxes and Trade in the Roman Empire', *JRS* 70 (1980), 101–25: 109, who was necessarily puzzled (111). K. Lockyear, 'Hoard Structure and Coin Production in Antiquity—an Empirical Investigation', *NC* 159 (1999), 215–43 (see esp. fig. 13), seems to have put the fact beyond reasonable doubt.

out of Hermogenes', he says, cryptically, 'and I see that I have 600,000 at home.' For the rest, he will borrow at interest from the seller, 'until', cryptically again, 'we pay by means of Faberius or with someone who is in debt to Faberius'.¹²⁴ Why did Cicero not simply pay with *nomina* in this case? Probably because he could not at this juncture afford to reduce his income (see *Att.* 12. 25. 1), and the Horti Silaniani were to be a convenient residence (12. 29. 2, cf. 27. 3) not a productive property (see 12. 31. 2: 'sed mihi utrivis...').¹²⁵

One underlying reason for this growth in documentary transactions was clearly that in a Mediterranean-wide empire it was dangerous as well as inconvenient to send large sums of specie backwards and forwards over long distances—it was of course known to be risky to transport large sums of coin by sea,¹²⁶ and both officials and private citizens probably tried to avoid it whenever they could.¹²⁷ We have noticed that shipwrecked trading ships seldom seem to have carried many coins in high classical times. And when a numismatic scholar set out to list evidence that shows that 'coin might on occasion be carried from one region to another to purchase goods',¹²⁸ his harvest was remarkably meagre. It amounted to two texts concerning

¹²⁴ 'dum a Faberio vel cum aliquo qui Faberio debet repraesentabimus', and, he adds, 'erit etiam aliquid alicunde'. Shackleton Bailey (who deleted *cum*) translated 'until we *pay cash* with what comes from Faberius or some debtor...', asserting that this is the normal meaning of *repraesentare*. It is clear in any case that, whatever Faberius' obligation to Cicero consisted of (*illud Faberianum* was a serious problem for Cicero: *Att.* 12. 29. 2), it was not a *nomen* that could be used in payment, even though it could be sold (12. 31. 2), presumably at a steep discount; it is equally clear that if and when Faberius paid off this obligation he might do so by means of a *nomen* ('aliquo qui Faberio debet'). Faberius was of course an assistant of the dictator. As for the meaning of *repraesentare*, *praesens pecunia* means 'ready money', but matters are, I suspect, more complicated than Shackleton Bailey allows (his claim that in *Dig.* 35. 1. 36 *repraesentare* means 'pay cash' cannot be right): the *Oxford Latin Dictionary* understandably hedges a little with 'pay (a sum) in ready money, pay at once', and it might be better to translate 'settle an obligation', *vel sim.*; there is never, as far as I can see, any clear implication of coins.

¹²⁵ An intriguing possibility: Cicero intended to pay several million sesterces in cash, but in the new gold coins, which would have meant that each million would have weighed a relatively manageable 96.5 kg.

¹²⁶ *Cic. Fam.* 2. 17. 4, *Plu. Cat. Min.* 38.

¹²⁷ Sometimes of course it was necessary to ship large quantities of coin, especially in emergencies (e.g. *Plu. Brut.* 24, 25).

¹²⁸ C. Howgego, 'Coin Circulation and the Integration of the Roman Economy', *JRA* 7 (1994), 5–21 at 7.

the Indian Ocean trade, and a single fragment of the republican dramatist Pomponius.¹²⁹

How did all this change when Rome began to produce a regular gold coinage in 48 BC or at least in 46? It was now much easier to pay large bills in coin, if one wanted to, and few people would now doubt that gold coins took on a major role. One scholar has guessed that 'gold soon made up more than 25% of the money supply'.¹³⁰ The long-term effects can be judged to some extent from the finds at Pompeii, where gold coins, in terms of value, make up 69 per cent of all the coins found.¹³¹ When substantial amounts of gold arrived in Rome as booty after republican wars, it did not quickly or directly turn into money. But the first major annexation of a new province after the introduction of gold coinage at Rome, the annexation of Egypt, resulted in a great increase in *res nummaria* and this drove down interest rates for a time (Suet. *Div. Aug.* 41);¹³² it may be fortuitous that we hear of this, but it may also be the case that Egyptian gold found its way on to the Roman credit market more quickly and directly than precious-metal booty had under the Republic. Be that as it may, the availability of gold coins probably reduced the importance of documentary transactions, but not by much, for physical convenience was in fact no more than a subordinate reason for most kinds of non-cash payments. A large proportion of the texts I have cited to show the importance of non-cash payments belong in fact to this new period.

When the earliest Greek and Roman coins were minted, they presumably had the same value in the marketplace as the equivalent quantity of metal. From very early on, however, states from time to time attempted to establish a conventional value for coins that, as metal, were worth less than their 'fiat' or 'fiduciary' value.¹³³ They could do this by debasement or by lowering the weight standard.¹³⁴

¹²⁹ Lines 115–16 (*Scaen. Rom. Frag.* ed. Ribbeck, ii. 292). Plin. *NH* 33. 46 is irrelevant.

¹³⁰ K. Verboven, '54–44 BCE: Financial or Monetary Crisis?', in *CM* 49–68 at 62.

¹³¹ Duncan-Jones, *MG* 71, following L. Breglia and E. Pozzi. Yet some caution is needed: there were more rich people in Pompeii than in the average Roman town.

¹³² For some useful commentary on this passage see J. Andreau, 'L'État romain face au monde de la banque et du crédit', in *État, fiscalités, économies. Actes du V^e Congrès de l'Association Française des Historiens Économistes* (Paris, 1985), 3–11, repr. in *Patrimoines, échanges* [n. 115], 203–16 at 212–14.

¹³³ See now Seaford, *MEG* 136–46. Finley, *AE* 196, simply asserted otherwise with no discussion.

¹³⁴ Also in theory by decreeing that coins of pure metal had more value than they would have had as bullion (Seaford, *MEG* 139–43).

I refer to this matter here solely because the Roman state *may* by this means have increased the money supply without having had to find and process new supplies of gold, silver, and bronze. Under the Republic, public worrying about the purity of the coinage (as in the praetorship of Marius Gratidianus in 85 BC) suggests that the value of that coinage in the marketplace had not up to that point departed very far from its value as metal. But in the high Empire Romans counted out coins, they did not weigh them out,¹³⁵ and while there is naturally some evidence that the purity of the coinage was still a concern under the Principate,¹³⁶ it may be that the *nummularii* who tested coins were mainly on guard against outright forgery.

The obvious possibility is that the gradual but in the end severe debasement of the silver coinage that took place from Nero's time onwards, together with the decline in the weight of the denarius,¹³⁷ radically increased the fiduciary element in the coinage's value, as scholars have from time to time supposed.¹³⁸ The *antoninianus* in any case was probably fiduciary coinage.¹³⁹ The only place one can really be sure one way or the other (because it is the only place where prices can be correlated with the purity of the coinage) is Egypt, and there it is quite certain that prices did not track debasement.¹⁴⁰ Fiduciary coinage would not, of course, have increased the money supply if the value of the coinage in circulation remained approximately the same (or increased less than the percentage of the debasement), with the government simply using less silver. But that is not what happened:¹⁴¹ the (nominal) value of the coinage in circulation

¹³⁵ K. Strobel, 'Geldwesen und Währungsgeschichte des Imperium Romanum im Spiegel der Entwicklung des 3. Jahrhunderts n.Chr.', in Strobel (ed.), *Die Ökonomie des Imperium Romanum* (St Katharinen, 2002), 86–168 at 97.

¹³⁶ Tertullian, *De paenitentia* 6. 5 is not much to go on. But see Petr. *Sat.* 56, Martial 12. 57. 7 (Neronian coins under suspicion).

¹³⁷ See Duncan-Jones, *MG* fig. 15.4 (cf. 15.7), for the former effect, down to the reign of Severus Alexander, fig.15.2 for the latter. Occasionally these processes were reversed for a time. Coins also became more variable within emperors' reigns.

¹³⁸ See e.g. H.-U. von Freyberg, *Kapitalverkehr und Handel im römischen Kaiserreich* (Freiburg im Breisgau, 1989), 87–9. Cf. E. Lo Cascio, 'State and Coinage in the Late Republic and Early Empire', *JRS* 71 (1981), 76–86 at 79.

¹³⁹ Not all agree: see E. Lo Cascio, 'Dinamiche economiche e politiche fiscali fra i Severi e Aureliano', in *Storia di Roma* (Turin, 1993), iii/1. 247–82 at 261–7.

¹⁴⁰ See e.g. Lo Cascio, *ibid.* 275.

¹⁴¹ See esp. Duncan-Jones, *MG* 103–5.

continued to increase throughout the period under consideration here. At the same time it is clear that after about 200, if not before, well-informed people had to some extent become suspicious of debased coins.¹⁴²

6. SOME POSSIBLE OBJECTIONS

Freyberg, aware of some of the evidence for Roman credit-money, had the merit of asking whether the Roman credit system too can have had a multiplier effect. ‘Wahrscheinlich kaum’, he says,¹⁴³ on the grounds that there were no clearing centres. But seen historically, clearing banks were a technical improvement, not an indispensable foundation for a market in obligations: the Wisselbank of Amsterdam, founded in 1609, was somewhat precocious,¹⁴⁴ and London had no clearing bank until 1770,¹⁴⁵ while the United States’ first clearing house was established in New York in 1853.¹⁴⁶ In other words, Freyberg fell into the trap of looking for modern institutions in antiquity. What matters here is not whether there were clearing centres (which would no doubt have been a considerable convenience in Rome or Alexandria), but whether lenders had more recoverable debt than they had state-issued money, i.e. coin, in reserve—and the

¹⁴² Evidence was gathered by Duncan-Jones, *MG* 218 n. 25.

¹⁴³ *Kapitalverkehr* [n. 138], 93. Freyberg’s other complaint is that Roman finance lacked ‘legal and technical standardization’, which could also be said about modern capitalism. E. Lo Cascio also argues that there was no multiplier effect, or none that mattered (‘How Did the Romans View their Coinage and its Function?’, in C. E. King and D. G. Wigg (eds.), *Coin Finds and Coin Use in the Roman World* (Berlin, 1996), 273–87 at 279–80), on the grounds that this would require ‘the possibility of a direct transfer of credit’, but (a) practitioners of *delegatio*, and probably bankers too, did effect such transfers, and (b) standard accounts of the money multiplier do not in any case make it depend on *how* the bank or bank-like lender conveys funds to the borrower.

¹⁴⁴ See J. de Vries and A. van der Woude, *The First Modern Economy* (Cambridge, 1997) (original edn., 1995), 131.

¹⁴⁵ Davies, *History of Money* [n. 26], 321–2 (even then its function was quite limited).

¹⁴⁶ G. Gorton, ‘Clearinghouses and the Origin of Central Banking in the United States’, *Journal of Economic History* 45 (1985), 277–83 at 278.

answer to that is obviously that most of the time they did (we recall Scaevola's *coactor argentarius*).¹⁴⁷

But how much did credit money add to the money supply of the Roman Empire? Some will respond to the argumentation of the previous sections by claiming that the addition was small. My view is that (a) we cannot know this, and (b) even if the addition was limited, that would not greatly diminish the strategic importance of credit-money in the Roman economy.

In this context 'small' must mean 'small' in relation to GDP and/or to the stock of coinage. Since we do not seem to possess any clear information as to the normal ratio of the money supply to GDP in any early modern economy (our best type of comparison), and we have in any case only the most general notion of the size of the GDP of the Roman Empire,¹⁴⁸ we should turn our attention to the stock of coinage. But here too there is a marked lack of scholarly consensus. Duncan-Jones's detailed argumentation led him to the conclusion that the value of the gold and silver coins in circulation in the second-century Roman Empire was on the order of 19 billion HS, and that there was probably an additional 2 billion HS of bronze coinage.¹⁴⁹ This would mean that there existed something close to 350 to 420 HS of coinage per person (depending on one's estimate of the whole population). I at first found this figure implausibly high, but comparisons with pre-industrial Holland and England, which I do not reproduce here, convinced me that they are at least possible. Other scholars, however, have on the whole rejected them.¹⁵⁰ This is not a problem to be solved here. Duncan-Jones was of course fully aware in principle that from Nero's reign onwards the government commonly had strong motives to remint coins,¹⁵¹ but he perhaps underestimates the likely tendency of hoarders to prefer old coins to new—for

¹⁴⁷ I have already cited the evidence of the Ephesus Debt Law and of Scaevola in *Dig.* 40. 7. 40. 8.

¹⁴⁸ Hopkins argued rather cogently that 'as a metaphor' we might conclude that Roman GDP was greater, perhaps much greater, than 9 billion HS p.a. in the High Empire (150 HS per person): 'Rome, Taxes' [n. 4], 44–6 = 197–9.

¹⁴⁹ *MG* 168–70 (12,012 billion HS of gold, 6,864 billion of silver).

¹⁵⁰ Jongman, 'A Golden Age. Death, Money Supply and Social Succession in the Roman Empire', in *CM* 181–96 at 186, accepts it and then professes to be surprised by the consequences.

¹⁵¹ *MG* 104, 197–200.

many undoubtedly knew that the older a coin was the purer it was likely to be (this tendency could easily coexist with a partially fiduciary coinage). The claim that ‘hoards normally represent cross-sections of coin in circulation at a particular date’¹⁵² is probably to a significant degree false. No need to debate here the contention, which has found very little favour,¹⁵³ that precious-metal hoards represent military donatives. Reminting probably had a much greater effect than Duncan-Jones allows.

Most scholars probably still prefer an estimate of money stock in the range 6–8 billion HS—which (paradoxically, since he did not know the evidence even at second hand) appears to derive from R. W. Goldsmith¹⁵⁴—while they recognize that these figures are very hypothetical.¹⁵⁵ Goldsmith, incidentally, who imagined a financially primitive Roman Empire, was nonetheless content to imagine that the value of financial instruments was not 10 billion sesterces, but something not much less.¹⁵⁶ Needless to say, these figures are not robust enough to support an argument. But the reader will see, I trust, that there are no data of any kind that should make us suppose that credit-money was relatively small in quantity.¹⁵⁷

But it does not really matter. The concept ‘money supply’ is in a sense too modern to apply to the Roman Empire. What matters, after all, if we are thinking about the rate of development that was possible in the Roman economy, is not (as it might be in a mass-market modern economy) whether the consumer has money and credit at his/her disposal, but whether the decurion-class buyer and the small

¹⁵² Duncan-Jones, *MG* 115. For the arguments that support this see *ibid.* 77–85. C. Howgego makes a similar assumption (‘The Circulation of Silver Coins, Models of the Roman Economy’, in King and Wigg, *Coin Finds* [n. 143], 219–36 at 220–1), even though he knows that it can sometimes be falsified (221 n. 12).

¹⁵³ See, against, C. Howgego, *JRS* 86 (1996), 208.

¹⁵⁴ *Premodern Financial* [n. 95], 40–1. This would have been in AD 14.

¹⁵⁵ Cf. Lo Cascio, ‘Introduzione’ [n. 4], 6. Hopkins, ‘Rome, Taxes’ [n. 4], 75 = 227 n. 90, judged 21 billion much too high an estimate, drawing attention to what it would mean for individuals, especially since ‘significant sectors of the rural economy were non-monetized or under-monetized’ (an assertion about which I have some reservations).

¹⁵⁶ *Premodern Financial* [n. 95], 57.

¹⁵⁷ Some of my economist readers have expressed frustration that there is not more evidence for the use of *nomina* in making payments. But the limitations of the evidence for the Roman financial system are what they are.

entrepreneur can find money to borrow when they need to (at a reasonable price—that is another avenue of enquiry). And the evidence combines to suggest that they could. As Andreau has pointed out, we hear of capital unable to find borrowers (Petr. *Sat.* 53, Plin. *Ep.* 10. 54 and 55—admittedly a special kind of case), not the reverse.¹⁵⁸ The likelihood is that the big borrowers, and those who needed funds for business or agricultural purposes, usually found lenders at tolerable rates unless they were recognized credit risks. That leaves plenty of room for bankruptcy and impoverishment, but it does mean that the economic failures of the Roman Empire, in the period in question, are unlikely to be traceable in the main to a shortage of money.

7. AN OVERVIEW OF THIRD-CENTURY DEVELOPMENTS

To round out this picture, we should ask what happened to the money supply after the Severans, down to 301. I will concentrate on the two most important effects in a complex and disputed history, and avoid as far as possible interpreting the tetrarchs' Currency Edict.

After about 260 *argentarii* disappear from the sources, and after 300 *nummularii* too;¹⁵⁹ there is every reason to think that they had succumbed to a deteriorating economy. This does not mean that banking had wholly died out (we know it had not), and we know from the Currency Edict what we could not in any case have doubted, that lending and borrowing continued,¹⁶⁰ but the disappearance of bankers from the evidence does suggest that, by 300 at least, the

¹⁵⁸ *Banking and Business* [n. 47], 93. For further evidence see D. P. Kehoe, *Investment, Profit, and Tenancy: The Jurists and the Roman Agrarian Economy* (Ann Arbor, 1997), 52 (where, however, the dates of the texts quoted may have some relevance).

¹⁵⁹ J. Andreau, e.g. 'Declino e morte dei mestieri bancari nel Mediterraneo occidentale (II–IV d.C.)', in A. Giardina (ed.), *Società romana e impero tardoantico* (Rome, 1986), i. 601–15 (repr. in *Patrimoine, échanges* [n. 115], 133–55), *Vie financière* [n. 68], 46, 49, *Banking and Business* [n. 47], 33–4.

¹⁶⁰ See K. T. Erim, J. Reynolds, and M. H. Crawford, 'Diocletian's Currency Reform: a New Inscription', *JRS* 61 (1971), 171–7 at 173 (fr. b, lines 3–10).

volume of credit-money had drastically shrunk. The unexpected burst of inflation under Commodus must have hurt creditors severely, and the obvious problems of the mid-third-century economy, in particular political uncertainty, decreased agricultural production, and greatly diminished long-distance trade, did further damage. One wonders how much of the credit structure was left by the time of the new inflation under Aurelian.¹⁶¹

Why was there a viciously sharp acceleration in prices in the 270s, a roughly tenfold increase in 274/275?¹⁶² (No need to quibble here as to how closely the rise in Egyptian prices corresponded to an Empire-wide phenomenon). A conventional Fisher explanation would link the event to an abrupt increase in the money supply. But the two phenomena seem so vastly disproportionate—in fact do we do not know that money supply *in the Roman Empire* increased at all in the period directly prior to the rise in prices (as distinct from earlier decades). Even if the production of Alexandrian tetradrachms increased notably from 265 onwards, it did not multiply the money supply eight to ten times—and in any case we are looking for an Empire-wide cause.¹⁶³

Neither can we simply attribute the inflation of the 270s to the lighter weight of the *aureus* or to the debasement of the silver coinage, because they had already been marked tendencies long before. Those on the other hand who have denied that debasement had anything to do with the matter¹⁶⁴ in effect ignore an event of a kind unknown to Fisher, namely an abrupt loss of confidence in the silver coinage,¹⁶⁵ leading to what we might call a post-fiduciary

¹⁶¹ For a number of relevant considerations see Carrié, 'Solidus et crédit' [n. 62], 266–7.

¹⁶² For the scale and chronology see above all D. W. Rathbone, 'Monetisation, not Price-inflation, in Third-century A.D. Egypt?', in King and Wigg [n. 143], 321–39, and 'Prices and Price-Formation in Roman Egypt', in J. Andreau (ed.), *Prix et formation des prix dans les économies antiques* (Saint-Bertrand-de-Comminges, 1997), 183–244.

¹⁶³ Increased coin production in Alexandria: J. E. Lendon, 'The Face on the Coins and Inflation in Roman Egypt', *Klio* 72 (1990), 106–34 at 111. But there is no confirmation of this in E. Christiansen, *Coinage in Roman Egypt: The Hoard Evidence* (Aarhus, 2004).

¹⁶⁴ Von Reden, 'Money' [n. 72], 158.

¹⁶⁵ Cf. J. Schwartz, 'La Monnaie et l'évolution des prix en Égypte romaine', in *Les 'Dévaluations' à Rome* (Rome, 1978), 169–79 at 178.

coinage, in which the government was obliged to improve the coinage's precious-metal value. The cup of debasement had finally run over. It was a matter of panic, in all probability, certainly not of cold reasoning (so it scarcely matters that Aurelian's coins were not visibly much worse than his predecessor's). Egyptian bankers were already sceptical about the value of the coinage in circulation in 260 (*Sel. Pap.* 2. 230). We can see references to 'old' and 'new' money in Egyptian documents of the 260s and later¹⁶⁶ as signs of anxiety about the viability of the coinage. Under Claudius Gothicus and under Aurelian the tetradrachm once again shrank and lost more of its already minute silver content.¹⁶⁷ All it needed was the bankers' refusal to accept legitimate coins; then, as in 260, tax-gatherers, and presumably borrowers too, would soon be in trouble and have to follow suit. What is most remarkable about all this is that the loss of confidence was apparently Empire-wide, which may have something to teach us about the nature of the imperial economy's 'integration'.

This was by no means the final end of all attempts at fiduciary coinage, but it was in effect the end of a period. We know that Diocletian intended his silver coinage to have some fiduciary value, 60 per cent above its bullion value;¹⁶⁸ whether his wishes were fulfilled and for how long is another matter.

As Carrié has observed,¹⁶⁹ one might have expected that after Diocletian introduced the *solidus* credit markets would have re-established themselves, but apparently they failed to do so on any large scale. This non-event and its explanation deserve further enquiry. Can the disappearance of specialized personnel be a sufficient explanation? Had it become significantly more difficult to recover loans at law?

¹⁶⁶ For the fullest list of references see Rathbone, 'Monetisation' [n. 162], 336.

¹⁶⁷ *Ibid.* 326–8. The Palmyrene occupation of Egypt between 270 and 272 presumably diminished confidence in the central government.

¹⁶⁸ Lo Cascio, 'State and Coinage' [n. 138], 79 n. 22, showed that Diocletian wished his silver coinage to be fiduciary; see further 'How Did the Romans?' [n. 143], 284–5. Cf. J.-J. Aubert, 'Monetary Policy and Gresham's Law in the Late Third Century A.D.', in *CM* 245–63 at 253.

¹⁶⁹ '*Solidus* et crédit' [n. 62], 267.

8. CONCLUSION

The purpose of this chapter has not been to demonstrate that per capita growth occurred in the Late Republic or under the Principate (though such growth probably did occur in the second of these periods), but rather that shortage of money was not to any important extent a brake on growth. (What impeded sustained economic growth in Roman antiquity was, in my opinion, not a shortage of money, but mainly the failure to adopt technologies, especially a fuel technology, that would have allowed the Romans to escape from the Malthusian impasse).¹⁷⁰ Nonetheless it is worth clearing some cobwebs out of the attic. What I have attempted to demonstrate is that the Roman monetary system was far indeed from relying entirely on coinage. Romans, especially those whose credit was good, frequently made payments without coinage. It is difficult to define money and the money supply (and the strategy here has not been to import ready-made definitions from contemporary economics but rather to work out, with the assistance of contemporary economics, definitions that are appropriate to the Roman world), but we may reasonably think that credit-money added very significantly to the Roman Empire's money supply, or at the very least greatly assisted those who engaged in exchange.

¹⁷⁰ For a radically different view of Roman growth and lack of it see W. Scheidel, 'Real Income Growth in Roman Italy', forthcoming.

The Use and Survival of Coins and of Gold and Silver in the Vesuvian Cities

Jean Andreau

The coins found in Pompeii have been the subject of a number of articles, by Laura Breglia (1950), by Enrica Pozzi (1975), and more recently by Pasquale Dapoto, Teresa Giove, and Richard Duncan-Jones.¹ As for a comprehensive study of all the coins, we do not seem to be much better off than we were half a century ago, and the general catalogue which Breglia and Pozzi proposed has not yet come into being. But Pozzi suggested another project as well: she thought it would be very useful to study each group of coins closely within the context in which it had been found. In this respect there has been some progress, for in the last twenty years several houses have been studied fairly exhaustively.²

The chapter was translated from French by Jean Andreau and W. V. Harris.

¹ L. Breglia, 'Circolazione monetaria ed aspetti della vita economica a Pompei', in *Pompeiana, Raccolta di studi per il secondo centenario degli Scavi di Pompei* (Naples, 1950), 41–59; E. Pozzi Paolini, 'Circolazione monetale a Pompei', in B. Andreae and H. Kyrieleis (eds.), *Neue Forschungen in Pompeji* (Recklinghausen, 1975), 299–307; P. Dapoto, 'Circolazione monetale a Pompei', *RSP* 1 (1987), 107–10; T. Giove, 'Le monete e l'economia domestica', in M. Borriello, A. D'Ambrosio, S. De Caro, and P. G. Guzzo (eds.), *Pompei, abitare sotto il Vesuvio* (Ferrara, 1997), 187–91; R. Duncan-Jones, 'Roman Coin Circulation and the Cities of Vesuvius', in *CM* 161–80.

² See e.g. V. Castiglione Morelli Del Franco and R. Vitale, 'L'insula 8 della Regione 1: un campione di indagine socio-economica', *RSP* 3 (1989), 185–221; I. Cerato, 'La casa 1, 11, 9–15 di Pompei', *RSP* 11 (2000), 117–31; F. Dentamaro, 'Pompei, La casa di L. Cecilio Giocondo. Un'ipotesi di ricostruzione delle fasi edilizie mediante analisi stratigrafica delle strutture murarie', *RSP* 12–13 (2001–2), 131–41; M. C. Miletì, 'La casa 1, 11, 6–7 a Pompei, un esempio di edilizia privata minore', *RSP* 11 (2000), 101–16;

The recent paper by Duncan-Jones (2003) to some extent marks a new departure, in that:

1. He took into consideration many more coins than others had done before. Breglia's paper dealt with approximately 12,200 coins, whereas Duncan-Jones studied more than 32,000 coins.
2. His paper includes Herculaneum and Stabiae as well as Pompeii.
3. He compared the coins of the Vesuvian cities with those found at other sites, both in and outside Italy.
4. He chose the questions he would ask according to the availability of evidence.

Previous scholars had all of course explained the limits of the evidence and how far it was necessary to be cautious. When it came to the point, however, there was a gap between the precautions they recommended and their results, even when the results were relatively modest. One problem is that it is highly unlikely that we have information about all the coins that have been discovered since the eighteenth century. Furthermore, the coins that were found between 1748 and 1864 were all mixed together in the Naples Museum with coins that had come from other sites, because they belonged to the same series. Thus the numismatists cannot collate the written information with the coins themselves.

Moreover, in AD 79 some houses were not occupied, or at least they were occupied by few people or only infrequently, because of the AD 62 earthquake, or because of the two earthquakes (if there was a second earthquake during the 70s, as some experts now think), and because of the building work that went on after the earthquakes. In the whole Insula 5 of Regio 6, only nine coins have been found.³ There were only eleven bronze coins (issued by Augustus and the Julio-Claudians) in the villa of Oplontis named 'villa A' (one must not confuse this villa with the other villa in Oplontis, known as the villa of L. Crassius Tertius, which was very rich in gold and coins). No skeletons were found in Villa A, and it was under repair; it was

V. Pirozzi, 'I rinvenimenti del fondo Valiante', *RSP* 14 (2003), 49–84; K. S. Painter, *The Insula of the Menander at Pompeii*, iv. *The Silver Treasure* (Oxford, 2001); F. Vuat, 'La casa 1, 11, 5–8 e le sue fasi edilizie', *RSP* 11 (2000), 133–51.

³ M. Bonghi Jovino (ed.), *Ricerche a Pompei, L'insula 5 della Regio 6 dalle origini al 79 d. C.* (Rome, 1984), i. 69–70.

probably not occupied in 79.⁴ In the *villa rustica* that was excavated in Gragnano in 1984, apart from a silver-plated saucepan with a handle (a rare and expensive object if one compares it with what has been found in other buildings of that sort), there were no furnishings of any kind, again probably because it was not occupied in 79.⁵ In the same way, very few coins and no victims at all were found in the San Marco villa at Stabiae.⁶

Finally, many people left their homes at the time of the eruption and were able to get away. Fewer than 2,000 bodies have been found in the area affected by the eruption, which shows that most of the inhabitants must have succeeded in escaping. When they left, many of them took their most precious possessions, or at least some of them. This observation is even more valid for Herculaneum than for Pompeii, but even for Pompeii it always has to be kept in mind.

Breglia wrote that the coins discovered in Pompeii constitute 'a single enormous hoard', which was the result neither of a process of intentional hoarding nor of a selection, but corresponded to the 'everyday reality of life'.⁷ These ideas, which seem to make sense and which have often been repeated,⁸ are in fact completely wrong. The coins we know in Pompeii do not make up a single 'hoard', and they are not the reflection of everyday life. They result from several successive selections, and not all of them result from the same kind of selection. Some of them had been selected by the first-century-AD inhabitants, to be kept; others were used in everyday life. But a second selection, a negative one, was made when the major part of inhabitants left the area in 79: the coins we find are those that they could not bring away, or did not want to bring away. A third selection was also rather negative: I suppose that not all the coins which have been discovered have come down to us.

When coins or jewellery were found with a cadaver, or near one, outside in the street for instance, one must consider several scenarios.

⁴ V. Castiglione Morelli, 'Un gruzzolo dalla stanza degli Ori di Oplontis', *RSP* 11 (2000), 187–234.

⁵ P. Miniero, 'Ricerche sull'ager Stabianus', in R. I. Curtis (ed.), *Studia Pompeiana et Classica in Honor of Wilhelmina Jashemski* (New Rochelle, NY, 1988–9), i. 238, no. 11.

⁶ A. Barbet and P. Miniero (eds.), *La villa San Marco a Stabia* (Naples, 1999).

⁷ Breglia, 'Circolazione monetaria' [n. 1].

⁸ For instance by R. Cantilena, in Bonghi Jovino (ed.), *Ricerche a Pompei* [n. 3], i. 69.

Sometimes a person had not brought away all the valuables he or she had at home, but was simply carrying the things he or she happened to have that day. For instance, among the 'fugitives' who have been found by the seaside at Herculaneum, some were in possession of a single bronze coin, or of a silver coin and two bronze coins, or of three bronze coins, or of a ring, or of a bracelet.⁹ But even if the person was carrying more than that, even if he or she had bothered, during the escape, to bring away a number of valuables with the intention of rescuing them, there is no certainty, obviously, that all the articles of value that were in the house have been found with the corpse. In Herculaneum, at the site I have just alluded to, a small 'hoard' with bronze and silver coins was found in a wicker basket, near to corpse no. 21, in room 2. Do those coins constitute the entire amount that this man or woman used to keep at home?¹⁰ The husband, the wife, or the children, and in some case freedmen or relatives, or sometimes even slaves, may have left the *domus* carrying coins, jewellery, or plate.

When coins are found in a shop or a house, there is no certainty that those were the only coins kept there before the eruption, so it is arbitrary to conclude that the coins composed the entire family wealth, or even 'the entirety of its ready cash', as Breglia wrote.¹¹

If one takes all the precautions I have just listed into account, any research on the social significance of the coins found in the Vesuvian cities becomes unfeasible. It is impossible to determine how many coins were kept in a rich man's dwelling and how many in a poor man's. To reach any conclusions about social differences, there are only two ways, which are not mutually exclusive but in fact complement one another. The first one consists of dropping any claim to produce statistics and of studying instead each house, one at a time, as Pozzi suggested, with the aim of conducting a critical analysis of all the evidence found in each one. This project has started, but it will require many years to complete. The second method consists of comparing the evidence from the Vesuvian cities with that from other sites, in conjunction with the evidence of the texts and inscriptions.

⁹ M. Pagano, 'Scavi sull'antica marina: ambienti secondo e quinto', *RSP* 3 (1989), 273–8; 'Ufficio Scavi di Ercolano', *RSP* 10 (1999), 217–20.

¹⁰ Pagano, 'Scavi sull'antica marina', 276–7.

¹¹ Breglia, 'Circolazione monetaria' [n. 1].

But it may perhaps be more fruitful to ask other questions, which do not concern social differences. Duncan-Jones has compared the Vesuvian cities with other sites, and in particular he has dealt with the circulation of money. Which coins got to Pompeii, and how long did they take to get there? Which coins were usually retained, and why? For each metal, he compared the chronology of the coins found in the Vesuvian cities with those of other hoards found on Italian sites, in the Rhine and Danube provinces, in Roman Britain, or in Slovenia. Among the coins found on several sites, he compared the numbers of sesterces, *dupondii*, *asses*, and *quadrantes*. Some aspects of such comparisons may be debatable, but the topic Duncan-Jones chose—that is, the circulation of coins—allowed him to obtain some results, in spite of the limits of the evidence. For even if we do not know of all the coins that were in Pompeii in the year 79, the available sample is representative from the point of view of chronology and the origin of the coins. (It is plainly not representative of the social distribution of monetary finds. Only 203 sesterces were found in the opulent Casa del Fauno. None of the evidence that was found in this house allows us to know how much in the way of liquid assets or valuable possessions the master of such a house kept at home, or how much he spent in an average month or on an average day).

In what follows, I shall apply the approaches just outlined. As much as possible, I am going to take advantage of the fresh research about single houses and shops that has been published in the last quarter of a century. I shall not be discussing the problem of social differences, or, if I do so, it will be indirectly and as prudently as possible, via the use of architectural criteria, which are more reliable at Pompeii than the evidence of coins; and via the conservation of coins and of uncoined precious metals (either in bars and ingots or in jewels and plate). I shall try to collate the available evidence of the Vesuvian cities with the information we get in the ancient texts, and particularly in the juridical texts. Research on Pompeii and Herculaneum is in my opinion very often focused too narrowly on the Vesuvian cities themselves; too rarely is the Vesuvian evidence compared with what was happening in the rest of Italy and the Empire.

I have chosen to present some observations on the ways in which coins and precious objects of gold and silver were kept and used. I shall begin with some comments on money finds. Then, I will speak

about bank accounts, next of the *argentum infectum* and *aurum infectum* (that is precious metals in ingots, bricks, or bars), and finally silverware and goldware (*argentum* and *aurum factum*). To tell the truth, I fear that some of my conclusions will be rather negative. Pompeii and Herculaneum are exceptional sites, as is often and rightly said. In monetary matters they are rather misleading, even if, in addition to the coins, one considers the wax-tablets, the graffiti, and the gold and silverware. They are misleading for all the reasons I have already stated and for a few other reasons that I shall give later. But I hope not to be entirely negative.

It is worth distinguishing between coin 'hoards' found in houses of the members of the elite and those found in shops, workshops, and more modest houses. The latter are still less well known than the former, though some of them are more surprising.

In some cases, important amounts of money were kept in modest houses or on professional premises, just as in the rich *domus*. It was not common, but it could happen. It depended on the occupant's income, on his or her propensity to save, and on the place where the occupant kept his or her savings. Let us take an example outside the Vesuvian area. In 1987 and 1993, two hoards were found in the centre of ancient Musarna, a small town near Viterbo in Southern Etruria. They are both composed of denarii, and date to the first century BC. One of them is relatively modest, but the other one (the 1987 find) shows that it was possible to keep a large sum of money in a shop or in a small space which apparently served an economic function.¹² It was composed of 994 denarii, that is 3,976 sesterces, and dates from the first half of the century. This sum more or less corresponded, in my view, to the price at that time of four *iugera* of land or of 25 or 30 hectolitres of *vin ordinaire*, or of 18 hectolitres of olive oil. The state of the *denarii* is exceptionally good; they seem to have circulated very little. Even the oldest coins (some which go back a century and a half) show little sign of use. Thus these coins were carefully selected, either when they were new or later on. The owner of the coins selected for retention the best of the coins that he received, and he avoided hoarding plated coins. The hoard is likely to be the result of

¹² J. Andreau, H. Broise, F. Catalli, L. Galeotti, and V. Jolivet, *Musarna*, i. *Les Trésors monétaires* (Rome, 2002).

a very long process, during several decades, probably between the 20s of the second century and the 80s of the first century. However, it was kept in a very ordinary jug, only just buried in shallow ground without any paving, within a small yard or rather a small makeshift warehouse. It is strange that such an amount was buried in an open space, or in a very simple structure. It presumably belonged to the owner of that space (a tradesman? a craftsman?). We may imagine that the hoard was not kept in this same place during the decades of the process of hoarding; it may have been kept elsewhere, then at some unknown date buried where it was found. Even so, it is startling that such an amount was kept in such a modest place. Sometimes quite ordinary people kept notable amounts of cash in their ordinary professional work spaces.

This material from Musarna helps us to think about some of the Pompeian finds. For instance, in the house and *caupona* where Lucius Vetutius Placidus seems to have lived (1.8.8–9), nothing extremely valuable was found: only some bronze tools and utensils, plus 1,704 bronze coins, worth about 600 sesterces. It is easy to say that bronze was the coinage of everyday life, and that such a sum of money corresponded to a single day's business of the *caupona*. But that is probably not correct, for silver too could easily be used in small transactions (one denarius equalled four sesterces); and, on the other hand, 600 sesterces is rather too large an amount, in my opinion, for the receipts of a single day. The proprietor probably had silver coins too, and took them away with him, leaving the bronze. In antiquity people who had a lot of coins often classified them by metal, separating the gold, silver, and bronze. I suggest that the coins that L. Vetutius Placidus possessed were not only bronze, and that they represented more than a single day's work.

Richer men and professional bankers often kept their money and precious objects in their houses, whether in boxes or strong-boxes (in Pompeii some examples of both kinds of containers have been found), or in cupboards (*armaria*) which were more or less reinforced with metal (some of these have been found at Pompeii). Some *armaria* were used to keep food,¹³ others contained plates and dishes or clothes.¹⁴ But reinforced cupboards, in which jewels,

¹³ Plaut. *Capt.* 919.

¹⁴ Plin. *NH* 29. 101.

money, and other precious objects were kept, were called *armaria* as well.¹⁵ Other rich men kept their valuables in particularly enclosed and protected parts of the house. Apuleius provides an example of such a room, which he calls a *horreum*; it was in the middle of the house (*mediis aedibus*) and was well protected with strong locks.¹⁶ Milo was a rich man in the Thessalian town of Hypata who practised as a pawnbroker, and kept his treasures in that room. Apuleius writes that he accepted gold and silver (that is probably goldware and silverware rather than bars or ingots) as pledges, and stored them in this *horreum*.¹⁷ A passage in the *Digest*, quoted from Q. Cervidius Scaevola, refers to such a *horreum* inside a house; but we do not know whether it was reinforced or not.¹⁸ Such safe rooms inside the house have not been identified in the Vesuvian cities, but there probably were some.

A difference between rich houses and more modest buildings (houses, shops, and workshops) is that jewels, plate, and precious objects are generally to be found only in the former. The distinction between the two categories concerns valuable objects other than money more than the coins themselves. In modest houses, one encounters such objects only when they had a professional significance. In the Pompeian house 2.9.2, for instance, gemstones were found, with tools that show that the occupant was a craftsman, a *gemmarius*.¹⁹ But in this same house there were bronze vessels, objects of everyday utility that could also constitute a modest form of savings. And then there are a few cases between the two categories. Take for instance the House of the Indian Statuette, where twenty-one bronze vessels and thirty-nine glass vessels were found, but only eight bronze coins. Or the House of Marcus Epidius Primus, which, as regards coins and precious objects, is much more 'normal' (nine silver vessels, some denarii, and some sesterces). Thus research on single houses, shops, and workshops can reveal the habits of the

¹⁵ Plaut. *Men.* 531.

¹⁶ Apul. *Met.* 3. 18. 3 ('horreum quoddam satis validis claustris obseptum obseratumque').

¹⁷ 'gazis Milonis fuerat refertum'; and see also *Met.* 1. 21. 5–6.

¹⁸ *Dig.* 8. 2. 41 (Scaev. *lib. I responsorum*). On this text see A. Wallace-Hadrill, *Houses and Society in Pompeii and Herculaneum* (Princeton, 1994), 106.

¹⁹ See e.g. A. M. Sodo, 'Regio II, insula 9', *RSP* 2 (1988), 195–202. On the activity of the *gemmarii* at Pompeii see Cerato, 'La casa 1, 11, 9–15' [n. 2].

inhabitants better, even if we cannot be definite about all the valuables the house contained.

Dozens of skeletons were found in room 10 of L. Crassius Tertius' villa in Oplontis (seventy-four in all, it appears). Some of these persons carried not inconsiderable amounts of money with them; the total, for the whole group, comes to more than 18,000 sesterces. It is not likely that all these people actually lived in the villa; if they did, some of them were very probably engaged in some activity outside it. Such was most likely the case of a woman (skeleton 7) who wore a single piece of jewellery, a silver bracelet, but carried 409 bronze, silver, and gold coins (that is more than 1,000 sesterces in all) in a bag made of linen. Some of these coins correspond to the coins circulating in AD 79; others show that there had been a process of 'hoarding' (for instance, there were 110 republican denarii). V. Castiglione Morelli has very sensibly concluded that this woman was a merchant or shopkeeper, or in any case a woman who had a professional activity outside the villa.²⁰ Several skeletons from room 10 carried relatively important amounts of money: fifty-five gold coins were found near skeleton 9, one hundred gold coins in a box near skeleton 27, and about 1,340 sesterces near skeleton 12. According to Castiglione Morelli, the reason is that we are in a villa: she argues that a villa's economic activities required the presence of large quantities of cash. I am not convinced by this idea: generally speaking, villas have not yielded more coins than town sites, quite the contrary.

In Pompeii and Herculaneum we have very few good examples of coin 'hoards' belonging to rich men, probably for one of the reasons that have already been stated. However, there is the Casa del Menandro, where 118 pieces of silver plate, gold jewels, thirteen *aurei*, and thirty-three denarii were found in one single box. Compared to the importance of the silver plate and the jewels, the value of these coins is quite low. There is the Boscoreale hoard too, which I shall address in the last part of this chapter.

A. Héron de Villefosse stressed the fact that the jewellery at Pompeii was of poor quality compared to the silver plate; he wrote that most of the Pompeian women's jewels were of very little value. He thought that even the jewellery found in the Boscoreale villa was

²⁰ Castiglione Morelli, 'Un gruzzolo' [n. 4].

no exception to this rule.²¹ If he was right (and his opinion has never, I think, been disputed or refuted), there is a gap, in the rich houses themselves, between the silver plate and the gold and silver jewellery.

If the number of coins found in Vesuvian cities seems rather restricted, especially in the richest houses, there may be another reason: the season of the year at the time of the eruption. Wine could begin to be sold in April, and olive oil was ready to be sold right at the beginning of the year; the sheep were sheared in spring, about the month of May. Some payments were spread out over the whole year, but others were probably made in full, and only once. The vintage could be sold before it had been picked, which probably permitted the owner to receive the money earlier. The text of Pliny's letter which provides us the date of the eruption is dubious. The text gives 'the ninth day before the kalends of September' (that is 24 August), and this was never questioned until recently.²² Now, however, M. Borgongino and G. Stefani have argued that the presence of certain kinds of fruit at Pompeii is incompatible with that season of the year; instead of 24 August, they have proposed 24 October, which is not philologically impossible.²³ If the eruption of Vesuvius took place in October, as they argued, this date could explain the relatively restricted number of coin finds. For in the seasonal chronology of the various crops, the last three months of the year, if one compares them to the first half of the year, seem to be a slack period as regards payments and revenue. If the eruption took place in August, the seasonal explanation is much more doubtful. In any case, the evidence has not so far enabled us to detect the influence of the various harvests on the quantity of coins discovered.

Outside their houses, the Romans sometimes kept a part of their property in warehouses (*horrea*), where they could lease rooms or cupboards or drawers or boxes, as inscriptions show. Such warehouses have never been identified at Pompeii, though some rooms in the building at Murécine which was excavated more than a century ago in the 'fondo Valiante' may have been for warehousing. Not far

²¹ A. Héron de Villefosse, *L'Argenterie et les bijoux d'or du trésor de Boscoreale* (Paris, 1903), 181–5.

²² Plin. *Ep.* 6. 16. 4.

²³ M. Borgongino and G. Stefani, 'Intorno alla data dell'eruzione del 79 d. C.', *RSP* 12–13 (2001–2), 177–215.

from there, in the Casa dei Triclinii, where the archive of the Sulpicii was found in 1959, there does not seem to have been a warehouse. But warehouses certainly existed in those localities, not far from the harbour on the Sarno river. If they are excavated some day, it will be interesting to see whether they contain coin hoards or not.

And what about banks? What should we think about the possible bank accounts of the Pompeians? As everyone knows, Lucius Caecilius Iucundus' tablets are receipts of auctions: Iucundus, who was a deposit-banker, was in the custom of paying the seller, and then collecting the amount of the price from the buyer. The receipts were issued by the sellers, to testify that they had been paid by Iucundus. So the tablets have no direct connection with bank accounts. After studying them, however, I wondered whether it might be possible to use them to get some idea of the accounts the sellers had with Iucundus' bank. Several verbs are used in the tablets to mean that the seller had received the sums due to them. Thus we encounter *accepisse*, *persoluta habere*, *numeratos* or *numerata habere*, *soluta habere*. Sometimes different verbs are used in the two versions of the same receipt, versions which since Zangemeister's edition of the tablets have usually been called *scriptura interior* and *scriptura exterior*. But it so happens that *persolvere* and *numerare* are never both used in the same document. Now it is beyond doubt that *numerare* means 'to pay in cash', with coins. I concluded that *persolvere*, 'to pay through an intermediary', was employed whenever it was not possible to use *numerare*, because the amount had been paid into the seller's bank account.²⁴

Some sixty of the Iucundus tablets bear the word *perscriptio* on their edges, which indicates the nature of the document. It has sometimes been thought that in the Iucundus tablets this word means a credit transfer into a bank account; but that is not so. For in some of these *perscriptiones*, one reads the verb *numerare*, and *numerare* necessarily applies to a payment in cash.²⁵ Not all the amounts that Iucundus paid because of auctions were transferred

²⁴ J. Andreau, *Vie financière dans le monde romain. Les métiers de manieurs d'argent (IVe siècle av. J.-C.-IIIe siècle apr. J.-C.)* (Rome, 1987), 574–5.

²⁵ This is the case at least in tablets 17, 29, 32, 48, and 72; there are some other probable or dubious cases.

into bank accounts. As *perscriptio* applies both to a payment which is accompanied by a written document and to this written document itself, in several texts it refers to a deposit into a bank account or to a credit transfer, but such is not the case in the Iucundus tablets.²⁶ When there is a transfer, the words that are used in these documents are *persolvere* and *persolutio*.

If this is so, twelve sellers mentioned in the tablets had accounts with Iucundus' bank.²⁷ It is interesting to notice that, among those sellers, five were women, and that the amounts concerned are larger on average than the usual sums that appear in the Iucundus tablets: their average is 7,024 sesterces, by comparison with 5,767 sesterces for the tablets as a whole; and their median is 6,875 sesterces as against 3,059. So, very probably, if one possessed a bank account and made deposits into it, it was partly to do with fear—the fear of carrying large amounts of money, especially in the case of a woman. On the other hand, the tablets in which we can definitely read the verb *numerare* also number twelve.²⁸ Only one woman, Caesia Optata (Tablet 29) is found among the sellers in these cases, and the median of the amounts that are known from these tablets is only 1,742.5 sesterces.²⁹

This analysis is, of course, based on a very limited amount of evidence, for of the 137 documents in Iucundus' archives that concern auctions, many are incomplete. The inscription on the edge (in which *perscriptio* is often written) is more frequently preserved than the first version of the text, the *scriptura interior*. Moreover we must not forget that this evidence dates back to the 50s, and not to the last

²⁶ Andreau, *Vie financière* [n. 24], 568–83; and id., *Banking and Business in the Roman World* (Cambridge, 1999), 39–46.

²⁷ Tablets 12, 15, 22, 25, 26, 27, 28, 32, 35, 40, 43, 58. To those twelve certain cases may be added six other tablets in which the presence of *persolvere* is not certain, or where the word *solvere* is employed (11, 38, 46, 49, 62, 69).

²⁸ Tablets 1, 5, 7, 10, 13, 14, 17, 29, 31, 47, 48, 72. We may add four other tablets in which the presence of *numerare* is not certain (2, 57, 59, 66).

²⁹ According to my argumentation, the amounts should be smaller when the money is paid in cash than when it is transferred into a bank account. In fact the average of the six sums that are known with the verb *numerare* is very high (7,718.75 sesterces), but this is because of one particularly large payment (38,079 sesterces in Tablet 10). If we do not take this payment into account, the average is only 1,646.7 sesterces (as against 3,059 for all the known sums). This is a case in which the median is far more significant than the arithmetic average.

years of the city. In my view, however, it shows that it was not at all exceptional at Pompeii, at least for people who were reasonably prosperous, to have an account with a banker. This fact has to be taken into account when we evaluate the presence of coins in the houses that have been excavated. If some of the inhabitants deposited money in banks, the coins to be found in their homes obviously did not constitute the whole of their assets. Unfortunately, we do not know whether Lucundus was the only banker in Pompeii or not; nor do we even know for sure that there was still a banker at Pompeii in the year 79.

In the Lucundus tablets, no pledges or securities for loans are ever mentioned, but when he lent money, Lucundus must surely have required them, at least in some cases. He needed a lot of space to store his documents, and space to keep both his clients' deposits and anything that he had accepted as a security for a loan, and perhaps also precious objects deposited by his customers. Where was all this kept? In his own house, where in fact a safe was found?³⁰ Or did Lucundus own or lease spaces or appropriate containers in warehouses? At least one passage in the *Digest* mentions a banker who kept his professional documents in warehouses.³¹

Several literary texts allude to gold or silver that has not been turned into coin, jewellery, plate, or other usable objects. This is what Latins called *argentum infectum* or *aurum infectum*. Such precious metals took the form of ingots or bars (*lateres*), or perhaps in some cases irregular, crudely cut lumps (*masses*). But in all the Latin texts that refer clearly to such *infectum* gold or silver, the metal belonged to the Roman Treasury or to other official treasuries. This applies, for instance, to the references in Livy to the booty acquired by Rome in the early second century BC.³² When Livy mentions the various components of such booty, he several times makes a clear distinction between the *argentum infectum* (in ingots or bars), the *argentum factum* (in silver objects) and the *argentum signatum* (in coins).³³

³⁰ On this house see now Dentamaro, 'Pompei, Casa' [n. 2]. Among other things, she speaks of an upper floor at the rear of the house which could have been used as a warehouse (the roof of this upper floor was so low, apparently, that the space was not habitable).

³¹ *Dig.* 2. 13. 6 *pr.* (Ulp.).

³² Liv. 36. 40. 12–13.

³³ Liv. 34. 52. 4; see also Liv. 34. 10. 4 and 7.

In other passages, he distinguishes between, on the one hand, the *pondus auri* and the *pondus argenti* (that is gold and silver that has not been coined, which is measured by its weight) and on the other hand the *signatum* (that is, the coined silver).³⁴ When Pliny the Elder specifies the quantities of precious metal Caesar found in the *aerarium* when he got to Rome in 49 BC, at the beginning of the civil war (15,000 ingots of gold, *lateres aurei*, 30,000 ingots of silver, 30,000,000 sesterces in coins, *in numerato*), this was of course gold and silver that belonged to the Treasury of the state, just as in Livy.³⁵

In other cases we cannot be sure whether the text refers to precious metals that were 'infected' or to gold and silver that had been converted into coins or jewellery or plate. In Cicero's *Pro Cluentio*, for instance, we hear of a doctor, Strato, who is said to have stolen five pounds of gold from a strong cupboard in the house of Sassia.³⁶ Cicero does not say what form this gold took. It was not in coins, but it could have been either in bars or manufactured objects. We are in the same state of uncertainty when Cicero speaks of the gold that Clodia took out of her cupboard (*armarium*) to lend to Caelius; he may have had coins in mind, but we cannot be sure.³⁷ And when Caesar mentions the levy that M. Terentius Varro exacted in 49 from the Roman citizens living in the province of Hispania Ulterior (18,000,000 sesterces, 20,000 pounds of silver, and 120,000 *modii* of corn), the situation is similar.³⁸ The silver was not made up of coins, since Caesar had already spoken of sesterces in the same sentence, but it is not possible to be sure whether the silver consisted of manufactured objects, bars of crude metal, or both.

Coming nearer to Pompeii, we should note the same situation in the Murécine Tablet *TPSulp* 55. On 3 March, AD 49, in Puteoli, P. Verginius Ampliatus borrowed 5,000 sesterces, and he deposited as security an unknown number of pounds of silver (certainly more than ten)—which he refers to as silver 'quod est signo meo signatum' (which is sealed with my seal).³⁹ According to Giuseppe Camodeca,

³⁴ Liv. 31. 20. 7; 33. 27. 2–4; 36. 40. 12–13. ³⁵ Plin. *NH* 33. 56; see also 33. 51.

³⁶ Cic. *Cluent.* 179 ('nummorum aliquantum et auri; auri quinque pondo').

³⁷ Cic. *Cael.* 52.

³⁸ Caes. *BC* 2. 18. 4.

³⁹ G. Camodeca, 'Per una riedizione dell'archivio puteolano dei Sulpicii', *Puteoli* 9–10 (1985–6), 3–40; and *Tabulae Pompeianae Sulpiciorum* (Rome, 1999), i. 144–6.

the silver would have been in a bag, which would have been sealed with Ampliatius' seal. If so, this very probably means that it was silver plate measured by weight, rather than ingots of rough metal.

Does this mean that private persons never possessed gold and silver bars or ingots? No, it does not. On the contrary, in the *Digest* one finds several texts in which it is clear that private persons were in possession of a number of such bars.⁴⁰ These passages are particularly concerned with legacies. But very probably people used to keep manufactured gold and silverware more often than bars or ingots. This may partly explain why no bar or ingot has ever been found in Pompeii. But one cannot exclude the possibility that in a Roman city as rich as Pompeii such bars were kept in some houses or warehouses of a certain size and wealth. If they were, it means that their owners took them away when they left Pompeii in 79.

Coins have been found on or close by cadavers more often than have silver and artefacts, and such artefacts often consisted simply of the jewellery that the dead man or woman was wearing: rings, earrings, bracelets, chains, and necklaces. Some of the dead were carrying large sums of money. In room 10 of Oplontis villa B, a woman (skeleton 27) was carrying *aurei* and *denarii* in a small box: the value of her coins amounted to 11,000 sesterces. Another woman (skeleton 9) was carrying 5,500 sesterces, and another had 1,000 sesterces in a small bag made of cloth. In houses, the opposite tends to be the case: there, on average, the manufactured silver and gold objects are more numerous than coins. However, as I have already said, we probably only have a small part of all the gold and silverware that was usually kept in the city during the 50s and at the beginning of the 60s, before the first earthquake.

There is no evidence that the inhabitants of the Vesuvian cities ever made payments by means of objects made of gold or silver. But we know that gold and silver plate was often sold by weight, or at least that the weight had great importance in the prices that were put on it. In the Vesuvian cities, just as elsewhere, some such pieces bear inscriptions mentioning their weight. It is clear that, apart from their utility in everyday life, gold and silver items counted as stores

⁴⁰ For instance, *Dig.* 34. 2. 19 (Ulp. *lib.* XX *ad Sab.*) and 34. 2. 27. 4 (Ulp. *lib.* XLIV *ad Sab.*).

of value, and they could be used as security when one wanted to borrow money, as is the case in the Murécine Tablet 55 referred to previously. Some scholars think that women's dowries often did not include much land, and that they inherited comparatively less land than their brothers—though that is not certain. At all events, some of the manufactured silver and gold objects that have survived were probably parts of dowries.

On that topic, some passages of the *Digest* are especially interesting, because they show that the *paterfamilias* had to establish a clear distinction between two kinds of silver- and goldware: pieces that were a part of the silver and gold store of savings, and those which could be used in everyday life as household goods or as jewellery. Such a distinction confirms that manufactured gold and silver objects could be counted as stores of value that was divided from the rest and not used. The decision of the owner could be explicitly written down, but, in a number of cases, he showed what he meant by putting some of the precious-metal objects in a special place, in a specific cupboard for instance, which one juridical texts calls an *argentarium*.⁴¹ What was kept in this place was kept apart from the household goods and also from the wife's jewellery. It was a reserve of savings. At his death, a father could give legacies out of this reserve, which was independent of the rest of the house's contents.

When one looks carefully at the silver- and goldware that has been found in the Vesuvian cities, it is possible to identify boxes or cupboards containing such reserves of savings. They contain both coins and manufactured objects, as was the case with Sassia's *armarium* in the *Pro Cluentio*. I cite three examples: first, the big box and the small casket in the Casa del Menandro; second, the box containing goldware that was found in the villa of L. Crassius Tertius (Villa B at Oplontis): in that box, made of wood, which was probably kept on the upper floor, there were six gold rings, three other rings, two pairs of earrings, a bracelet, and coins worth 1,000 sesterces.⁴² The third example is the Boscoreale villa. There, only a few objects were kept in a cupboard. When the eruption occurred, the rest of the silver hoard,

⁴¹ *Dig.* 34. 2. 19. 8 (Ulp. *lib. XX ad Sab.*). See Andreau, *Vie financière* [n. 24], 81–2.

⁴² A. D'Ambrosio, 'Oplontis, Attività dell'Ufficio Scavi: 1984–1985', *RSP* 1 (1987), 172–6; and Castiglione Morelli, 'Un gruzzolo' [n. 4].

the most beautiful we know from this period (together with the one from the Casa del Menandro and the one from Hildesheim), was probably put in a safe place, a cistern, with jewels and coins. But this hoard was composed of two separate parts: on the one hand, a collection of top-quality silver plate, which had been collected over several generations from the beginning of Christian era to the reigns of Nero and Vespasian; on the other hand, a less valuable set of silver plate for eating and drinking. So in this case, too, there had been a process of hoarding, and a distinction has been established between the store of savings and the vessels that were usually employed in the house.⁴³

In some less rich houses, however, all the valuables of the family were kept together in the same place. It seems that there was no distinction between the ordinary objects in common use and the savings reserve, the savings store.⁴⁴ In such houses there were cupboards or chests, containing lots of different things made of various materials, all mixed up together, which were used in ordinary life. In house 5.4.3, for example, in a room not far from the *atrium*, two small cupboards contained coins (worth 500 sesterces), but also a spoon, some small bronze vases and glass vases, three glass cups, nine bottles, an Arretine cup, and various other things.⁴⁵ In the Casa della Venere in Bikini (1.11.6–7), two gold rings and two gold bracelets were found in a chest (*arca*), together with many bronze objects which were used in everyday life.⁴⁶

We will never know how much money and how much gold and silver there was in Pompeii and Herculaneum in 62, before the first earthquake, or how much there was in 79, before the eruption. But, if we compare the available evidence of the Vesuvian cities with information from other regions and cities and with what the ancient texts say, we can understand better how the inhabitants lived, and thus

⁴³ Héron de Villefosse, *L'Argenterie et les bijoux* [n. 21]; F. Baratte, *Musée du Louvre, L'Argenterie romaine* (Paris, 1976).

⁴⁴ In *Vie financière* [n. 24], 81 n. 82, I wrote that on average modest families probably used their silver objects less than the rich ones, and that they kept them as a store of value rather than to employ them in everyday life. I am no longer convinced by this idea, which I had taken from the earlier scholarship.

⁴⁵ A. Sogliano, 'Pompei, Relazione degli scavi fatti durante il mese di maggio 1899', *Notizie degli Scavi* (1899), 203–8.

⁴⁶ Mileti, 'La Casa 1, 11, 6–7 a Pompei' [n. 2].

what role money and precious metals played in their lives. In Graeco-Roman antiquity, coins were by far the commonest means of payment, but in the cities where there were bankers, we should not forget bank accounts. And coinage is not the only way to keep valuables. The evidence from the Vesuvian cities shows that we must recognize the importance of jewellery and precious metals, of gold and silver jewels, and of silver plate.

Money and Credit in Roman Egypt

Peter van Minnen

The textual evidence for Egypt is unique for the Roman Empire. Papyrus documents allow us to trace developments in the economy over time. One problem is that papyrologists have not yet digested the information in such a way that economic historians can take it from there. Another problem is that there are major gaps in what the documents tell us. Finally, in the interpretation of the findings we cannot avoid making assumptions about the nature of the Egyptian economy in the Roman period. In what follows, I will first look at some general trends and then focus on trends in agriculture before going into investment.

1. MONEY, PRICES, AND INFLATION

The development of prices in Roman Egypt illustrates general economic trends and provides the chronological framework for what follows. First comes the revaluation of the Egyptian *tetradrachma* down to one denarius under Tiberius/Claudius¹ (making the Egyptian drachma equivalent to one sestertius), which raised prices in Egypt considerably but did not affect the economy much. Next comes the doubling of prices in Egypt in the period AD 160–90,

¹ For this see E. Göltzner, *Entstehung und Entwicklung des alexandrinischen Münzwesens von 30 v. Chr. bis zum Ende der julisch-claudischen Dynastie* (Berlin, 2004).

somehow caused by the Antonine Plague, but again without affecting the economy much. Then comes the sustained inflation from 275 onwards, which more or less ruined the economy.² In the next decades, production and population must have dropped dramatically. The Egyptian economy did not really recover until the proliferation of *solidi* in the 360s.³ This parallel gold currency allowed prices in accounting units (denarii) to continue to rise, whereas prices in gold (and in bronze coins)⁴ actually declined somewhat over time. 'Real' prices for wheat in Egypt dropped between the fourth and the sixth centuries. Because the money supply increased rather than declined in the same period, the drop in prices points to a considerable increase in the production of wheat (but not to pre-275 levels). It will have been the same for other goods, for which we have less reliable series of prices.⁵

We still have to do the maths on the inflation from 275 onwards. If prices in Egypt expressed in a particular bronze coin rose 48 times in the period from 274 to 295 and 1,000 times between 295 and 352, the shorter first period and not the longer second period is the one that experienced greater inflation,⁶ for the annual rate of inflation in the first period is higher. That in the second period is still high, but not as high as the Annual Percentage Rate on credit card debts! If the APR is 18 per cent, a credit card debt of \$1 increases to one of \$48 in about

² G. Depeyrot, 'Economy and Society', in N. Lenski (ed.), *The Cambridge Companion to the Age of Constantine* (Cambridge, 2006), 226–52 at 234, assumes that the inflationary crisis started earlier, in the third decade of the third century, and that by about 275 a beginning was made to solve it, but at least for Egypt there is no evidence for an inflationary crisis before 275. Perhaps, in 275, Egypt was dragged down by the collapse elsewhere.

³ J.-M. Carrié, 'Aspects concrets de la vie monétaire en province', *RN* 159 (2003), 175–203 at 185 n. 26, offers rather thin evidence for the idea that soldiers in Egypt had more *solidi* in their hands from the 350s onwards, but in general the increase in the number of *solidi* is numismatically undisputable. Also note that *solidi* were used for taxation purposes from the 370s onwards.

⁴ C. Zuckerman, *Du village à l'empire. Autour du registre fiscal d'Aphroditô (525/526)* (Paris, 2004), has shown that bronze coins, which were evaluated by weight, were revaluated over time as against *solidi*, plainly because of the massive supply of the latter.

⁵ The evidence for prices is set out in D. Rathbone, 'Prices and Price-formation in Roman Egypt', in *FPF* 183–244, and R. S. Bagnall, *Currency and Inflation in Fourth Century Egypt* (Chico, Calif., 1985), with addenda in *P. Kellis* 4.

⁶ *Contra* J.-M. Carrié, in J.-M. Carrié and A. Rousselle, *L'Empire romain en mutation des Sévères à Constantin* (Paris, 1999), 568.

twenty-one years (comparable to what happened to prices in the period 274–95) and to one of \$1,000 in about thirty-eight years (whereas it took fifty-seven years for a similar price increase to occur in the period 295–352). After this, inflation in terms of the denarius was much reduced though it continued steadily into the sixth century. None of this affected the new gold currency. Constantine set out to base the Empire's monetary system on gold, and his successors successfully implemented the change. Although they did not stop inflation (and even gave it a boost after 352/3 by the revaluation of the *solidus* by a factor of 40–50 against the denarius), it did slow down over time. After Julian, inflation was in fact negligible.

These developments affected the different 'actors' in the economy differently.

The state lost considerable income after 160–90, because money taxes were not indexed properly, and money taxes made up the bulk of the state's income in Egypt. After 275, the state lost almost all its income, even taxes in kind, because production dropped significantly. A couple of decades later, the state restored its income by taxing landowners more aggressively than ever before.

Egyptian landowners, big and small, had a relatively hard time in Late Antiquity, because their land was taxed more heavily, and also because prices for their produce dropped between the fourth and the sixth centuries. Big landowners could survive only by acquiring more land or by investing in cash crops such as wine, but this would not have been easy when their income was dropping.

Ordinary inhabitants of the cities in Roman Egypt needed to buy food. After 160–90, their life became easier, because money taxes were not indexed properly. After 275, they died in large numbers, because wheat prices soared. Expressed in gold, wheat prices rose 30–60 per cent higher in the first half of the fourth century than the prices that prevailed during the first two centuries of Roman rule. Between the fourth and the sixth centuries, however, life in the cities improved because wheat prices dropped. In the fifth and sixth centuries wheat even cost a little less than it had cost in the first two centuries, presumably because population levels did not return to what they had been in the early Roman period.

The inhabitants of the cities who depended on wages were better off in the third century than before, because the Antonine Plague had

made their labour more valuable. After 275 they too died in large numbers. Once the urban economy got back on its feet, however, their wages went back to a fairly high level.

To get back to the state: how much did it extract from the Egyptian economy in the first century—and how did this level of extraction develop over time? To estimate the approximate size of the Egyptian economy in about the middle of the first century would require a lengthy discussion. As to the size of Rome's bite, we cannot go beyond an informed guess. Instead of using a 'conservative' bite of 10 per cent; (a higher level than is known in any other pre-modern state), I think we have to assume a considerably bigger bite for Egypt, say 20 per cent.

We can state more confidently how this figure is likely to have changed, which may be more important than agreeing on an exact figure. Money taxes were not indexed for inflation. After 160–90, therefore, the bite taken out of the Egyptian economy by Rome would have decreased, chiefly because money taxes constituted the bulk of the state's income. Taxes on land increased only from the fourth century onwards. Early on, taxes on land were relatively low, but by the sixth century the state derived more income from land than from all other sources combined, a significant change over against the earlier Roman period. Rome's total bite may again have been about 20 per cent, but different people, mainly landowners, were now feeling it.

2. MONEY, AGRICULTURE, AND TAXATION

Trends in agricultural production can be traced with the help of over 1,000 published land leases—the number is growing every day. If we limit ourselves here to land leases from Hermopolis,⁷ we get the breakdown by centuries at Table 11.1. I distinguish leases that specify a rent exclusively in kind, those that specify a mixed rent, and those

⁷ Two hundred and forty-two leases with usable evidence. Note that G. Mickwitz, *Geld und Wirtschaft im römischen Reich des vierten Jahrhunderts n. Chr.* (Helsinki, 1932), 120, in making a similar point, had only slightly more leases (301) at his disposal for all of Roman Egypt.

TABLE 11.1. *Land leases from Hermopolis*

	Century						
	1st	2nd	3rd	4th	5th	6th	7th
Rent in kind	7	21	4	30	19	34	21
Mixed	3	9	7	5	2	3	3
Rent in money	—	14	5	9	11	21	14
All	10	44	16	44	32	58	38
Of which money/mixed)	3	23	12	14	13	24	17
% money/mixed	30	50	75	30	40	40	45

that specify a rent exclusively in money (at the bottom, I have calculated the two kinds of leases involving money as a percentage of the total).

Assuming (or predicting: I am making a 'scientific' statement that is open to falsification) that data from other places in Egypt (mainly Heracleopolis, Oxyrhynchus, and the Arsinoite nome) will confirm the trend indicated here, we can conclude that there was increasing monetization of the agrarian economy between the first and the third centuries, a significant reduction in the monetized agrarian economy after 275, and a gradual remonetization of the agrarian economy from the fourth century onwards with the introduction of the *solidus*.⁸ The evidence for the first and third centuries is not (yet) as good as we would like it to be.

Long-term trends in agricultural production are representative of overall trends in productivity (implying similar trends in the size of the population as well). The Egyptian economy was, of course, to a large extent based on agriculture. Arable land was by far the most important kind, and the most important form of agriculture on arable land was growing wheat. Of all kinds of land, easily the most common in the Roman period was privately owned land. Leases for privately owned land grown with wheat constitute almost half of all leases. In these leases, the rent is usually specified as a fixed amount, not a share.

As a general rule, high productivity, prosperous tenants, and high rents go hand in hand in an agrarian economy, and so do low productivity, poor tenants, and low rents. To see how this worked

⁸ We do not have to limit the effect of the introduction of the *solidus* to those on the receiving end (the new bureaucratic elite), with J. Banaji, *Agrarian Change in Late Antiquity: Gold, Labour, and Aristocratic Dominance* (Oxford, 2001).

out in Roman Egypt, we can again draw on the evidence provided by the over 1,000 published leases. The best evidence comes from Her-mopolis, Heracleopolis, and Oxyrhynchus. Starting in the third century, leases from troubled villages in the Arsinoite nome skew the data so much that I have refrained from including their evidence altogether. In a previous contribution,⁹ I presented five easy steps to help understand the Egyptian agrarian economy in the light of the evidence of the leases just mentioned. I update these steps in what follows.

Naturally, not all of these more than 1,000 published leases contain usable data. The statistical basis is therefore still rather shaky, but it may be useful to point out here that the ‘scatter’ of data for the first two centuries is not very big, whereas that for the later Roman period is much more worrisome. We do not have to conclude that the figures for the later Roman period are statistically unusable, but it is true that economic integration was much higher in the first two centuries, and this brought rents all over Egypt much closer together than was the case in the fifth and sixth centuries.

Step 1 The fixed amount of rent per surface unit for the owner of private arable land grown with wheat (derived from leases):

	Period in centuries			
	1st–2nd	3rd	4th	5th–6th
Rent in <i>artabas</i>	8	6.25	4.5	5.5

Step 2 The amount kept by the tenant of such land (extrapolated from step 1):

	Period in centuries			
	1st–2nd	3rd	4th	5th–6th
Tenant’s share in <i>artabas</i>	7	6.25	4.5	5.5
Share as %	<50	50	50	50

NB: I am assuming that population pressure in the first two centuries pushed the rent over the traditional 50 per cent, so that the tenant got

⁹ P. van Minnen, ‘The Changing World of the Cities of Later Roman Egypt’, in J.-U. Krause and C. Witschel (eds.), *Die Stadt in der Spätantike—Niedergang oder Wandel?* (Stuttgart, 2006), 153–79 at 173–5.

to keep a bit less than the owner.¹⁰ Rent, however, cannot have been *much* more than the traditional 50 per cent.

Step 3 The total product on such land (steps 1 and 2 combined):

	Period in centuries			
	1st–2nd	3rd	4th	5th–6th
Total product in <i>artabas</i>	15	12.5	9	11

Step 4 The taxes on such land (derived from tax accounts):¹¹

	Period: in centuries				in years	
	1st–2nd	3rd	4th	5th–6th	>± 537	>550
Tax in <i>artabas</i>	1.25	1.25	1.75	2.75	3.25	3.75
% of step 3	8.33	10	19.45	25	29.55	34.1

Step 5a The net amount the owner kept after taxes (step 1 minus 4):

	Period: in centuries				in years	
	1st–2nd	3rd	4th	5th–6th	>± 537	>550
Amount in <i>artabas</i>	6.75	5	2.75	2.75	2.25	1.75
% of step 3	45	40	30.55	25	20.45	15.9

Step 5b The net amount the owner kept after taxes if he worked on his own land (step 3 minus 4):

	Period in centuries				in years	
	1st–2nd	3rd	4th	5th–6th	>± 537	>550
Amount in <i>artabas</i>	13.75	11.25	7.25	8.25	7.75	7.25
% of step 3	91.67	90	80.55	75	70.45	65.9

¹⁰ From the fourth century onwards leases for sharecropping confirm the 50 per cent figure, but we do not have such evidence for the earlier centuries.

¹¹ The essential data can be found in R. S. Bagnall, 'Agricultural Productivity and Taxation in Later Roman Egypt', *Transactions of the American Philological Association* 115 (1985), 289–308. He calculates a higher figure for the fourth century, 2.1–2.6 *artabas*, but this is based on money taxes on arable land, which are still insufficiently

If we look at the decline in production from the first two centuries to the third, implied by step 3 (from 15 to 12.5 *artabas*), we notice that the drop (2.5 *artabas*) affected the tenant (0.75 *artaba* according to step 2) less than the owner (1.75 *artaba* according to step 1), because the Antonine Plague eliminated the population pressure that had pushed the rent a bit over the traditional 50 per cent in the first two centuries. If we next look at the decline from the third to the fourth century implied by step 3 (from 12.5 to 9 *artabas*), we notice that the drop (3.5 *artabas*) affected the tenant and the owner equally. But we also notice that the owner lost an extra 0.5 *artaba* in taxes (step 4). If we look at the recovery from the fourth to the sixth century implied by step 3 (from 9 to 11 *artabas*), we notice that the tenant got one of the two extra *artabas* (step 2). So did the owner (step 1), but step 4 shows that he had to hand that extra *artaba* (and more) over to the state as additional taxes on land. The recovery from the fourth to the sixth century inclusive benefited the tenant and the state, not the owner. If we finally compare the overall drop for the owner, from 45 per cent to just over 15 per cent of the yield (step 5a), with that for the owner if he worked on his own land, from 90 to a little over 65 per cent (step 5b), we also see that the owner who rented out his land took the biggest hit. Social arithmetic¹² at work!

According to step 4, the state increased its bite from less than 10 per cent to almost 35 per cent. This shows that the state exercised more power over landowners in Late Antiquity than earlier on, and that it even consolidated its power between the fourth century and the reign of Justinian. Traditionally, Late Antiquity has been regarded as a period in which big landowners got the better of the state. This view is untenable. The recovery between the fourth and

known for the fourth century. If the average charge on arable land in the fourth century was 2.25 *artabas* instead of the conservative 1.75 *artabas* I have used in the text, this would account for 25 per cent (up from 19.45 per cent) of the total product, and the owner would have managed to keep only 25 per cent (down from 30.55 per cent) for himself. The owner who worked on his own land would have kept only 75 per cent (down from 80.55 per cent). See now also Zuckerman, *Du village à l'empire* [n. 4], 215, for the increases in Justinian's reign included in steps 4, 5a, and 5b in the text. The increases were all in the money taxes on arable land, in the basic tax in kind.

¹² The term used by J.-M. Carrié, 'L'Arithmétique sociale de l'économie agraire. Prix de la terre, rente foncière et prix des céréales dans l'Égypte romano-byzantine,' in *PPF* 121–46, who arrived at similar conclusions.

the sixth century was split between the tenant and the state. The big landowners did not benefit, and under Justinian they even had to pay more taxes on their land.

3. MONEY AND INVESTMENT

Direct information about investment, in land or otherwise, comes mainly from sale documents. These rarely tell us where the buyers got their money. As an alternative we can approach investment, not directly through sales, but indirectly through loans. Who had the money to float loans? Who needed to borrow money to make investments?¹³

In the early Roman period, farmers who worked on their own land obtained a modest income by selling their surplus. After 160–90, their income rose because it became easier for them to pay money taxes, which were not indexed properly. Over time, such farmers would have been able to make more investments in additional land or in improving the infrastructure on the land they already owned. In the early fourth century, such farmers made more money because of high wheat prices, but now they also paid more in taxes. Between that time and the reign of Justinian, they lost income because wheat prices dropped and taxes rose. Their ability to invest would have been impaired. Earlier on, their rising incomes would have made them ever more likely candidates for borrowing additional money to make even bigger investments.

Big landowners in the cities made lots of money in the early Roman period and paid relatively little in the way of taxes. Their extra funds were available for investment. Much of this money was spent on enhancing the cities (they did not wait until the official ‘municipalization’ after 201). Anything left over would have been available to them to invest. They could have done this by directly investing in land, either buying more land or improving the infrastructure on land they already owned. But the easiest and commonest

¹³ As a curiosity: in the Late Period wisdom text *P. Brit. Mus.* 2 col. 16. 9–12 the advice is given to borrow money at interest only to invest in land, take a wife, or celebrate one’s birthday, but not to ‘live well on it’ all the time (for as long as it lasts).

way for them to invest was by lending the money to others. By the third century, however, these big landowners had seen their income from agriculture decline (because rents dropped after the Antonine Plague); they were barely able to keep up appearances in the cities, and they would not have been able to make investments other than by floating the occasional loan to those who had increasing reason to invest (the farmers of the previous paragraph). After 275, they could no longer even keep up appearances in town. By the fourth century conditions gradually improved, but higher taxes and a further drop in rents cancelled the effect of higher wheat prices for big landowners. Taxes increased between the fourth century and the reign of Justinian, while wheat prices and therefore the income of big landowners fell.

Ordinary inhabitants of Egyptian cities absorbed some of the surplus income of big landowners in the earlier Roman period. After 275, they suffered most from the inflation and the relatively high wheat prices. After the introduction of the *solidus* in the fourth century, their life improved as prices dropped over time.

Now that we have impressionistically established who had and who needed money, we can consider the interest rate on loans. The usual interest rate quoted in loans of the Roman period was 12 per cent p.a., the official maximum for loans of money (loans in kind usually fetched 50 per cent interest irrespective of their duration). At this rate of interest, those with extra money on hand felt no need to invest it in land (which yielded at most a 10 per cent return on investment, often less). How important then was interest in relation to other potential sources of income, such as land? The aggregate volume of loans outstanding at any given time may have been far from negligible in comparison with the value of landed property. This is extremely difficult to establish, however: money assets were never registered for taxation purposes the way land was. But some examples may give us at least an idea. A papyrus from Oxyrhynchus (*P. Oxy.* 49. 3508) shows that a candidate for a minor liturgical office in AD 70 had assets to the value of 23,500 drachmas. Only 8,500 of these were in land he owned (23 *arourai*, 8 of which ultimately derived from an overdue loan). The rest, 15,000 drachmas, was still out with debtors, who had put their own land up as security—that is why their value was included in the creditor's assets. He may have

had more money out in loans without such security. To get a sense of how much, we can take a look at another text from Oxyrhynchus (*P. Erl.* 94). It concerns the debts of one man to another in the second century:

at 10%	on land	10,400 dr.
	on other security	3,400 dr.
	total	13,800 dr.
	annual interest	1,380 dr.
at 12%	on building lots	
	on a slave	
	total	7,200 dr.
	annual interest	864 dr.

Both men may have had credit relationships with others as well. Suffice it to remark here that slightly less than half the security put up was land. Urban property, slaves, and other forms of security accounted for the rest. The reminder that land was not everything people owned in Egypt may be useful.

The biggest loan from the earlier Roman period is recorded in a text found in Oxyrhynchus (*P. Oxy.* 27. 2471, of the middle of the first century) but concerned with debts contracted in Alexandria. I include a translation in the appendix. The principal, 13 talents or 78,000 drachmas, would have weighed more than 250 kg. Clearly a paper transaction was behind this loan. The text cancels the loan, which had been repaid in several stages through banks. Note that the creditors, Roman citizens whose Roman citizenship did not derive from their father Bion, operate a private bank, and that one of them is an Alexandrian priest and gymnasiarch and even belongs to the Museum. The original loan was floated through another bank, which was also involved in the repayment.

The biggest loan from Late Antiquity (also physically the biggest: it is a huge document, too big to be included here) is another text presumably found in Oxyrhynchus (*P. Oxy.* 63. 4394 of the very end of the fifth century). Twenty-two months earlier, two state officers from Alexandria had taken up a loan of 1,455 *solidi* or about 20 pounds of gold from another state officer in Alexandria. In the text considerably less than half the loan plus 6 per cent interest or 675 *solidi* is paid back by one of the debtors in the form of two orchards.

The remaining debt is still owed by the two debtors and amounts to 940 *solidi*.

The biggest loan of all concerns the lucrative trade with India. It is behind the famous 'Muziris' papyrus (SB 18. 13167 of the second century) the back of which is translated in the appendix.¹⁴ Although we have to imagine that the creditor who floated the loan to a merchant was resident in Alexandria, the papyrus was for some reason found somewhere in Middle Egypt. On the front, several additional details are given about the transport of the luxury goods to Alexandria. Another contract solely occupied with the loan itself must also have existed, but, as so often, it does not survive. The text we have implies that the creditor had agents in several places along the route, so he was not just investing some extra cash but regularly involved himself in the trade. The merchant provided the expertise, shared the risk and also had a personal stake in the venture, because theoretically he could make a huge profit and merely repay the loan with interest. The text indicates that the creditor had the right to buy the goods first, and this may have been what was intended.

The text on the back evaluates the cargo after it had been reduced by the 25 per cent tax. Even so, the value of the remaining 75 per cent is staggering, almost 7 million drachmas. Apparently the state kept 25 per cent of the cargo. It did not (at least not immediately) get the money. Do we have to imagine that the goods were taken by the state to Rome to adorn the halls of Caesar's palace? Of course not. Did it take them to Rome to sell? Too risky. Did it perhaps sell them in Alexandria itself? Unlikely: the state was not very good at selling.¹⁵ I assume that the merchant or perhaps rather the creditor actually kept the 25 per cent of the goods and merely transferred their value to the state in another papyrus. That way, they rather than the state ran the risk of perhaps obtaining a less favourable price than anticipated.

¹⁴ See D. Rathbone, 'The "Muziris" Papyrus (SB XVIII 13167): Financing Roman Trade with India', *Bulletin. Société archéologique d'Alexandrie* 46 (2001), 39–50.

¹⁵ J.-M. Carrié, 'L'Institution annonaire de la première à la deuxième Rome: continuité et innovation', in B. Marin and C. Virlouvet (eds.), *Nourrir les cités de Méditerranée. Antiquité—temps modernes* (Paris, 2003), 153–211 at 177, entertains the possibility that the state sold surplus wheat from the *annona* in Alexandria, but in that case too I rather think that it left the wheat in the hands of the transporters and merchants who were handling it anyway, and that they sold the wheat and paid the state its 'commission'.

Although we do not know the amount of the original loan, and have to leave generous room for profits, it must have been quite a bit more than in the two other big loans from Alexandria I discussed earlier. With only a couple of dozen such ships taxed at 2.3 million drachmas each, the state would have derived an income from the 25 per cent tax alone that would have matched the value of the Egyptian *annona*. What if there were over a hundred such ships each year in the first two centuries of Roman rule? For now, this must remain one of the *arcana imperii*.

4. MONEY FLOWS: A GRAPHIC MODEL

Egyptian coins did not circulate outside Egypt. How did the state manage to derive an income from money taxes levied in Egypt? A model (Fig. 11.1) of the flow of money between Egypt and the Empire, both cash and paper, helps visualize how the ‘firewall’ (semi-permeable: *aurei* did get in)¹⁶ between the monetary system of Egypt and the rest of the Empire did not prevent monetary exchanges on a large scale.

This sinusoidal system allowed the government to take in hundreds of millions of Egyptian drachmas in taxes, most of which it did not spend in Egypt itself. Because Egypt’s currency could not be taken to the rest of the Empire, the government somehow exchanged it in Alexandria, the connecting point between two ‘whirlpools’, for imperial money offered by the merchants. The state could spend the imperial money elsewhere. The merchants took the Egyptian money off the hands of the state, bought goods in Egypt with it, and sold them abroad. The presence of *aurei* in Egyptian hoards also shows that these merchants bought more goods in Egypt than the government took out in taxes. Since foreigners could not invest in land in Egypt, all imperial money that found its way into Egypt can be safely linked to trade in movable goods.

¹⁶ See J. Andreau, ‘Le Système monétaire partiellement “fermé” de l’Égypte romaine’, in F. Duyrat and O. Picard (eds.), *L’Exception égyptienne? Production et échanges monétaires en Égypte hellénistique et romaine* (Cairo, 2005), 329–38.

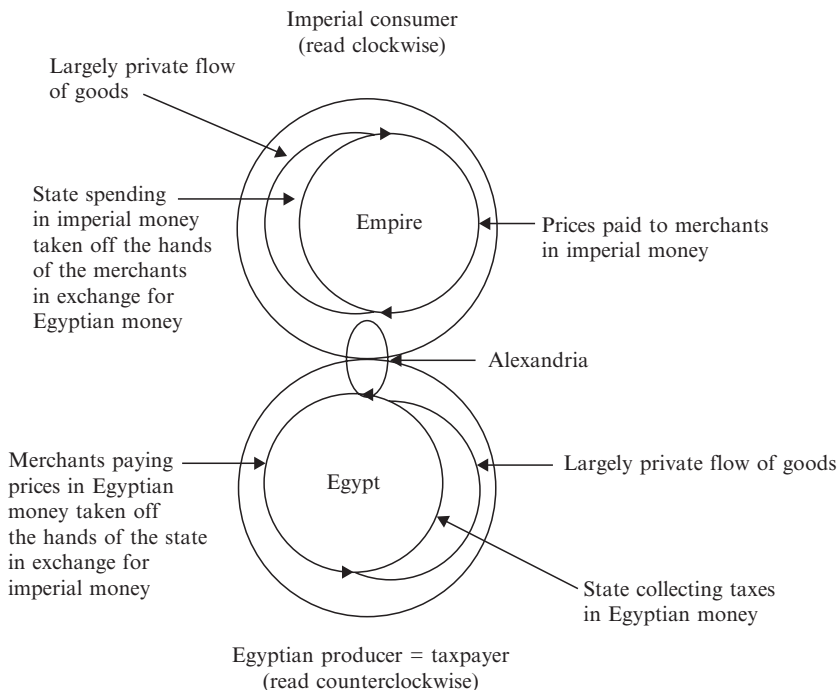


Figure 11.1. The flow of money between Egypt and the Empire.

Enough Egyptian money flowed back into the Egyptian economy each year to allow the taxpayers to pay their money taxes (and money taxes constituted the bulk of what they owed the state). A large part of these transactions would have been on paper rather than in coins. Coins would have tended to stay behind in the lower reaches of the system, near the producers/taxpayers who were often dealing in petty cash. Higher up, closer to Alexandria, most money would have come in the form of bank transfers, as in the first papyrus translated in the appendix. Unfortunately, most of our evidence is concerned with the lower reaches of the system.

In the rest of the Roman Empire the system was not much different. The individual consumers of Egyptian goods elsewhere

tended to pay for these goods in cash, but the merchants closer to the centre, especially those dealing directly with Alexandria, would usually have been able to avoid bulky cash transfers by means of documentary transactions. These would have generated a paper trail in places where we unfortunately have found few or no papyri.

Perhaps it is best to end on this sobering thought: papyri are wonderful but they rarely perform the miracles we want. The evidence is biased towards what I have called ‘the lower reaches of the system’, and not so much towards private activities in those reaches, such as bank transactions involving merchants, but towards the state’s activities there: the run-of-the-mill collection of taxes. But in the grand scheme of things, myriads of Egyptian tax payments were the lubricant for a highly developed commercial system.

APPENDIX

Translation of *P. Oxy.* 27. 2471 (from the edition):

To... *archidikastes* and superintendent of the *chrematistai* and the other courts, from Tiberius Claudius Demetrius and Tiberius Claudius Isidorus, sons of Bion, of the tribe Quirina... Demetrius and Isidorus both sons of Bion... Demetrius priest and gymnasiarch and one of those exempt from taxes and maintained in the temple of the Muses and from Chaeremon, son of Ale...

We agree between ourselves as follows, whereas Demetrius and Isidorus have received from Chaeremon—through Chaeremon himself and through others, by the former drafts on the exchange-bank of Narcissus, son of Archias, and by the drafts on the exchange-bank of Demetrius and Isidorus themselves and by the present draft made by Chaeremon and executed through the aforesaid exchange-bank of Narcissus—the thirteen talents which they lent to Chaeremon himself by a *synchoresis* through the *archidikastes*’ office in Pharmuthi of the eighth year of Tiberius Claudius Caesar Augustus Germanicus Imperator, together with the interests, that the loan *synchoresis* be null and void as well as the draft on the above exchange-bank of Narcissus which related to it and that neither Demetrius nor Isidorus nor any other on their behalf proceed against Chaeremon regarding the aforesaid loan and the interests or any other transaction whatsoever, written or unwritten, from past times until the present day.

Translation of SB 18. 13167 col. ii (adapted from Rathbone, “Muziris” Papyrus’ [n. 14], 44):

Gangetic nard:

60 boxes, of which likewise the price is reckoned with the box at
4,500 dr(achmai) of silver, 45 tal. (of silver)

Ivory:

first (A), sound: 78 tal(ents)-weight 54.75 mn(ai), of which likewise the
price is reckoned,

first (A1), 78 tal.-weight 4[3] mn., which become by the standards of
the quarter-tax, the talent being reckoned at 95 lbs, total 7,478 lbs, from
which the equivalent is, reckoning 97.5 (written 7[9.5] (?) lbs to the
talent, on the ratio which is normally reckoned among merchants, 76
tal.-weight 45 mn., with the mna at 100 dr. (of silver), (sub)total
76 tal. 4,500 dr. (of silver),

then (A2), the remaining tusks, taken at the higher (weight) by the
arabarchs for the collection of the quarter-tax in the sum of tusks despite
the equivalence when undergoing collection of the quarter-tax, 11.75
(written 11.5) mn., with the mna at the same 100 dr. (of silver),
1,175 dr. (of silver),

makes total (for sound) 76 tal. 5,675 dr. (of silver)

then (B), fragments: 13 tal.-weight 9.75 mn., of which likewise the price is
reckoned,

first (B1), 12 tal.-weight 4[7] mn., which as explained above, become in
turn (?) by the standards of the quarter-tax 1,214 lbs, and, according to
how among merchants it is reckoned, (are) 12 tal.-weight 27 mn., with
the mna at 70 dr. (of silver), 8 tal 4,290 dr. of silver,
then (B2), the remaining (fragments), taken at the higher (weight) for
collection of the quarter-tax as explained above, 22.75 mn., with the mna
at the same 70 dr. (of silver), 1,592.5 dr. of silver.

(makes) total for fragments 8 tal 5,882.5 dr. (of silver)

(makes) total price of ivory [85 tal. 5,557.5 dr.] of silver.

Makes the price of the (after-tax remaining) 3/4 of the cargoes shipped out
in the ship *Hermapollon* 1,154 tal. 2,852 dr. of silver.

The Monetization of Rome's Frontier Provinces

Constantina Katsari

1. INTRODUCTION

One of the fiercest debates about the monetization¹ of the Roman Empire concerns the difference between rural and urban sites. One view has been that the use of coined money was limited to the cities of the Empire, given that excavations of villas in Italy have yielded only a very small number of coins.² Archaeologists working on Roman Britain have pointed out, however, that a substantial number of hoards in Britain have been found in rural sites, while fewer have been found on military sites or in towns.³ The evidence from Karanis in Egypt, where more than 30,000 coins have been excavated,⁴ supports the theory that the availability of coin in the countryside was quite high.

¹ By 'monetization' I mean the extent of the daily use of money (either coins or credit) in the course of commercial or other type of transactions in a specific region or state.

² M. H. Crawford, 'Money and Exchange in the Roman World', *JRS* 60 (1970), 40–8 at 45. A. Burnett also concluded that the rural population probably did not use coins extensively: *Coinage in the Roman World* (London, 1987), 96.

³ R. Reece, 'Coins and Villas', in K. Branigan and D. Miles (eds.), *Villa Economies: Economic Aspects of Romano-British Villas* (Sheffield, 1989), 34–41; Reece, *Coinage in Roman Britain* (London, 1987), 76–7 and 129–31.

⁴ R. Haatvedt, *Coins from Karanis. The University of Michigan Excavations 1924–1935* (Ann Arbor, 1964).

Yet no one has maintained that the level of coin use was as high in the countryside as it was in the towns.⁵

In an attempt to bridge the contrasting hypotheses, de Ligt has suggested that the rural economy was neither fully monetized nor undermonetized. In many rural areas of the Roman Empire, and in particular in Egypt, barter transactions and cash payments complemented each other; accordingly, the peasant economies in the ancient world resembled in many respects the medieval peasant economies. Specifically, in both the ancient and the medieval world, peasant production aimed at self-sufficiency in food, so that peasant demand for external foodstuffs was low. The bulk of what peasants produced went into subsistence and into payment of rents and taxes, while only a small part of their resources was spent on goods and services provided by specialists.⁶ This model must also make room for periodic markets, which probably met the comparatively moderate needs of the inhabitants of the countryside, who would not have to visit the city markets.⁷ As an example, the large estates, especially in Roman Egypt, seem to have been genuinely monetized and their inhabitants seem to have participated in at least some commercial transactions. In those occasions in which commodities were exchanged for either produce or services, the transaction was reckoned on both sides in monetary terms, even if cash did not always change hands. In addition, the use of credit extended the monetization of the local economy beyond the limits of the actual quantity of coins in circulation.⁸

In this chapter I propose to consider whether the now very extensive numismatic evidence from the Balkans, Asia Minor, and Syria can help to clarify this question. I am aware of course that numismatic finds can throw little light on the extent to which the inhabitants of these provinces kept monetary accounts or the amount of

⁵ C. Howgego, 'The Supply and Use of Money in the Roman World, 200 BC to AD 300', *JRS* 82 (1992), 1–31, esp. 20, 22. He believes that the monetization of rural economies was indeed high, but not as high as in cities and towns.

⁶ L. de Ligt, 'Demand, Supply, Distribution: The Roman Peasantry between Town and Countryside: Rural Monetization and Peasant Demand', *MBAH* 9/2 (1990), 24–56.

⁷ L. de Ligt, *Fairs and Markets in the Roman Empire* (Amsterdam, 1993).

⁸ D. Rathbone, *Economic Rationalism and Rural Society in Third Century AD Egypt: The Heroninos Archive and the Appianus Estate* (Cambridge, 1991), 323–6.

credit-money they employed, but the limitations of the evidence should not prevent us from considering it at all. In this fashion, I shall reassess the role of diverse economic forces—such as the army, trading activities, and the urbanization of the provinces—and raise some questions about their impact on the monetization of the North and Eastern frontier through an analysis of the numismatic material found in the course of excavations or surface surveys at urban centres, fortress-cities, and military installations in rural areas.

2. COINS, URBANIZATION, AND TRADE IN THE DANUBE PROVINCES

It is known that the Roman emperor paid his soldiers mainly in silver or gold coins that were produced in mainstream or provincial mints. The precious-metal coins were subsequently distributed in the distant provinces of the Empire where the troops were stationed. Once they resided in a certain area, they participated actively in the already established local markets where a large part of their salaries would have been spent, thus triggering the monetization of the Roman economy. On the whole, coinage was invented in order to facilitate state payments, that is, for financial reasons; the economic function of coinage was only an accidental consequence. If we accept the longstanding theory that the soldiers were mainly responsible for the monetization of the Roman Empire,⁹ then we may also assume that the impact of the army would have been higher in both rural and urban areas where substantial forces were assembled for extensive periods of time.

At first inspection, the numismatic material seems to confirm Crawford's theory about the significant impact of the army on the monetization of local economies. Archaeologists have found an extremely large number of coins in settlements close to the Danube,

⁹ M. H. Crawford, 'Money and Exchange in the Roman World', *JRS* 60 (1970), 40–8. He repeated this view in *La Moneta in Grecia e in Roma* (Rome, 1982), 120–2, and in 'Finance, Coinage and Money from the Severans to Constantine', in H. Temporini (ed.), *Aufstieg und Niedergang der römischen Welt* (Berlin, 1975), ii/2. 560–93. See also, K. Hopkins, 'Taxes and Trade in the Roman Empire', *JRS* 70 (1980), 101–25.

an area that was heavily militarized during the Roman Principate. Even if we exclude the coin hoards, since they consist of coins that were purposely withdrawn from the circulation pool and, thus, were used in market transactions only infrequently, the number of stray coins and coins from excavation sites in Austria, for example, is overwhelming.¹⁰ A recent Ph.D. thesis catalogued more than 360,000 coins issued from the reign of Trajan until the beginning of the fourth century AD and found near the north-eastern frontier and specifically in Roman Dacia.¹¹ Although such great numbers could be considered an indication of higher monetization levels in the militarized frontier regions of the Roman Empire than in the less militarized provinces, a detailed analysis of the existing numismatic data points in a different direction.

A number of researchers agree that if excavation sites were clustered together according to their primary function, then different types of sites would produce different results. On the one hand, John Casey¹² placed civil and military sites in two different groups (in the latter he included also the scanty evidence from non-urban centres in the countryside). Later he also noticed differences between forts and temples, because the coins found in the latter could have been deposited there as votive offerings that were not expected to be recovered; therefore a different treatment of the numismatic data from the two sites became imperative.¹³ On the other hand, R. Reece has performed another even more sophisticated clustering of British sites.¹⁴ Country sites were divided into forts, temples, and villas,

¹⁰ R. Göbl, *Die Fundmünzen der römischen Zeit in Oesterreich* (Vienna, 1976), iii; F. Schmidt-Dick, *ibid.* (Vienna, 1989), ii/3; F. Dick, *ibid.* (Vienna, 1978), ix; H. Bannert and G. Piccottini, *Die Fundmünzen von Magdalensberg* (Klagenfurt, 1972); L. Okamura, 'Coin Hoards and Frontier Forts: Problems of Interpretation', in H. Vetters and M. Kandler, *Akten des 14. Internationalen Limeskongresses 1986 in Carnuntum: Der roemische Limes in Oesterreich* (Vienna, 1990), 45–54.

¹¹ C. Gazdac, 'Monetary Circulation in the Province of Dacia in the Period from Trajan to Constantine I (AD 106–337)' (D.Phil. thesis, Oxford, 2002).

¹² P. J. Casey, *Roman Coinage in Britain* (Aylesbury, 1980), 26–51.

¹³ P. J. Casey, *Understanding Ancient Coins: An Introduction for Archaeologists and Historians* (London, 1986), 82.

¹⁴ R. Reece, *Coinage in Roman Britain* (London, 1987), 72, 91–4; *id.*, *Roman Coins from 140 Sites in Britain* (Cirencester, 1991), 1–2; 'British Sites and their Roman Coins', *Antiquity* 67 (1993), 863–9; 'Site Finds in Roman Britain', *Britannia* 26 (1995), 179–206, esp. 181, 183.

while all the towns and settlements (including all the sites below the rank of *civitas*) were separated into small and large. Towns were divided between those that followed a general pattern of coin loss and those that followed an individual pattern. Furthermore they were divided between the east of Britain and the west. On the whole, the different groups showed different patterns of coin loss and changes that were caused both by category (such as town or settlement) and/or geography (east or west). In this chapter, because of the lack of adequate numismatic material coming from excavation sites on the eastern frontier, I will implement a simpler model of statistical analysis based on a distinction between urban sites and military sites. With this aim in mind, I have excluded from this study any examination of the precious or base metal coin hoards, because they tend to indicate only the death rate at a given time and not the degree of regional monetization. This way, I hope to assess the different levels of monetization that characterized urban and military settlements, and thus the role of the army in the circulation of coins in the Roman economy.

It is true that the army played a crucial role in the urbanization of some regions near the Roman *limes*, which in turn may have become more monetized. In the first instance, we should take into consideration the combination of different factors that allowed the army to initiate the process of urbanization of the provinces near the northern frontier. The troops sent there for the defence of the region were stationed initially in camps, which were transformed later into powerful fortresses.¹⁵ At the same time, the Roman soldiers created their own 'urban centres', where their families resided, together with merchants, administrators, and other entrepreneurs. Topographical details of some of the Danube legionary bases show us that around each fortress were one or two civilian settlements, the creation and development of which ran parallel with that of the fortress itself. Since the northern frontier gradually attracted a great number of people, the central government in Rome decided that these groups should be organized into cities so that they could be effectively administered and taxed. The foundation of colonies was initiated

¹⁵ As an example of the military organization of Dacia see N. Gudea, 'The Defensive System of Roman Dacia', *Britannia* 10 (1979), 63–87.

by the Flavians. These colonies were based either on the settlement of veterans or on existing settlements of Roman citizens who had moved in from outside the province. The Flavian-Trajanic period was one of massive movements of population, but it was not until the time of Hadrian that these random imperial decisions formed the nucleus of an urbanization policy.¹⁶

As settlers took over in the first century AD there was a growth of trading contacts with the hinterland as well as with the *barbaricum*, and this in turn stimulated new, specialized trading centres in the frontier zone.¹⁷ The markets then multiplied and satellite markets sprang up besides the smaller settlements. Trade flourished and the complexity of its organization suggests that the process of urbanization was developing rapidly. According to some researchers, the troops were heavily dependent for their food supplies on pre-existent central places, where local production was concentrated and where a market economy with long-distance trading networks was fully functional.¹⁸ Nevertheless, a series of recent studies has come to the conclusion that it was impossible for the Roman army to rely entirely on the local markets for its supplies, even at the time of the greatest provincial development.¹⁹ While the 'free' markets close to the frontiers seemed to have covered most of the daily needs of the local population, the provisions for the army may have been imported from other areas through the imperial supply system. In this case, it is possible that the inhabitants of the cities along the northern frontier were the main forces in the monetized part of these 'free' urban markets, while the commercial activities of the soldiers may have also contributed to the flourishing of the local marketplaces.

In fact, a closer look at the numismatic evidence from the region indicates that the urban sites close to the Danube were more monetized

¹⁶ A. Mocsy, *Pannonia and Upper Moesia* (trans. S. Frere, London, 1974), 112–20, 139–41.

¹⁷ H. Elton, *Frontiers of the Roman Empire* (London, 1996), 83, 87.

¹⁸ W. Groenman-van Waateringe, 'Urbanization and the North-west Frontier of the Roman Empire', in W. S. Hanson and L. J. F. Keppie (eds.), *Roman Frontier Studies 1979: Papers Presented to the 12th International Congress of Roman Frontier Studies*, (BAR-IS 71(iii)) (Oxford, 1980), iii. 1037–44, esp. 1038–41.

¹⁹ C. R. Whittaker, *Frontiers of the Roman Empire: A Social and Economic Study* (Baltimore, 1994), 101–4; W. H. J. Willems, *Romans and Batavians: A Regional Study in the Dutch Eastern River Area* (Amsterdam, 1986), 264–7.

than the military sites. The coins I used for this study are from excavated sites or, in some cases, stray finds coming from a specific area. They are usually coins of smaller value, mainly bronze denominations, which were lost by accident and, thus, put out of circulation forever.²⁰ The fact that bronze coins represent the bulk of the finds should not surprise us. Similarly, only 182 of the 16,557 coins that came from Agora excavations in Athens were silver, and three gold, while the rest were bronze.²¹ Abundant losses of small denominations probably reflect, in fact, the extensive degree of monetization in the Roman Empire.

In Fig. 12.1, you can see that the number of coins issued from the reign of Trajan until the reign of Constantine that has been found in Dacia. Let us categorize sites as ‘urban’, ‘military’, or ‘fortress cities’. It is clear that the number of coins found at urban sites, such as Ulpia,

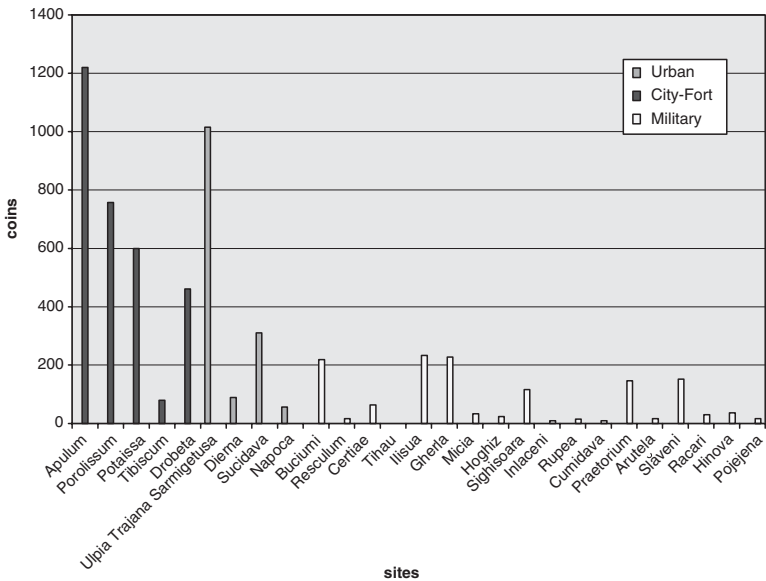


Figure 12.1. Coins from Dacia: excavations.

²⁰ Anonymus, *De rebus bellicis* 1. 6: ‘emendi et vendendi utilitas’.

²¹ A. Walker, ‘Excavation Coins: The Use and Misuse of Numismatic Evidence in Archaeology’, in K. A. Sheedy and C. Papageorgiadou-Banis (eds.), *Numismatic Archaeology, Archaeological Numismatics* (Oxford, 1996), 17–26, esp. 21 n. 17.

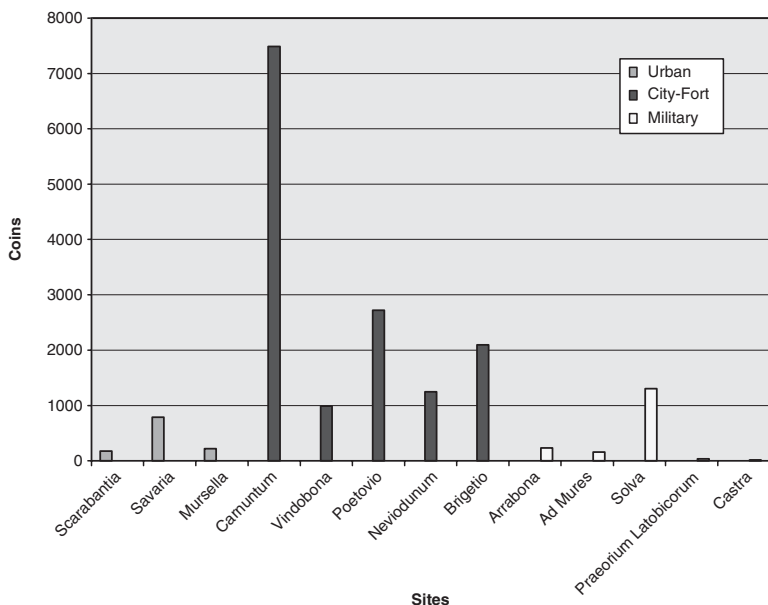


Figure 12.2. Pannonia Superior: excavations.

Napoca, and Sucidava,²² are, at least in two of the cases, far more than the coins that have been found on military sites—Buciumi, Resculum, Certiae, Tihau, Ilisua, Gherla, Micia, Hoghiz, Sighisoara, Inlaceni, Rupea, Cumidava, Praetorium, Arutela, Slăveni, Racari, Hinova, and Pojejena²³—that existed within the same province.²⁴ A third category, the fortress-cities of Apulum, Porolissum, Potaissa, and Drobeta,²⁵ emerges, and indicates a higher use of coins in the urban centres where soldiers were stationed. The limitations of this evidence are fairly obvious—the sheer size of the excavated site is a variable which it has not so far been possible to control systematically; but the evidence most definitely suggests that it was urbanization, *not* the presence of soldiers per se, that led to the heavy use of coinage.

²² For the evidence see Appendix 1.

²³ See Appendix 2.

²⁴ This list of military sites that have yielded extremely low numbers of coins is far from complete.

²⁵ See Appendix 3.

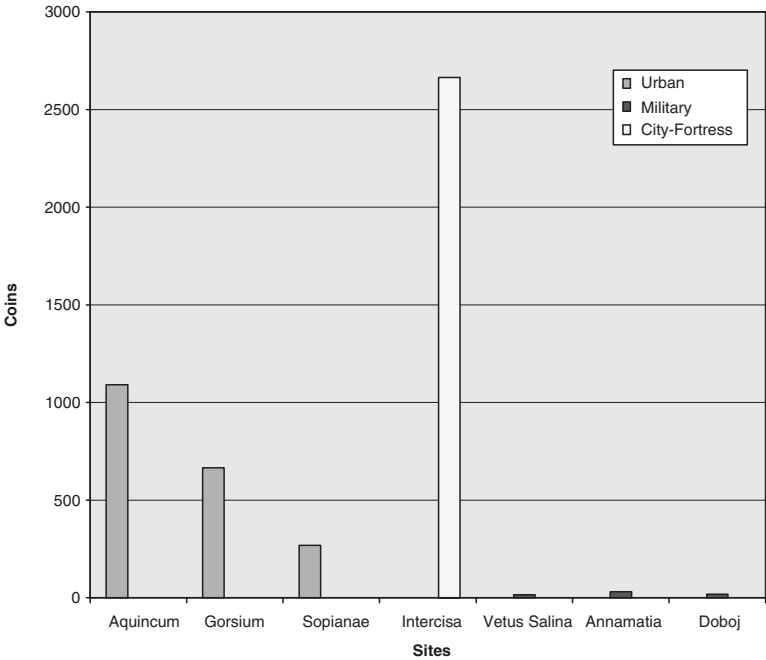


Figure 12.3. Pannonia Inferior: excavations.

The same numismatic patterns characterize the sites of other provinces in the northern Balkans (see Fig. 12.2). Specifically, the fortress-cities of Pannonia Superior—Carnuntum, Vindobona, Poetovio, Neviodunum, and Brigetio²⁶—tend to show a higher degree of monetization when they are compared to both urban centres—Scarabantia,²⁷ Savaria,²⁸ and Mursella²⁹—and military sites—Arrabona,³⁰ Ad Mures,³¹ Solva,³² Praetorium Latobicorum,³³ and Castra.³⁴

²⁶ See Appendix 4.

²⁷ Scarabantia = Sopron (Hungary): *Die Fundmünzen der römischen Zeit in Ungarn* (FMRU), ii. 131–9.

²⁸ Savaria = Szombathely (Hungary): J. Fitz, *Der Geldumlauf der römischen Provinzen in Donaugebiet Mitte des 3. Jahrhunderts* (Budapest, 1978), 39–41.

²⁹ Mursella = Árpás (Hungary): FMRU ii. 30–63.

³⁰ Arrabona = Győr (Hungary): FMRU ii. 69–99.

³¹ Ad Mures = Ács (Hungary): FMRU iii. 34–44.

³² Solva = Esztergom (Hungary): FMRU iii. 96–168.

³³ Praetorium Latobicorum = Trebnje (Slovenia): FMRSL i. 408–18.

³⁴ Castra = Banja Luka (Bosnia-Herzegovina): G. Kraljevic, 'Rimski novel iz okolice Banke Luke', *Glasnik* 38 (1983), 127–38.

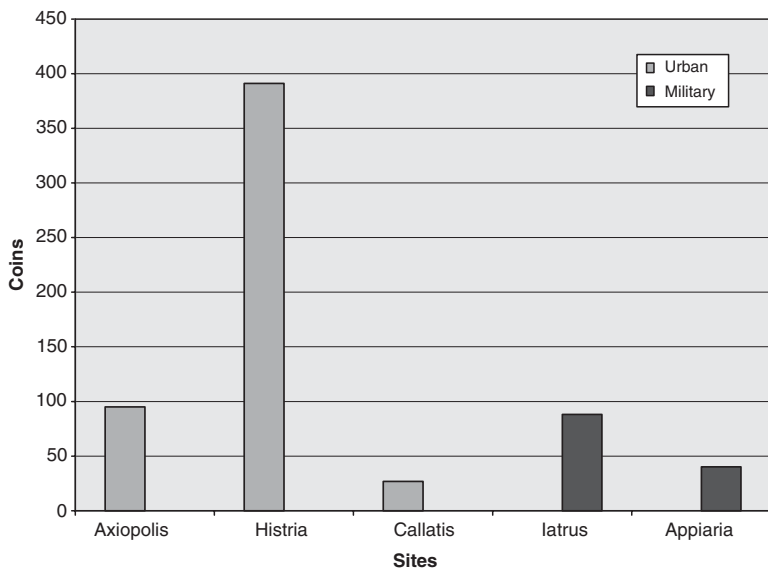


Figure 12.4. Moesia Inferior: excavations.

In fact, the same pattern may be detected in Pannonia Inferior (Fig. 12.3). The coins found in the fortress-city of Intercisa³⁵ exceed in number the ones found in the rest of the cities in the same province. It should be noted, furthermore, that far more coins have been found in the towns of Aquincum,³⁶ Gorsium,³⁷ and Sopiana³⁸ than in the military establishments of Vetus Salina,³⁹ Annamatia,⁴⁰ and Doboj.⁴¹

Finally, the analysis of the numismatic material from excavations in Moesia Inferior (Fig. 12.4) indicates higher levels of monetization

³⁵ Intercisa = Dunaújváros (Hungary): *FMRU* i. 53–192.

³⁶ Aquincum = Budapest: Gazdac, 'Monetary Circulation' [n. 11], 836.

³⁷ Gorsium = Tac (Hungary): *FMRU* i. 289–370.

³⁸ Sopiana = Pécs (Hungary): F. Fülep, *Sopiana. The History of Pécs during the Roman Era and the Problem of the Continuity of the Late Roman Population* (Budapest, 1984), 220–56.

³⁹ Vetus Salina = Adony (Hungary): *FMRU* i. 23–5.

⁴⁰ Annamatia = Baracs (Hungary): *FMRU* i. 26–8.

⁴¹ Doboj in Bosnia Hercegovina: G. Kraljevic, 'Rimski novei iz castruma kod Doboja', *Glasnik* 39 (1984), 85–95.

in the city of Histria,⁴² while the rest of the urban sites—Axiopolis,⁴³ Callatis⁴⁴—and the military ones—Iatrus,⁴⁵ Appiaria⁴⁶—seem to have produced more or less equal numbers of coins.

From these facts we may conclude that, in all likelihood, the soldiers who resided near urban centres constituted a substantial economic force that boosted the monetized transactions taking place in the local pre-existing markets. On the other hand, the soldiers who lived mostly within military forts and away from towns do not seem to have initiated the creation of new markets or participated extensively in the exchange of coins for commodities.

3. THE CASES OF ASIA MINOR AND SYRIA

The numismatic evidence from the provinces of the eastern frontier partly confirms and partly disconfirms the northern-frontier model set out above. The presence of the Roman army near the eastern frontier of the Empire does not seem to have triggered a higher urbanization or monetization of the regions of eastern Asia Minor as much as it affected the Northern frontier, despite the fact that the routes traversing Phrygia between the provinces of Asia and Galatia were well guarded, and that legions were stationed on both sides of the borders. The legions in the East ranked second in total strength to the Danube forces and evidence suggests that the eastern frontier was as elaborately organized as the frontier system in northern Europe.⁴⁷ The exact locations, as well as the composition of the military units

⁴² Histria on the Black Sea (Romania): C. Preda and H. Nubar, *Histria*, iii. *Descoperirile monetare 1914–1970* (Bucharest, 1973).

⁴³ Axiopolis = Cernavodă (Romania): G. Poenaru Bordea, R. Orcheșanu, and E. Nicolae, 'Axiopolis aux IIIe–VIIe siècles de n.è. à la lumière des découvertes monétaires', *Studii și Cercetări de Numismatică* 9 (1989), 53–73.

⁴⁴ Callatis = Mangalia (Romania): C. Preda, *Callatis. Necropola romano-bizantină* (Bucharest, 1980), 64–72.

⁴⁵ Iatrus = Krivina (Bulgaria): E. Schönert Geiss, 'Die Fundmünzen Iatrus-Krivina. Spätantike Befestigung und frühmittelalterliche Siedlung an der unteren Donau', *Schriften zur Geschichte und Kultur der Antike* 17 (1991).

⁴⁶ Appiaria = Riahovet (Bulgaria): I. Bichvalov, *Moneti ot Riahovet* (Veliko Trnovo, 1994).

⁴⁷ S. Mitchell, *Anatolia: Land, Men and Gods in Asia Minor* (Oxford, 1993), 119, 121.

of Syria and Mesopotamia, especially during the third century, may be unknown and somewhat speculative,⁴⁸ but we should have no doubts about the great strength of the forces in the East.

The western provinces of Asia Minor were heavily urbanized as early as the classical and Hellenistic periods; these cities served as administrative centres also under the Roman Empire. The emperors exacted dues and services from these communities on a regular basis, while the civic authorities were held responsible for the functioning of this system. This way the local magistrates helped the central administration to run the Empire in an effective manner. Towards the realization of this aim, the emperors, by the end of the Julio-Claudian period, divided most of Pontus, Paphlagonia, north Galatia, Galatian Phrygia, Lycaonia, and Pisidia into contiguous city territories, thus transforming the political geography of central and eastern Anatolia.⁴⁹ Only one province did not undergo a similar transformation: Cappadocia. This province had never had a network of cities and the governors made no attempt to promote its urbanization or the production of bronze coins, a production which was actually undertaken only by the few civic centres of the region.⁵⁰ In the western part of Cappadocia there existed only the cities of Caesarea, Tyana, and Archelais, while there is a possibility that a fourth one, Diocaesarea, was founded there during the Julio-Claudian

⁴⁸ D. L. Kennedy, 'The Garrisoning of Mesopotamia in the Late Antonine and Early Severan Period', *Antichthon* 21 (1987), 57–66.

⁴⁹ The cities of all of these provinces intermittently produced bronze coinages that served the local markets until the middle of the third century AD. For catalogues of the issues produced during the Julio-Claudian and the Flavian eras see A. Burnett, M. Amandry, and P. P. Ripolles (eds.), *Roman Provincial Coinage* (London, 1992), i; A. M. Burnett, M. Amandry, and I. Carradice (eds.), *Roman Provincial Coinage* (London, 1999), ii/1.

⁵⁰ For the coinage of Caesarea in Cappadocia see W. E. Metcalf, *The Silver Coinage of Caesarea in Cappadocia* (New York, 1966); K. Butcher and M. Ponting, 'Rome and the East: Production of Roman Provincial Coinage for Caesarea in Cappadocia under Vespasian', *Oxford Journal of Archaeology* 14/1 (1995), 63–77; B. Roger, 'The Bronze Coinage of Gordian III from Caesarea in Cappadocia', in R. Ashton (ed.), *Studies in Ancient Coinage from Turkey* (London, 1996), 49–95; W. Metcalf, 'Notes on Severan Caesarea', in *Internationales Kolloquium zur kaiserzeitlichen Münzprägung Kleinasiens, Munich 1994* (Milan, 1997), 173–81. The coinages of Tyana and Cybistra are amply recorded in various SNG volumes, the British Museum Catalogue of Coins, and *Roman Provincial Coinage*, i, and ii, as well as the online collection of the American Numismatic Society. See also U. Yarkin, 'An Unpublished Coin for Ariarathes III for Cybistra in Cappadocia', *NC* 141 (1981), 144–5.

period. In central Cappadocia, only one community achieved the status of city under the Empire: Comana. Cappadocia, like Egypt, was administered through domains and estates and not through the cities. An equestrian procurator collected the revenues from the imperial estates and then dispatched them to the military treasury, which would probably cover the expenses of the troops stationed in the province.⁵¹ Aside from Cappadocia, the eastern provinces of Armenia and Mesopotamia were not nearly as urbanized as the western provinces of Asia Minor, and the Roman state did not seem to have taken any serious measure in order to improve the situation. Only the province of Mesopotamia, which had the lowest degree of urbanization among the eastern provinces, attracted the attention of the emperors, who planted there a notable number of colonies during the third century AD; these, though, were probably real colonies of veterans and were intended to serve as permanent garrisons.⁵² Despite the large numbers of soldiers in the regions near the frontier, the effect of the army on the urbanization of eastern Asia Minor and its subsequent monetization was insignificant by comparison to the Balkans. The only cases we know of direct impact of the army on the foundation of cities on the Euphrates frontier are the remote places of Satala and Melitene. There, the legions seem to have built themselves cities that simultaneously played the role of regularly planned fortresses.⁵³ It was only because of the foundation of the two new cities that the areas surrounding these urban centres might have achieved higher levels of monetization than the rest of the eastern regions, since they probably increased the density of trading activities. However, a surface survey of the legionary fortress of Melitene in the south-east of Turkey yielded no coins at all.⁵⁴

⁵¹ Mitchell, *Anatolia* [n. 47], 97–8.

⁵² A. H. M. Jones, *The Cities of the Eastern Roman Provinces*, 2nd edn. (Amsterdam, 1983), 220.

⁵³ N. Hodgson, 'The East as Part of the Wider Roman Imperial Frontier Policy', in D. H. French and C. S. Lightfoot, *The Eastern Frontier of the Roman Empire* (BAR-IS 553(i)) (Oxford, 1989), 177–89, esp. 178–81.

⁵⁴ V. Sevin and Z. Derin, 'A Fortified Site to the East of Malatya', in French and Lightfoot *ibid.* 437–60. There is a possibility that a future survey may change the results for two reasons: (1) a city was founded in the immediate area almost a generation after the establishment of the fort, and (2) the city was on the crossroads that 'saw' some of the international trade coming from the east.

The Syrian cities, on the other hand, from the Hellenistic period onwards, were almost as developed as those of western Asia Minor. In these circumstances, the soldiers were deployed in or close to existing cities, most of which produced their own bronze coinages.⁵⁵ Urban legionary bases, and cities with smaller garrisons, included Apamea, Zeugma, Raphanea, Cyrrhus, Samosata, Palmyra, Dura-Europos, Kifrin, Seleucia Pieria, and Antioch on the Orontes. The pattern of legionary bases was clearly determined by the existing urban structure, and the Roman military in Syria had little impact on the province's urban development.⁵⁶ The only cases where the army played a role of some importance in urbanization were the foundation of the colonies of Berytus and Ptolemais.⁵⁷ The rapid expansion and the economic growth of the Syrian cities, together with international trade and such factors as the establishment of cadasters and the construction of dams, probably helped bring about economic growth in the countryside too.⁵⁸

Some of the above-mentioned Syrian cities, such as Samosata, Zeugma, Cyrrhus, Carrhae, Edessa, Rhesaina, and Singara, issued their own civic bronze coinages. It has been suggested that these were produced for military purposes, since these urban centres also had military connections.⁵⁹ I am more inclined, however, to accept Howgego's hypothesis that there were no particular imperial requirements for the production of civic bronzes, since there is little or no evidence that civic currencies circulated predominantly in areas of military activity.⁶⁰ It is possible that the civic issues of these cities

⁵⁵ The coinages of Syrian cities: see once again the BM Catalogue of Coins, *Roman Provincial Coinage*, i and ii, and the online collection of the American Numismatic Society.

⁵⁶ N. Pollard, *Soldiers, Cities and Civilians in Roman Syria* (Ann Arbor, 2000), 38–43.

⁵⁷ During the third century AD a number of cities—Heliopolis, Tyre, Sidon, Emesa, Damascus, Palmyra, Dura-Europos, Carrhae Edessa, Rhesaina, Nisibis, and Singara—assumed the honorary title of *colonia* (Pollard, *ibid.* 61–3). But this change would not have affected the economic status quo either in the cities or in the monetized part of the countryside.

⁵⁸ G. Tate, 'The Syrian Countryside during the Roman Era', in S. E. Alcock (ed.), *The Early Roman Empire in the East* (Oxford, 1997), 55–71, esp. 60–4.

⁵⁹ J.-P. Callu, *La Politique monétaire des empereurs romains de 238 à 311* (Paris, 1968), 28. M. H. Crawford agreed, claiming that the minting of civic coinages was imposed on the cities by the central imperial authorities who wished to provide coins for Roman troops: 'Finance, Coinage and Money from the Severans to Constantine', in H. Temporini (ed.), *Aufstieg und Niedergang der römischen Welt* (1975), ii 2. 560–93.

⁶⁰ C. Howgego, *Greek Imperial Countermarks* (London, 1985).

served the needs of the local markets. The soldiers stationed in this area used the same small change as the rest of the population in order to purchase commodities in the pre-existing urban market places, if the imperial supply system did not provide them with all they needed.

So far, only a handful of coins of the Roman imperial period have been found in eastern frontier sites that were unmistakably of a military nature. So it was at a military post in northern Iran that overlooks the Tigris, Seh Qubba.⁶¹ Pagnik Oreni and Dibsi Faraj, two military sites on the Euphrates frontier, which were excavated in the late 60s and early 70s, did not produce more than a handful of coins minted from the first to third century AD in the mint of Caesarea Cappadociae.⁶² Even in some of the excavations of the forts in the province of Syria, such as el-Lejjun and Qasr Bshr,⁶³ which can still be seen near the Limes Arabicus, and Qasr el-Hallabat⁶⁴ in north-east Jordan, no coins were found. Excavations in the Roman camp that was temporarily situated near Masada in Israel have turned up only a few stratified coins, none later than AD 73.⁶⁵ Similarly, only a few coins were produced by the excavations at the early third century fort sites at Ain Sinu in Mesopotamia.⁶⁶ The excavation of the fort of Tell el-Hajj yielded, exceptionally, around forty coins dated to the first and the second centuries.⁶⁷

⁶¹ W. Ball, 'Seh Qubba, A Roman Frontier Post in Northern Iraq', in French and Lightfoot (eds.) [n. 53], 7–18.

⁶² R. P. Harper, 'Two Excavations on the Euphrates Frontier 1968–1974: Pagnik Oreni (Eastern Turkey) 1968–1971, and Dibsi Faraj (Northern Syria) 1972–1974', in *Studien zu den Militärgrenzen Roms: Vorträge des 10. internationalen Limeskongresses in der Germania Inferior* (Cologne, 1977), ii. 453–60.

⁶³ J. W. Betlyon, 'Coins, Commerce, and Politics: Coins from the Limes Arabicus Project, 1976–1985', in S. T. Parker (ed.), *The Roman Frontier in Central Jordan: Interim Report of the Limes Arabicus Project, 1980–1985* (BAR-IS 340 (ii)) (Oxford, 1986), 655–89.

⁶⁴ D. L. Kennedy, *Archaeological Explorations on the Roman Frontier in North-East Jordan: The Roman and Byzantine Military Installations and Road Network on the Ground and from the Air* (BAR-IS 134) (Oxford, 1982), 17–68.

⁶⁵ D. Kennedy and D. Riley, *Rome's Desert Frontier: From the Air* (London, 1990), 99.

⁶⁶ D. Oates, *Studies in the Ancient History of Northern Iraq* (Oxford, 1968), 85, 88.

⁶⁷ P. Bridel et al., *Tell el Hajj in Syrien. Zweiter vorläufiger Bericht Grabungskampagne 1972* (Bern, 1974), 60–4. Two were silver denarii, nine were SC imperial bronze coins, three were bronze sestertii from the mint of Rome, four were civic bronze coins from Antioch, four coins from the mint of Palestine, three Nabataean coins and two coins from Caesarea in Cappadocia; the rest were single specimens from Syrian mints.

The fortresses or garrisons of Syria that were in or near existing towns or cities present a higher degree of monetization. A prominent example of a fortress-city with a higher level of monetization is Dura. It was founded by the Seleucid dynasty after 312 BC, was under Parthian control from around 113 BC until AD 115, when it first fell into the hands of the Romans. Two years later the Parthians returned, until it was conquered again by the armies of Lucius Verus. The Romans then retained the site until the Sassanids attacked in 256.⁶⁸ Apart from the numerous coin hoards found during the excavations, a fact that points towards a rather large loss of life in the middle of the third century AD due to the failure of the Roman defences, the excavations revealed also a high number of individual coin finds probably lost during the daily transactions of the soldiers or other inhabitants.

The fortress of Dura was an important trade centre. Its monetization dates to before its annexation to the Roman Empire under Verus: the excavations in the area revealed 300 denarii and 13 tetradrachms minted before AD 165, 224 of which belonged to hoards. A total of 463 bronze SC coins issued by mainstream mints were found, only seven of which were part of hoards. There were also a handful of pre-AD 165 bronze coins minted in Rome, while very few coins came from the Syrian civic mints.⁶⁹ We cannot exclude the possibility that some of these coins, especially the ones issued during the second century AD, may have arrived in Dura after its annexation. However, the substantial numbers of Julio-Claudian and Flavian coins indicate that the majority of first-century coins arrived in the city at a time when it did not belong to the Roman Empire. The physical presence of soldiers and officers in Dura during the reign of Trajan may have resulted in the intensification of monetized transactions through the use of Roman coins. And the transactions of soldiers who were stationed on Roman soil may have led to particularly large quantities of coin circulating along the eastern frontier. Some of these coins may have crossed the border and were spent or lost by soldiers during military campaigns. Alternatively, the soldiers may have spent the money within the Empire; subsequently, civilians who were

⁶⁸ J. D. Grainger, *The Cities of Seleucid Syria* (Oxford, 1990), 46; A. R. Bellinger, *The Excavations at Dura Europos. Final Reports*, vi. *The Coins* (New Haven, 1949), 201.

⁶⁹ Bellinger, *ibid.* 12–89.

involved in long-distance trade brought them to the Parthian areas.⁷⁰ None of these possibilities can be excluded, since it is almost impossible to identify the owner of a coin before it was lost. But there is another possibility: once the coins arrived in Parthian Dura, for whatever reason they arrived, they were extensively used in the urban markets. It seems that both the silver and the bronze coins were accepted as the established legal tender in commercial transactions. Consequently, we may reach the same conclusion as Bellinger, according to whom Parthian Dura was a highly monetized community; if there was a lack of Parthian coins there at any given period, then the vacuum must have been filled with Roman coins.⁷¹ It is therefore possible that the same high levels of monetization continued after the annexation of Dura, as the markets continued to function uninhibited under the Roman authorities. The city's level of monetization was probably high enough to allow tax revenues from Syria, both direct and indirect, to take the form of cash payment, as scattered references on cash assessment of taxes in the Principate indicate.⁷² In fact, the study of the few coin hoards from Dura that have included Parthian coins may indicate its commercial connections not only with Rome but also with the neighbouring Empire.⁷³

Another highly monetized place may have been Palmyra, a fortress-city that existed at the principal oasis in the Syrian Desert and had a close relationship with Dura. Palmyra was mainly a caravan city, founded in consequence of the initiative of surrounding tribes as early as the first century BC. However, it became part of the Roman Empire only in the first century AD, by which time it served also as a legionary fortress. The city was an essential link on a major route for caravan traffic from the Persian Gulf to the cities of Syria and, beyond, to the ports of the Levant.⁷⁴ Roman political influence can

⁷⁰ For all these suggestions see N. Pollard, 'Roman Material across Imperial Frontiers? Three Case Studies from Parthian Dura-Europos', in S. Colvin (ed.), *The Graeco-Roman East: Politics, Culture, Society* (Cambridge, 2004), 119–44, esp. 130–1.

⁷¹ Bellinger, *The Excavations*, vi [n. 68], 203–4.

⁷² N. Pollard, 'The Roman Army as "Total Institution" in the Near East: Dura Europos as a Case Study', in D. L. Kennedy (ed.), *The Roman Army in the East* (JRA Suppl. 18) (Ann Arbor, 1996), 211–27, esp. 224.

⁷³ Bellinger, *The Excavations*, vi [n. 68], *passim*.

⁷⁴ F. Millar, 'Caravan Cities: The Roman Near East and Long Distance Trade by Land', in *Modus Operandi: Essays in Honour of Geoffrey Rickman* (London, 1998), 121–37.

be detected from the Julio-Claudian period. The construction of a road linking the city to the Euphrates in 75 entailed a tightening of that control. Throughout the first two centuries of the Principate, Palmyra maintained its own forces to police the desert and provide protection for the caravans. There is no evidence for any permanent Roman garrison at least until the 150s,⁷⁵ while the fact that a limited number of Roman troops was stationed there does not seem to have undermined the monetization of the area. Brief excavations in Palmyra during the early 60s revealed a small number of Roman coins (twenty-two) from the second and early third centuries.⁷⁶

The Palmyrenes managed to create a trade route which passed through their city, while they protected the caravans from the attacks of desert tribesmen, thus turning Palmyra into a commercial success. Trade was not the only source of revenue for the city, though. The agricultural development of the area and herding activities boosted the local economy and increased the wealth of the elites.⁷⁷ Part of the products that travelled on the emperor's road was made available in the local markets. The wealthiest citizens of Palmyra would not only have invested their income in trading activities, but would also have bought luxury goods and other commodities for private consumption. And the Palmyrene army, which was maintained by the city and not by the emperor, would have participated actively in the market place and would have made a modest contribution to the already monetized economy.

Zeugma, a legionary fortress of the first century that in the second century became a permanent base of *Legio III Scythica* may be considered an exception to our model. Although the city served also as a merchant station for the people who traded products to and from the East, Butcher, who was responsible for the publication of the coins found in the fortress-city, considered their number

⁷⁵ Kennedy and Riley, *Rome's Desert Frontier* [n. 65], 134–7.

⁷⁶ K. Michailowski, *Palmyra: Fouilles Polonaises 1961* (Warsaw, 1963); Michailowski, *Palmyra: Fouilles Polonaises 1962* (Warsaw, 1964); Michailowski, *Palmyra: Fouilles Polonaises 1963 et 1964* (Warsaw, 1966); R. Fellman and C. Dunan, *Le Sanctuaire de Baalshamin à Palmyre: Kleinfunde* (Rome, 1975), vi. The number of coins may seem low but, in fact, if compared with the absence of coins from other military sites, it should be deemed significant.

⁷⁷ G. K. Young, *Rome's Eastern Trade: International Commerce and Imperial Policy, 31 BC–AD 305* (London, 2001), 136–8, 167.

insufficient for any kind of statistical analysis.⁷⁸ We cannot assume, though, that the economy of Zeugma was a primitive one or that it relied exclusively on barter. The need for the use of small change in the markets of Zeugma should not be in any doubt, since the city had its own mint that intermittently produced civic bronze coins. The existence of this mint could indicate that money was used extensively in the local markets for the daily transactions of both soldiers and the inhabitants of the region around the fortress.⁷⁹

The case of Palmyra and Dura in the eastern provinces suggests the importance of inter-regional trade in the monetization of urban markets. Merchants who travelled along the imperial roads stopped, and no doubt traded, at the major cities that lay on their way. In eastern Syria, for example, Palmyra, Dura-Europos, and Zeugma belonged to the network of trade routes that the merchants used in order to bring luxury goods from China, India, and Arabia.⁸⁰ On the other hand, despite the existence of trade routes that passed through Melitene and Satala and other military forts along the Euphrates the cities on these roads were few and small, with the consequence that the long-distance trade passing through the area did not have a major impact on the monetization of the regional economy. By contrast, Cappadocian Caesarea was not just a major city in a non-urbanized province, but also the point of convergence of five major trade routes.⁸¹ It is not a coincidence that its civic mint produced substantial quantities of silver as well as bronze issues, thus supplying the entire province with the necessary means of exchange.

Similarly, the economies of the cities near the Black Sea, the northern part of the eastern frontier, and specifically the fortress-town of Apsaros, which lies in Adchara, the south-western portion of the Republic of Georgia, were probably monetized. Recent excavations and extensive surveys in the area of the fort revealed a denarius of Gordian III together with coins of Hadrian and Septimius Severus, as

⁷⁸ D. L. Kennedy, *The Twin Towns of Zeugma on the Euphrates: Rescue Work and Historical Studies* (JRA Suppl. 27) (Portsmouth, RI, 1998).

⁷⁹ See K. Butcher, 'The Mint at Zeugma', in D. Kennedy (ed.), *The Twin Towns of Zeugma*, 233–6; M. Arslan, 'A Hoard of Coins of Zeugma and Antioch from the Mid-Third Century AD', in Ashton (ed.), *Studies* [n. 50], 47–8.

⁸⁰ Young, *Rome's Eastern Trade* [n. 77], 141, map 4.1.

⁸¹ Mitchell, *Anatolia* [n. 47], 130–1, maps 8–9.

well as a hoard of forty-two more coins of the third century buried within the fort. The primary role of this military establishment of the early second century AD seems to have been the support of a strong Roman presence at the junction of riverine routes towards the hinterland, Anatolia, Iberia, and Armenia.⁸² The fort was close to a town that has not yet been properly excavated, but that probably facilitated trade activities. The position of the army along the routes that connected the Colchian coast with inland routes, navigable rivers, and highways gave the Romans the opportunity to control trade between the Colchians and the Pontic and Mediterranean worlds. Furthermore, for centuries the coast of Colchis had seen extensive trading activity and exchange between Roman forces and local people,⁸³ a fact that probably also boosted the already monetized local markets.

From all this evidence, it becomes clear that the presence of the army in forts, fortresses, or other exclusively military installations did not necessarily have the power to monetize the local markets, if indeed there were any established markets anywhere near the forts. The level of monetization is especially low in military sites built far from urban centres. If the role of the army in the monetization of the military sites near the frontiers was limited, then it becomes crucial to explore other factors that may have had an impact on the monetization of the highly militarized provinces. We should explore the possibility that the degree of urbanization of certain provinces may be a strong indication of the degree of daily trading activities and, consequently, of the levels of monetized exchange of commodities.

4. THE MODEL REVISED

The predominance of military installations and the low level of urbanization near some parts of the Roman *limes* (e.g. Cappadocia

⁸² D. Braund and N. Inaishvili, 'Excavation Reports: The Lazika Project', *Anatolian Studies, Research Reports* (1998), 3.

⁸³ D. C. Braund, 'Coping with the Caucasus: Roman Responses to Local Conditions in Colchis', in French and Lightfoot (eds.), *The Eastern Frontier* [n. 53], 31–9, esp. 34, 38–9; id., *Georgia in Antiquity: A History of Colchis and Transcaucasian Iberia 550 BC–AD 562* (Oxford, 1994), 173, 181.

as well as the rural areas of other frontier provinces), combined with the lack of coins, may point towards the main reason for the limited volume of commercial transactions in the areas surrounding the forts. These military sites were obviously located in the middle of the Roman countryside and they were probably in communication only with nearby villages and *komai* that held fairs at regular weekly or monthly intervals. The soldiers may have participated actively in the commercial transactions that took place there, but their participation may not have been as frequent as in the case of urban markets. Furthermore, since the basic needs of the army were already covered by the Roman state, the soldiers may not always have been willing to travel to a village in order to pay for luxury goods and services.

Although we cannot ignore the partial monetization of the periodic markets in the rural areas, we should not forget that the urban markets were constantly in operation throughout the year and that they served not only the city dwellers, but also occasional visitors, whether these were merchants or inhabitants of the countryside. It is almost tautologous to say that the volume of transactions in the urban markets was much higher than in rural marketplaces. Furthermore, the administration of the Roman Empire depended heavily on bureaucratic mechanisms formed within the urban centres, which organized most aspects of provincial life and local politics. In all likelihood, the maintenance of the civic administration promoted the monetization of the area, since the majority of payments for public buildings, gymnasia, theatres, festivals, largesses, and other expenses would have been distributed in the form of cash rather than goods.⁸⁴ Administrative expenditure, combined with the acquisition of luxuries and services by the wealthy elite, who also resided in the cities, must have contributed further to the monetization of the most urbanized regions. Meanwhile the fortress-cities near the frontiers also contributed to monetization. The process of monetization was thus closely linked to the process of urbanization of the provinces.

In conclusion, I suggest that the monetization of the Roman Empire depended mainly on the levels of urbanization and on the extent of trading activities, although the economic role of troops in

⁸⁴ For the expenses of a Roman city in Egypt see R. Alston, *The City in Roman and Byzantine Egypt* (London, 2002), 193–6.

the provinces should not be completely ignored. The abundance of numismatic evidence from the regions along the northern frontier may indicate a higher degree of urbanization, which was indeed partly a consequence of the existence of a large number of troops in these areas. However, the impact of the army was indirect, and the monetization of the local markets was, rather, instigated by the creation of large urban centres that attracted merchants from distant areas and peasants from the countryside as well as soldiers from nearby military installations. The cities of Syria, on the other hand, already attracted regional and inter-regional merchants to their territories, even before the Romans annexed the province. The exchange of commodities for money is indicated by the abundance of coins found in the course of excavations and field surveys near or in urban centres. The absence of similar quantities of coins from the military forts of Asia Minor and Syria strongly indicates that the army was not the only factor in the monetization of the Empire. It is not a coincidence that most coin hoards and coin finds have come from areas such as Syria, the regions around the Black Sea, and the Danube, where trade routes existed, international trade flourished, and powerful cities were built. Perhaps it is time to start regarding the army as a smaller part of a wider Roman monetary economy that was actually defined by a number of diverse economic forces.

APPENDIX 1

Coin Finds from Urban Sites in Dacia

Ulpia: I. Winkler, 'Descoperiri monetare in Ulpia Traiana Sarmizegetusa', *Sargetia* 11–12 (1974–5), 117–36; E. Chirilă et al., 'Descoperiri monetare antice in Transilvania (XII)', *Acta Musei Porolissensis* 2 (1978), 60; D. Alicu, *Ulpia Trajana Sarmizegetusa. Amfiteatrul* (Cluj-Napoca, 1997); D. Alicu et al., *Cercetări arheologice la Sarmizegetusa* (Campania, 1992–3); Gazdac, 'Monetary Circulation' [n.11], 729–32.

Napoca: N. Vlassa, 'Două descoperiri monetare post-aureliene in Transilvania', *SCIVA* 15/1 (1964), 139–41; D. Protase, *Problema continuității in Dacia in lumina arheologiei și numismaticii* (Bucharest, 1966), 96; B. Mitrea, 'Descoperiri

recente și mai vechi de monede antice și bizantine in Republica Socialistă România', *SCIVA* 18/1 (1967), 188–202, esp. 198, no. 47; id., 'Descoperiri recente și mai vechi de monede antice și bizantine in Republica Socialistă România', *SCIVA* 19/1 (1968), 169–82, esp. 177, no. 51; E. Chirilă et al., 'Descoperiri monetare antice in Transilvania (XII)', *Acta Musei Porolissensis* 2 (1978), 53–7; E. Chirilă, 'Descoperiri monetare antice in Transilvania (XI)', *Studii și Comunicări Sibiu* 18 (1974), 136; B. Mitrea, 'Découvertes monétaires en Roumanie—1987 (XXXI)', *Dacia* ns 32 (1988), 217, no. 19; G. Boenaru Bordea and B. Mitrea, 'Découvertes monétaires en Roumanie—1993 (XXXVII)', *Dacia* ns 38–9 (1994–5), 459–77, esp. 466, no. 37.

Sucidava = Celei: B. Mitrea, 'Descoperiri recente și mai vechi de monede antice și bizantine in Republica Populară Română', *SCIVA* 15/4 (1964), 568–82, esp. 575, no. 44; D. Tudor, 'Sucidava (II)', *Dacia* 7–8 (1937–40), 359–400, esp. 393–9; D. Tudor, 'Sucidava (III)', *Dacia* 11–12 (1945–7), 145–208, esp. 202; C. Preda, 'Circulatia monedelor romane postaueliene in Dacia', *SCIVA* 26/4 (1975), 441–86; G. Duncan, *Coin Circulation in the Danubian and Balkan Provinces of the Roman Empire, AD 294–578* (London, 1993); Gazdac, 'Monetary Circulation' [n. 11], 743–4.

APPENDIX 2

Coin Finds from Military Sites in Dacia

Buciumi: Gazdac, 'Monetary Circulation' [n. 11], 744–5.

Resculum: ibid. 745. *Certia*: I. B. Matei, *Castrul roman de la Romita-Certia* (Zalău, 1997). *Tihau*: D. Protase, *Orizonturi daco-romane* (Cluj-Napoca, 1995), 235. *Ilisua*: D. Protase, C. Gaiu, and G. Marinescu, *Castrul roman de la Ilisua* (Bistrita, 1997). *Gherla*: Gazdac, *Monetary Circulation* [n. 11], 747–8. *Micia = Vetel*: Gazdac, 'Monetary Circulation' [n. 11], 749. *Hoghiz*: ibid. 750. *Sighisoara*: *Münzen aus der Sammlung des Museums der Stadt Sighisoara* (Sighisoara, 1972), 17 and *passim*; I. Mitrofan and G. Moldovan, 'Castrul roman de la Sighisoara', *AMN* 5 (1968), 99–109. *Inlaceni*: N. Gudea, 'Inlaceni. Incercare de monografie', *Acta Musei Porolissensis* 3 (1979), 232. *Rupea*: *Münzen . . . Sighisoara* 16 and *passim*. *Cumidava = Râșnov*: N. Gudea and I. Popescu, *Castrul roman de la Risnov, Cumidava* (Brașov, 1971), 60. *Praetorium = Mehadia*: N. Gudea, 'Monedele din castrul roman de la Mehadia', *SCIVA* 26/1 (1975), 147–51; M. Macrea, N. Gudea, and I. Motu,

Praetorium. Castrul și așezarea romană de la Mehadia (Bucharest, 1993). *Arutela = Călimănești*: Gazdacm, 'Monetary Circulation' [n. 11], 756. *Slăveni*: ibid. 757. *Racari*: D. Protase, *Problema continuității în Dacia în lumina arheologiei și numismaticii* (Bucharest, 1966), 94, 181, no. 144; D. Tudor, 'Castrum Daciae Inferioris (VIII)', *Apulum* 5 (1965), 233–57. *Hinova*: M. Davidescu and I. Stângă, 'Monedele din castelul roman târziu de la Hinova', *Drobeta* 6 (1985), 75–89; M. Davidescu, *Cetatea romană de la Hinova* (Bucharest, 1989), 87–95. *Pojejena*: E. Chirilă and N. Gudea, 'Descoperiri monetare antice în Banat', *Apulum* 10 (1972), 713–17; B. Mitrea, 'Descoperiri de monede antice și bizantine în republica Socialistă România (XV)', *SCIVA* 23/1 (1972), 133–47, esp. 145, no. 80; D. Bălănescu, 'Descoperiri monetare din sudul Banatului (I)', *Studii și Cercetări de Numismatică* 8 (1984), 129–36, esp. 131, no. 10.

APPENDIX 3

Coin Finds from Fortress Cities in Dacia

Apulum = Alba Julia: B. Csermi, 'Apulum maradványok', *Az Alsófehérmegyei Történelmi Évkönyve* 9 (1987), 35–45; I. Winkler, 'Circulația monetară la Apulum', *AMN* 2 (1965), 213–56; *Münzen... Sighisoara* [see App. 2, Sighisoara]; R. Ocheșanu, 'Monede romane din secolul IV e.n. descoperite la Alba Iulia', *Apulum* 12 (1974), 617–19; V. Moga, 'Notite arheologice apulense', *Apulum* 19 (1981), 79–82; V. Pavel-Popa, 'Descoperiri monetare romane imperiale la Alba Iulia între anii 1957–1980', *Apulum* 19 (1981), 127; M. Blăjan, 'Circulația monetară în județul Alba, argument al continuității populației romanice în Dacia postromană', *Apulum* 22 (1984), 93–112; E. Chirilă and M. Blăjan, 'Descoperiri monetare antice în Transilvania', *Acta Musei Porolissensis* 12 (1988), 191; V. Pavel and V. Moga, 'Descoperiri monetare romane în castrul de la Apulum', *Apulum* 32 (1994), 251–6; V. Suci, 'Descoperiri monetare romane aflate în colecții din județul Alba', *Apulum* 33 (1995), 123–32; E. Nicolae, 'Descoperiri de monede antice și bizantine', *Buletinul Societății Numismatice Romane* 142–3 (1998), 270; G. Poenaru Bordea and B. Mitrea, 'Découvertes monétaires' [see above, under Napoca], 465, no. 21; V. Moga, *Castrul roman de la Apulum* (Cluj-Napoca, 1998), 110–235; Gazdac, 'Monetary Circulation' [n. 11], 732–4.

Porolissum = Moigrad: I. Winkler, 'Despre circulatia monetară la Porolissum', *AMN* 1 (1964), 215–23; *Muzeul Zalău. Catalogul colecției de monete antice* (Cluj-Napoca, 1968); N. Gudea, *Porolissum. Un complex daco-roman la marginea de nord a Imperiului Roman* (Zalau, 1997); Gazdac, *Monetary Circulation* [n. 11], 734–6.

Potaissa = Turda: I. Winkler and A. Hopârtean, *Moneda antică la Potaissa* (Cluj, 1973); E. Chirilă et al., 'Descoperiri monetare' [see above, App. 1, Ulpia], 60; G. Poenaru Bordea and B. Mitrea, 'Découvertes monétaires en Roumanie—1991', *Dacia NS* 36 (1992), 205, no. 51; M. Bărbulescu, *Potaissa* (Cluj-Napoca, 1994), 134.

Drobeta Turnu-Severin: D. Protase, *Problema continuității în Dacia în lumina arheologiei și numismaticii* (Bucharest, 1966), 182, no. 149; I. Stângă, *Viata economică la Drobeta în secolele II–VI p.-Ch.* (Bucharest, 1998).

APPENDIX 4

Coin Finds from Fortress Cities in Pannonia Superior

Carnuntum: Die Fundmünzen der römischen Zeit in Österreich (FMRÖ), iii/ I *passim*; G. Dembski, 'Die Münzen der Lagergrabungen Carnuntum 1968–1978', *Numismatische Zeitschrift* 99 (1985), 5–39; R. Göbl, 'Grabungen im Legionslager Carnuntum 1968–1978', *FMRÖ* 18 (1987); R. Göbl, 'Fundmünzen', *Carnuntum i. Das antike Stadtviertel bei Schloss Petronell* (Mödling, 1993), 59; H. Stiglitz, *Münzen der Grabung (1979–1983)* (manuscript); Gazdac, 'Monetary Circulation' [n. 11], 767–74.

Vindobona: FMRÖ IX, passim.

Poetovio = Ptuj (Slovenia): Die Fundmünzen der römischen Zeit in Slowenien (FMRSI), ii, *passim*; iii, *passim.*

Nevidodunum = Drnovo (Slovenia): FMRSI I, passim; P. Kos, 'The Monetary Circulation in the Southeastern Alpine Region ca 300 BC–AD 1000', *Situla* 24 (1986), 59–79.

Brigetio = Szöny (Hungary): K. Biro-Sey, Coins from Identified Sites of Brigetio and the Question of Local Currency (Budapest, 1977), *passim.*

The Divergent Evolution of Coinage in Eastern and Western Eurasia

Walter Scheidel

Money can take many forms, and has come into existence all over the world. Coinage,¹ by contrast, was independently created on no more than two occasions in history—in the Graeco-Lyidian Aegean perhaps as early as the late seventh century BC, and in the Great Plain of China around two centuries later—and has consequently followed only two distinct trajectories. What I propose to call the ‘Aegean’ type of coinage was characterized by solid, round (albeit occasionally rectangular or oblong) objects endowed with varied visual imagery and manufactured from a number of different metals, most notably—in terms of aggregate value—gold and silver. Chinese coins, on the other hand, were cast rather than struck, equipped with a (usually square) hole in the centre, lacked visual imagery beyond a few letters,

This chapter touches on some elements of my much more detailed study of ‘The Monetary Systems of the Han and Roman Empires’, forthcoming in W. Scheidel (ed.), *Rome and China: Comparative Studies in Ancient World Empires* (New York), which has developed out of the ‘Stanford Ancient Chinese and Mediterranean Empires Comparative History Project’, <<http://www.stanford.edu/~scheidel/acme.htm>>, accessed 21 June 2007. I am indebted to audiences in Beijing, New York, Shanghai, Stanford, and Tokyo for comments on earlier drafts.

¹ There is no obvious or universally accepted definition of ‘coin’. A coin may be described as money in the form of a small, mostly flat (but sometimes curved), usually (though not always) round, metal object that bears some kind of inscription or pictorial motif that has been uniformly applied to a series of such objects. (Modern definitions tend to stress the element of state authority, which must not be presumed for earlier periods.) The essence of ‘money’ is likewise difficult to pin down: it serves as a store and measure of wealth, a unit of account, and—arguably most importantly—as a medium of exchange.

and were not normally minted from precious metals: they consisted primarily of bronze (and sometimes iron), whereas gold and silver money circulated in the forms of ingots. In this chapter, I offer a brief survey of divergent monetary development at the opposing ends of the Eurasian land mass, followed by some preliminary observations on the probable causes of this process that focus on the historically specific circumstances of the creation of these two types of currency.

1. THE EXPANSION OF 'AEGEAN' COINAGE

From the beginning, western Eurasian or 'Aegean' coinage was based on precious metals, initially electrum, a naturally occurring gold-silver alloy that was soon largely replaced by separate gold and silver issues. Silver quickly became the dominant metal of the emerging 'Aegean' coinage system:² after its adoption by key poleis of the Aegean, such as Aegina, Corinth, and Athens and various Ionian and Cycladic communities, silver coinage spread along the main axes of Greek overseas migration, into the Black Sea region in the early sixth century BC, to Sicily and southern Italy in the mid-sixth century BC, and to the coastal settlements in Cyrene, Spain, and Provence. For a quarter of a millennium or so, production of Greek-style precious-metal coins was largely confined to Greek populations and those in close contact with them: from the late sixth century BC onward, Thracians and then Macedonians in the northern Aegean imitated the Greek format, followed by the Lycians in south-western Asia Minor. At roughly the same time, the Lydian variety of 'Aegean' coinage was adopted and modified by the Achaemenid Empire, although coin use appears to have been relatively rare beyond its western (that is, Mediterranean) periphery. Persian silver coins were minted in the first instance in the period of conflict with the Greeks in the first half of the fifth century BC, and hoard finds

² e.g. L. Weidauer, *Probleme der frühen Elektronprägung* (Fribourg, 1975); S. Karwiese, *Die Münzprägung von Ephesus* (Vienna, 1995), i. On pre-coin money, see G. Le Rider, *La Naissance de la monnaie. Pratiques monétaires de l'Orient ancien* (Paris, 2001). The most systematic survey of ancient coins is R. Göbl, *Antike Numismatik* (Munich, 1978), i. 57–130, on which much of this section is based. In this context, 'Aegean' stands for 'Graeco-Lydian' both before and after the Persian expansion.

are concentrated in Asia Minor. Gold issues did not take off until subsidies to Greek states commenced in the late fifth century BC and have predominantly been recovered from hoards in Greece, Cyprus, and Italy.³ It therefore seems that—regardless of the question of chronological primacy—Achaemenid coinage was above all a functional extension of, and response to, Greek coinage. The same holds true for the satrapal issues in western Asia Minor that are more overtly dependent on Greek models, as well as for Carthage, which began to issue Greek-style silver coins at the end of the fifth century BC, initially outside Africa proper, in the context of large-scale warfare against the Sicilian Greeks.⁴

The volume and catchment area of 'Aegean' coinage increased dramatically with the conquests of Alexander the Great in the 330s and 320s BC. As the gold and silver bullion stocks of the Achaemenid court were minted out and put into circulation by Alexander and his warring lieutenants, Greek-style coin came to be produced in large quantities all over the former Persian empire, from Eastern Iran to Mesopotamia, Syria, and Egypt. Gold, temporarily important under Alexander, was once again eclipsed by silver under his successors. Under this influence, north-western India, which had previously begun to develop a—possibly though not necessarily indigenous—tradition of punch-marked silver bars and proto-coins, imported the 'Aegean' model, as did a series of foreign dynasties that successively controlled parts of Central Asia and northern India, from the Graeco-Bactrian and Graeco-Indian regimes (third to first centuries BC) to the Sakas and Pahlavas (first centuries BC and AD) and the Kushan (?first to third centuries AD). The Parthians, who wrested Iran and Mesopotamia from the Seleucids in the second century BC, likewise continued Aegean monetary traditions with silver coins struck on the Attic standard. From the third through the seventh centuries AD, their regional successors, the Sasanid dynasty, continued to mint silver coins, supplemented by occasional gold issues. To the east, the Graeco-Bactrian, Saka, and Pahlavas issues were likewise dominated by silver. Gold assumed somewhat greater importance from the third century AD onward,

³ I. Carradice, 'The "Regal" Coinage of the Persian Empire', in id. (ed.), *Coinage and Administration in the Athenian and Persian Empires* (Oxford, 1987), 73–108.

⁴ See most recently I. Lee, 'Entella: The Silver Coinage of the Campanian Mercenaries and the Site of the First Carthaginian Mint 410–409 BC', *NC* 160 (2000), 1–66.

in the late Kushan period and especially with the Kushano-Sasanid issues of the second half of the fourth century AD. The White Huns subsequently returned to silver coinage while the Gupta dynasty in India (fourth to eighth centuries AD) favoured gold dinars.

In the west, the spread of Greek-style coins into the interior of Europe—among Celtic and Iberian groups—is difficult to date, although it appears that this process did not gain momentum until the second century BC, resulting in varied output in Spain, Gaul, the Alpine region, and the Balkans, as well as in the southern half of Britain. Gold and silver issues coexisted and varied in relative prevalence depending on the local metal supply.

At the early stages of 'Aegean' coinage, small denominations were invariably expressed in fractional silver coins of frequently minuscule weight (down to 0.2 g), which were produced in what could be very large quantities and predominantly for local use.⁵ Fractional bronze coinage that combined low value with greater user-friendliness only appeared in the mid-to-late fifth century BC. Bronze gained greater importance in the Hellenistic successor states, especially in Ptolemaic Egypt. It played only a limited role in the Parthian Empire but was more common among the Graeco-Bactrians and in the early Sasanid period.

In Italy, the archaic tradition of producing heavy metal bars of bronze (from c.200 to c.400 g) that was found among Etruscans, Samnites, and in Rome was gradually superseded by the introduction of Greek-style silver coins. Within the territories under Roman control, this process commenced with the production of Campanian silver staters from the late fourth century BC onward, followed by the *quadrigatus* and denarius silver coins in the second half of the third century BC. Bronze money shrank to coin-sized items and was increasingly marginalized by silver: by the second century BC, bronze may not have accounted for more than 10–15 per cent of the aggregate value of the Roman money stock.⁶ Roman expansion initiated a protracted process of monetary unification: the absorption and recoinage of much eastern Mediterranean silver in the first century BC and the concurrent demise

⁵ H. S. Kim, 'Small Change and the Moneyed Economy', in P. Cartledge, E. E. Cohen, and L. Foxhall (eds.), *Money, Labour and Land: Approaches to the Economies of Ancient Greece* (London, 2002), 44–51.

⁶ K. W. Harl, *Coinage in the Roman Economy, 300 B.C. to A.D. 700* (Baltimore, 1996), 47.

of local precious-metal coinages in the western Mediterranean and its hinterlands; massive injections of coined gold from the mid-first century BC onwards that created a trimetallic system of gold, silver, and base metal coins, dominated—in terms of value—by gold and silver; the destruction of Greek-style provincial silver coinages in the eastern Mediterranean in the mid-third century AD; and repeated reminting programmes and standardized Empire-wide reissues of new formats since the early fourth century AD. Progressive debasement of the imperial silver currency in the third century AD created a de facto—and, from the 370s, formal—two-tier system of (stable) gold coin and (unstable) base metal coin, the latter subject to cyclical debasement and inflation. The late Roman gold standard survived in the Byzantine Empire via the *solidus* and later the *hyperpyron*, complemented by bronze coins, all the way up to the fourteenth century.

Under late Roman and Sasanid influence, the kingdom of Axum in Ethiopia produced gold and silver coins from perhaps as early as the third century AD into the Middle Ages. Starting in the fifth century AD, imitations of Roman coins also appeared in the western parts of the disintegrated Roman Empire, including silver and bronze coins of the Vandals (fifth/sixth centuries AD), gold, silver, and bronze of the Ostrogoths (sixth century AD), mostly gold of the Visigoths (fifth to eighth centuries AD), the Suebians of Spain (fifth/sixth centuries AD), and the Lombards in Italy (since the late sixth century AD), while the Merovingian Franks shifted from gold to silver. From the eighth to the twelfth centuries, the latter was essentially the only metal used in western European minting. Gold coin returned in the thirteenth century and regular base-metal denominations in the fifteenth century, in both cases spurred by Italian pioneer issues. With European colonization, these extensions of the 'Aegean' currency tradition gradually spread all over the globe.

2. THE CREATION AND PERPETUATION OF CHINESE COINAGE

East Asia was the only exception. In the first millennium BC, China had developed a separate type of coinage that was characterized by

the inclusion of a central hole in round coins (in China as well as in the secondary monetary traditions of Korea, Vietnam, and Japan) and, more importantly, by the complete dominance of base-metal coins (a Chinese feature that was not always replicated by neighbouring cultures). The whole region did not fully adopt 'Aegean' conventions until growing Western influence and the introduction of foreign equipment facilitated the transition to solid coins in Japan (after the Meiji Restoration of 1867) and Korea (in the 1880s), and to solid as well as precious-metal coins in China (mostly in the late nineteenth century). The shunning of precious-metal coinage by successive Chinese dynasties over the course of more than 2,000 years marks out China as unique among all state-level societies that used coin, and raises two questions: Why did Chinese coinage develop differently from the 'Aegean' model, and why was its distinctive character maintained for a very long time even as economic circumstances changed and contact with 'Aegean' coin gradually intensified? These are complex problems that require much more detailed analysis than is possible here.

Historical Overview

In pre-imperial China, money took the form of cowrie shells, both originals and—increasingly—bronze imitations, tortoise shells, weighed gold, and (rarely) silver bars, and most notably—from at least 1000 BC onward—utensil money in the shape of spade blades and knives made of bronze.⁷ Initially large and quasi-functional, utensil money gradually shrank in size and weight until monetary objects ranged from about 7 to 30 g. Round coin appeared in the fourth century BC in the states of the central Great Plain, the economically most developed part of early China: likewise manufactured of bronze and

⁷ X. Peng, *A Monetary History of China* (Bellingham, 1994), i–ii, is the most comprehensive study of Chinese monetary history. For the pre-imperial period, see Y.-C. Wang, *Early Chinese Coinage* (New York, 1951) and now F. Thierry, *Monnaies chinoises*, i. *L'Antiquité préimpériale* (Paris, 1997). K. Peng, 'Coinage and Commercial Development in Eastern Zhou China' (Ph.D. thesis, Chicago, 2000) is the most sophisticated study of money in the Spring-and-Autumn and Warring States periods.

endowed with (mostly square) holes, these objects may have been modelled on earlier similarly shaped but much more valuable jade disks, and were cast according to regional weight standards with a variety of legends but no pictures. With the kingdom of Qin's conquest of the rival warring states in the 220s BC, the Qin *banliang* (i.e. 'half-ounce' (7.6 g)) coin became the official standard throughout the region, at least in theory if not immediately in practice. This imperial bronze currency was supplemented by gold that circulated as bullion, a two-tier system that was retained by the early Han dynasty (from 206 BC onward) which relied on a combination of gold (weighed but only occasionally cast in units of 1 *jin* = 16 *liang*, or 244 g) and increasingly underweight *banliang* coins. In the 110s BC, the reformist emperor Wu imposed a state monopoly on the production of bronze coins and replaced the (nominal) *banliang* issues with the *wuzhu* ('five grains') bronze coin of 3.2 g. For more than three centuries, with only a brief interruption during the Wang Mang usurpation of AD 6–23, *wuzhu* coins were cast in very large quantities: a textual reference to the production of 28 billion coins within a little over 110 years implies a mean annual output of some 230 million coins (using 750 tons of bronze), which translates to 7 or 8 coins per second.⁸

Notwithstanding considerable weight debasement in the early Han period, the annalistic tradition suggests that—within certain margins of tolerance—the intrinsic (metal) value of coins was supposed to match their nominal value.⁹ A Qin law from the mid-third century BC that required subjects to accept 'round coins' at their face value

⁸ For the textual sources, see N. L. Swann, *Food and Money in Ancient China: The Earliest Economic History of China to A.D. 25. Han Shu 24 with Related Texts, Han Shu 91 and Shih-chi 129* (Princeton, 1950); for the coinage, see F. Thierry, *Monnaies chinoises*, ii. *Des Qin aux Cinq Dynasties* (Paris, 2004). See also Peng, *Monetary History*, 102–85. For Wang Mang's issues, see H. Dubs, *The History of the Former Han Dynasty* (Baltimore, 1955), iii. 507–18; R. Thomsen, *Ambition and Confucianism: A Biography of Wang Mang* (Aarhus, 1988), 88–90, 117–24; H. Ehrend, *Wang Mang und seine Münzen—The Coins of Wang Mang* (Speyer, 2000). The tally of 28 billion is given in *Hanshu* 24B: 19b.

⁹ Chinese monetary history is defined by the tension between the market's assessment of coin according to its intrinsic value and the state's desire to ensure its acceptance at nominal value. For some aspects, see F. Thierry, 'De la nature fiduciaire de la monnaie chinoise', *Bulletin du Cercle d'Études Numismatiques* 30/1 (1993), 1–12. Much of the Han period from Wu's reign onward appears to have been characterized by a better-than-usual match between nominal and intrinsic value.

regardless of their actual weight and sought to outlaw the weighing of coin for private transactions will best be taken to reflect metallistic preferences among civilians. This reading is supported by a Han memorial of 175 BC which observes that in market transactions, additional coins were added to compensate for underweight specimens: intrinsic value trumped nominal value.¹⁰ Furthermore, sporadic experimentation with strongly overvalued token coins under Wu and especially under Wang Mang reportedly triggered widespread resistance, counterfeiting, and probably price inflation.¹¹ The success of the *wushu* system for over three centuries of Han rule depended both on availability (i.e. massive output) and reliability (i.e. reasonably solid standards of weight and purity): in a pilot study of weighed *wushu* coins kept at the Département des Monnaies, Médailles et Antiques in Paris, I have been able to show that from the late second century BC to the late second century AD, the imperial mint consistently focused on the official target weight, and that variations from the mean averaged out in larger samples.¹² By contrast, renewed recourse to token coins in the third century AD quickly resulted in inflation and currency collapse.¹³

In keeping with earlier custom, Han gold circulated as ingots, often in the shape of (hollow) deer hoofs. Currently known from twenty-six findspots in fourteen different provinces, these objects varied greatly in terms of weight as well as purity, and were frequently cut into pieces, presumably to facilitate exchange.¹⁴ The extent of gold use for commercial purposes is unknown: gold is primarily mentioned in the context of imperial gifts and expenses and within aristocratic circles, although small-scale gold use by commoners is not unheard of. Taken at face value, some of the reported aggregate

¹⁰ A. F. P. Hulsewé, *Remnants of Ch'in Law: An Annotated Translation of the Ch'in Legal and Administrative Rules of the 3rd Century BC, Discovered in Yün-meng Prefecture, Hu-pei Province, in 1975* (Leiden, 1985), 52 (law); *Hanshu* 24B: 3b–5b (memorial).

¹¹ *Hanshu* 24B: 13a, 14a (Wu); 99B: 14b, 15a, 21b, 25b (Wang Mang).

¹² Forthcoming work based on the data in Thierry, *Monnaies chinoises* [n.8], ii. 171–208.

¹³ Peng, *Monetary History* [n. 7], 170–4.

¹⁴ Z. Li, 'A Preliminary Study of Qin and Han Gold Currency', *Zhongguo shi yanjin* (1997), fasc. 1, 52–61 (in Chinese; English abstract in *China Archaeology and Art Digest* 2/1–2 (1997), 146–7); F. Thierry, 'Sur les spécificités fondamentales de la monnaie chinoise', in A. Testart (ed.), *Aux origines de la monnaie* (Paris, 2001), 109–44 at 132, 140 n. 22.

values are very considerable: 200 tons of gold supposedly disbursed by the emperor Wu (140–87 BC) and 150 tons of gold hoarded in the palace of Wang Mang (AD 23) rival the largest known accumulation of gold in the Roman world and would in principle bestow major monetary importance on gold as a means of exchange and store of value.¹⁵ However, it is unclear how many references to *jin* refer to actual gold or merely represent units of account for allocations that were in fact made in bronze coins.¹⁶ In any case, the sources for the Eastern Han period (AD 25–220) tally a mere five tons of gold handed out as imperial gifts, while silver and even silk assumed greater importance.¹⁷ This apparent scarcity of gold persisted to varying degrees under later dynasties, causing later observers to marvel at references to huge gold stocks in the Western Han and Xin periods, which casts further doubt on the true meaning of these reports.¹⁸

In the most general terms, the dichotomy of uncoined precious metals and coined base metals that had emerged in the pre-imperial period and had been formalized under the Qin and Han dynasties survived until the end of the nineteenth century.¹⁹ The Tang dynasty (618–907) introduced the *bao* ('treasure') coins, essentially a revamped version of the *wushu* format, while gold and silver ingots were used as a store of value and for international transactions.²⁰ In the Northern Song period (960–1127), economic expansion necessitated huge increases in the production of bronze coins and their supplementation by iron issues, until paper money was introduced in 1160 under the Southern Song (1127–1279) to augment the money supply. Paper money, increasingly less adequately backed by precious metal stocks, gained in importance in the Yuan (1271–1368) and

¹⁵ Peng, *Monetary History* [n. 7], 135–6 (Wu); *Hanshu* 99C: 25a–b, with H. Dubs, 'An Ancient Chinese Stock of Gold', *Journal of Economic History* 2 (1942), 36–9 (Wang Mang); cf. Harl, *Coinage* [n. 6], 176. Elite use: Peng, *Monetary History*, 135–8. Commoners: *Jiuzhang suanshu* 6. 3; 7. 5; 8. 7, in K. Vogel, *Neun Bücher arithmetischer Technik: Ein chinesisches Rechenbuch für den praktischen Gebrauch aus der frühen Hanzeit (220 v. Chr. bis 9 n. Chr.)* (Braunschweig, 1968), 63, 72, 84.

¹⁶ Thus Peng, *Monetary History*, 134 n. 1, cf. 136.

¹⁷ *Ibid.* 137–8, 145–6.

¹⁸ *Ibid.* 135 n. 9.

¹⁹ In the Tang and Song periods, gold and silver coins were occasionally minted as special gifts for aristocrats and courtiers, and for deposition in imperial tombs: *ibid.* 280–1, 362–4.

²⁰ *Ibid.* 246–59, 276–82.

early Ming (1368–1644) periods, until it was de facto abandoned in the 1430s. From then on, uncoined silver took over, greatly boosted by the influx of large quantities of silver from the New World and Japan from the mid-sixteenth century onwards. Song coin remained of great importance under the Yuan, and private production of bronze coinage eclipsed occasional attempts by the Ming state to revive public minting. Bronze coin once again assumed greater importance in the Qing period (1644–1911).²¹ While European silver coins had been circulating in China since the Ming period, the state did not issue (hole-less) silver coins until the 1830s, and only in insignificant quantities until 1897.²²

Causation

Why did the early Chinese states privilege bronze coins and—with a single exception (see below)—refrain from coining precious metals? An answer to this question requires consideration of the interplay of several variables: in the following, I focus on the bullion supply; military structures; political and ideological motivations; and path dependence.

The metal supply was arguably of critical importance. The earliest Aegean coins were made of electrum found on Mount Tmolos and in the Paktolos River in Lydia: it has even been argued that this alloy's variable gold and silver content might have encouraged the creation of the coin format per se.²³ Silver dominated the Greek currency system thanks to the deposits of Attica, Thrace, Siphnos, and Samos. Central Asian and Indian gold supported the Kushan and Gupta dinars. Gold issues by Celtic polities were driven by supply, just as bullion imports from Nubia and the Senegal/Niger region accounted for the temporary shift from silver to gold currencies in the early Islamic Middle East, the opening of new mines in twelfth- and

²¹ R. von Glahn, *Fountain of Fortune: Money and Monetary Policy in China, 1000–1700* (Berkeley and Los Angeles, 1996) is the most important study of monetary developments from the Song to the early Qing periods.

²² Peng, *Monetary History*, [n. 7], 668–706. Public gold issues were virtually non-existent (689).

²³ R. W. Wallace, 'The Origin of Electrum Coinage', *AJA* 91 (1987), 385–97.

thirteenth-century Europe ended the previous monetary recession, fourteenth-century gold imports from Guinea facilitated the reintroduction of gold coinage in late medieval Italy, the discovery of rich Tyrolean silver mines in the fifteenth century and subsequent massive transfers from the newly acquired Spanish territories of Mexico and Peru sustained the production and eventual dominance of heavy silver coins in western Europe, and Brazilian gold supported the later British gold currency.²⁴ In the Roman period, the conquest and exploitation of previously marginal gold-rich regions such as north-western Spain, Bosnia, and Dacia had given a massive boost to the Roman imperial gold currency. No comparable resources were available in the Chinese heartland. While the lack of ancient Chinese statistics forestalls direct comparisons between the Roman and Han empires, references to gold and silver output in later dynasties points to dramatic imbalances in the precious metal supply. In the first century AD, the Baebelo mines in Spain reportedly netted 35.4 tons of silver in state revenue alone per year, while the gold mines of Asturia and Bosnia yielded 6.5 and 5.8 tons per year, respectively.²⁵ These data compare extremely favourably with reports that silver mining yields in the entire Tang Empire totalled perhaps half a ton per year, and not more than one ton at their peak (or perhaps up to five times as much if these tallies refer to tax revenue on mining output, still far below Roman levels). Under the early Song, annual output figures ranged from 5.4 to 8.2 tons of silver, with a peak of 33 tons in 1022, accompanied by a puny half-ton of gold.²⁶ If anything, mining yields in the Warring States and Han periods must have been lower still: gold was mostly derived from placer deposits in riverbeds while deep-vein mining, if it occurred at all, appears to have been rare. A recent comprehensive survey of historical mineral extraction in

²⁴ A good example is the switch of the Boii from gold to silver after their move from Bohemia to Slovakia around 60 BC (Göbl, *Antike Numismatik* [n. 2], 118). For the early medieval Middle East, see E. Ashtor, *A Social and Economic History of the Near East in the Middle Ages* (Berkeley and Los Angeles, 1976), 80–1, and for Europe, J. Williams (ed.), *Money: A History* (London, 1997), 78, 80, 162, 165, 176. J. F. Richards (ed.), *Precious Metals in the Later Medieval and Early Modern Periods* (Durham NC, 1983) contains instructive case studies.

²⁵ Harl, *Coinage* [n. 6], 81–2. Dacian output must also have been considerable.

²⁶ Peng, *Monetary History* [n. 7], 278, 430.

China reveals that very few gold mines are known to have operated in the Han period. Silver was rarer still: as silver deposits were overwhelmingly concentrated in the remote south, mining output remained minimal prior to the Tang period.²⁷

These fundamental supply constraints are already reflected in the divergent development of pre-coinage money in eastern and western Eurasia: while 'Aegean' precious-metal coinage had grown out of a well-established Near Eastern and eastern Mediterranean tradition of using weighed silver bullion for monetary purposes, early Chinese civilization—most famously in the Shang and Western Zhou periods—generated an abundance of bronze vessels, a preference that helps account for the growing popularity of utensil money made of the same material. In both cases, precious-metal and bronze coins built on and continued earlier practices.²⁸

Differences in military practice may also help account for the popularity of precious-metal coins in western and central Eurasia and the dominance of bronze coin in ancient China. The incentives for the creation of the earliest coin issues in the Aegean continue to be much debated, and it is true that military demands do not appear to have played a central role, despite the fact that the need to pay mercenaries was once mooted as a possible motive.²⁹ It is also clear that archaic Greek coinage, once it had been adopted by a large number of poleis, was frequently used for market exchange (especially the large quantities of small denominations), and not merely or even predominantly for military purposes. At the same time, the gradual spread of precious-metal coinage beyond the very particular environment of the Greek polis was arguably much more forcefully

²⁷ P. J. Golas, *Science and Civilization in China*, v. *Chemistry and Chemical Technology, Part XIII: Mining* (Cambridge, 1999), 109–23 (gold), 123–36 (silver). Cf. also E. C. Bunker, 'The Enigmatic Role of Silver in China', *Orientalism* 25/11 (1994), 76–7, for the rarity of pre-Tang silver.

²⁸ For long-term continuity in the precious-metal tradition of western Eurasia, see Le Rider, *La Naissance* [n. 2], and above, Ch. 1. The early Chinese fixation on bronze is extremely well documented: P. R. Goldin, 'Ancient Chinese Civilization: Bibliography of Materials in Western Languages' (24 February 2006), at <www.lib.uchicago.edu/early-china/res/bib/Ancient_Chinese_Civilization_Bibliography.pdf> (accessed 21 June 2007), lists some 200 titles pertaining to this issue.

²⁹ R. M. Cook, 'Speculations on the Origins of Coinage', *Historia* 7 (1958), 257–62. For the debate, see most recently Schaps, *IC* 96–101, with discussion of previous interpretations.

driven by military concerns: while the Hellenistic kingdoms, imperial Carthage, and mid-Republican Rome are the most unambiguous examples, various Iranian empires or Iberian and Celtic polities may well belong in the same category. High value and low weight made silver coins in particular useful media for the compensation of professional soldiers, especially compared to unwieldy high-bulk and low-value base metal denominations. In ancient China, the conscription of large numbers of civilians by increasingly well-organized and coercive imperial states obviated the need for cash payments on a large scale.³⁰ There is no clear evidence of monetary stipends in the Warring States and Western Han periods: assuming that troops were provisioned in kind, bronze cash would have been adequate for small additional outlays.³¹ It need not be a coincidence that when the early Tang dynasty restored a uniform imperial bronze currency, it operated a military mobilization system that combined military service with farming, and did not require high-value coin for military payments.³² Moreover, the only western power that initially relied on comparable practices of mass conscription, the Roman Republic, did not feel a pressing need to adopt Greek-style silver coinage until it entered large-scale conflict with Greek and Hellenized competitors, but issued instead (large) bronze denominations for stipends and other disbursements.³³ Ancient China, by contrast, was never drawn into an environment dominated by precious-metal coinage.

Political circumstances likewise favoured a monopoly of bronze coin in early imperial China. The southern state of Chu, one of the main contenders for supremacy over the whole region, was the only (comparatively) gold-rich region in ancient China proper: gleaned from rivers, the gold of Chu accounts for all known finds of gold bullion and the majority of finds of gold objects from the Warring

³⁰ M. E. Lewis, 'Warring States Political History', in M. Loewe and E. L. Shaughnessy (eds.), *The Cambridge History of Ancient China from the Origins of Civilization to 221 B.C.* (Cambridge, 1999), 620–32; 'The Han Abolition of Universal Military Service', in H. van de Ven (ed.), *Warfare in Chinese History* (Leiden, 2000), 33–75.

³¹ Gold and cash were envisioned as special rewards: Peng, *Coinage* [n. 7], 170.

³² D. A. Graff, *Medieval Chinese Warfare, 300–900* (London, 2002), 189–90.

³³ See briefly M. H. Crawford, *Coinage and Money under the Roman Republic: Italy and the Mediterranean Economy* (London, 1985), 22–3, on the introduction of army pay using *aes grave* in 406 bc.

States period.³⁴ From the fifth to the third centuries BC, the government of Chu oversaw the production of small squares of gold that were cast as parts of large sheets stamped with a series of (ideally) rectangular seal marks. Individual squares could be broken or cut off for separate use. Each stamp bore the denomination (*yuan*) and the name of the Chu capital. Though surviving specimens vary considerably in shape and weight, two samples of reasonably well-preserved rectangles yield a mean weight of approximately 15 g, which is consistent with a target weight of 1 *liang* (15.3 g).³⁵ At 1.9 times the weight of an Augustan *aureus* or 3.4 times the weight of a Constantinian *solidus*, this renders the average Chu gold unit functionally equivalent to a large gold coin. The actual monetary importance of these gold rectangles is obscure: according to an observer from the Song period over 1,000 years later, ‘very many people’ had found specimens in the ground and in rivers, which may indicate that they had not been uncommon and had perhaps been used in similar ways as Aegean precious-metal coins.³⁶ There is no indication that these gold plates were issued beyond Chu’s conquest by Qin in 223 BC: while specimens continued to be hoarded into the Eastern Han period, the nature of these items—with the name of the rival Chu capital stamped on the obverse—makes it highly unlikely that they could be manufactured under the centralizing Qin regime. As a later source observed, ‘if the coinage is unified, the people will not

³⁴ Peng, *Monetary History* [n. 7], 72–3; W. Ran, ‘Gold and Silver Production in the Spring and Autumn and Warring States Periods in the Light of Archaeological Findings’, *Xibei Daxue xuebao* (1997), fasc. 2, 96–100 (in Chinese; English abstract in *China Archaeology and Art Digest* 1/2 (1997), 131–2); Peng, ‘Coinage’ [n. 7], 209–12. On Chu in general, see esp. C. A. Cook and J. S. Major (eds.), *Defining Chu: Image and Reality in Ancient China* (Honolulu, 1999).

³⁵ N. V. Ivotchkina, ‘The Early Chinese Chu Gold Plates, 5th–3rd cent. B.C.’, in *Proceedings of the 11th International Numismatic Congress* (Louvain-la-Neuve, 1993), iii, 329–32; Peng, *Monetary History* [n. 7] 73–4; D. Lu and Y. Wu, ‘Chu Gold Coins Unearthed in Hubei’, *Zhongguo qianbi* (1997), fasc. 1, 38 (in Chinese; English abstract in *China Archaeology and Art Digest* 2/1–2 (1997), 147); Peng, ‘Coinage’, 209–12. The same target weight of 1 *liang* is arguably implied by a sample of 5 small Han ‘deer-hoof’ gold ingots: Peng, *Monetary History* [n. 7], 144 n. 68. Cf. D. Hou, ‘A Supplementary Study of the Units of Measurement of Chu Gold Currency, and a Discussion of Three Groups of Bronze Weights with Inscriptions from Chu Tombs’, *Zhongguo qianbi* (1996), fasc. 1, 10–12 (in Chinese; English abstract in *China Archaeology and Art Digest* 2/1–2 (1997), 145–6) on gold measurement standards.

³⁶ Peng, *Monetary History* [n. 7], 73 n. 26.

serve two masters' (*Hanshu* 24B: 5b). A possible parallel in the form of gold ornaments with inscribed weights found at Yanxiadu, the capital of the northern state of Yan from 311 to 222 BC, likewise does not appear to have outlasted the Qin conquest: in this case, however, even less is known about the purpose of these items.³⁷ Overall, we need to combine the factors of metal supply and conquest: whereas only Chu produced enough bullion to maintain a proto-coinage in gold while the other states relied on bronze, the ultimate success of Qin (with its bronze *banliang* coins) led to the suppression of alternative forms of cast money. We can only speculate what might have happened if Chu had emerged victorious: while supply constraints would still have militated against the creation of an imperial gold currency on the Roman scale, precious-metal denominations could well have been retained as a potent symbol of the conquering power. The actual outcome of the conflict between Qin and Chu adds an element of contingency to the fundamental ecological constraints imposed by the metal supply and the systemic features of military service.

This raises related issues, those of ideological conservatism and attendant path dependence. The triumph of the 'bronze-coin' state of Qin over the 'gold-square' state of Chu and assorted other rivals lies behind the later statement that 'actual gold which weighed one *yi* was given the name "currency of the first class", and while the copper coins were the same as the Zhou cash on the reverse surface, their inscription read *banliang*, and their weight accorded with the legend' (*Hanshu* 24B: 3a). Although this claim is untrue in so far as there is no evidence of normed *yi*-sized gold ingots and the actual weight of the *banliang* coins regularly fell short of half a *liang*, it may nevertheless reflect the official standard that imposed uniform—if notional—conventions and sought to define 'proper' money to the extent that not even silver was deemed an acceptable monetary medium: according to this version of the new imperial reality, 'pearls, jade, tortoise [shell], cowries, silver, and tin... were not money' (*ibid.*). The Han regime, though at least initially rather weak and unable to enforce monetary regulations across its heterogeneous realm, officially adopted equivalent arrangements. Once this system

³⁷ E. C. Bunker, 'Gold in the Ancient Chinese World: A Cultural Puzzle', *Artibus Asiae* 53 (1993), 45–6.

had been in place for several centuries, any deviation from the putatively 'universal' gold-bar/bronze-coin norm of a universal empire seemed remarkable: this is why the use of silver or gold for the manufacturing of coins was specifically noted among the strange habits of distant barbarians such as Parthians and Romans.³⁸ When the Chinese state finally encountered 'Aegean' coinage after its expansion into the Tarim Basin of Xinjiang that bordered on the emerging Kushan Empire, hybrids in the form of solid coins with Hellenic (or Graeco-Indian) motifs on one side and Chinese symbols (or weight marks) on the other ensued but remained confined to that transitional frontier.³⁹ Sasanid and early Byzantine precious-metal coins that later arrived in China proper ended up as jewellery. The issue of massive amounts of Qin-Han-style bronze coins became a defining characteristic of the restorationist dynasties of Tang and Song. As the pedigree of the dichotomy of uncoined precious metal bars and coined base metal kept growing with increasing age, precious-metal coins became ever less conceivable. A real-life counterfactual is conveniently provided by Japan, which began to imitate early Tang coins from the late seventh century AD onwards. In the first phase of production, in the Nara and Heian periods, the dominant copper issues were occasionally supplemented by silver (and once even gold) coinage. Following a prolonged hiatus beginning in the tenth century when Japan relied on imported Song cash, the revival of minting in the fifteenth century once again generated gold and silver coins alongside the greatly expanding growing copper currency.⁴⁰ Despite strong Chinese influence with respect to design and the conventional emphasis on low-value copper cash, the Japanese were perfectly

³⁸ D. D. Leslie and K. H. J. Gardiner, *The Roman Empire in Chinese Sources* (Rome, 1996), 224–5.

³⁹ F. Thierry, 'Die Geschichte des chinesischen Geldes von den Ursprüngen bis zum Beginn des 20. Jahrhunderts', in W. Seipel (ed.), *Geld aus China* (Vienna, 2003), 73, 76; Williams, *Money* [n. 24], 139.

⁴⁰ The earliest archaeologically known coins only slightly predate the canonical date of AD 708 for the first emission: *The Japan Times*, 20 January 1999. For brief summaries of pre-Meiji monetary history, see W. H. McCullough, 'The Capital and Society', in D. H. Shively and W. H. McCullough (eds.), *The Cambridge History of Japan* (Cambridge, 1999), ii. 162, 164; G. C. Hurst, 'Inse?', same vol., 636–7; A. Naohiro, 'The Sixteenth-Century Unification', in J. W. Hall (ed.), *The Cambridge History of Japan* (Cambridge, 1991), iv. 61–2; T. Tatsuya, 'Politics in the Eighteenth Century', same vol., 453.

willing to convert precious metals into coin.⁴¹ By far the strongest evidence of Chinese monetary path dependence is furnished by the fact that even after the influx of thousands of tons of silver from Japan and especially from the Spanish colonies in the New World enabled late Ming China to maintain a silver-based monetary system, silver continued to circulate as weighed bullion and was never converted into regular coin.⁴²

Taken together, the environmental, military, and political conditions detailed in this section help us understand why the early Chinese states mostly relied on low-value bronze coins (tool-shaped or round), alternative formats were suppressed upon imperial unification, and the Qin and early Han regimes endeavoured to impose a two-tier currency system of uncoined gold and coined bronze. However, while these factors may arguably be sufficient to account for the initial characteristics of Chinese coinage, they fail to explain the subsequent rigidity of the monetary tradition in the face of changing circumstances. Thus, the shift to professional armies first in the Eastern Han period and once again under the late Tang and the Song failed to encourage the introduction of (objectively useful) precious-metal coin, while a dramatic increase in the silver supply in the late Ming period likewise proved to be of no consequence for the character of the imperial coinage. This long-term inflexibility stands in marked contrast not only to China's own willingness to experiment with paper money on a large scale but also to the monetary traditions of a large number of historical states that repeatedly adapted their currency systems to changes in metal supply or monetary demand. Against this background, ideological traditions must be assumed to have been instrumental in maintaining the conventional metallistic model. 'Path dependence' is merely a description of a process, and not its explanation: the roots of China's monetary exceptionalism may need to be sought in the specific properties of the belief system that shaped the decisions of the imperial ruling class, a search that calls for a cross-cultural perspective. Comparative monetary history requires us to draw on

⁴¹ Korea and Annam (Vietnam), by contrast, were more closely integrated into the Chinese cash system and did not mint precious-metal coins until the nineteenth century: P. Grierson, *Numismatics* (London, 1975), 64–5, 70–1.

⁴² Von Glahn, *Fountain of Fortune* [n. 21], 113–41.

a wide variety of variables well beyond the sphere of—ultimately descriptive—numismatics.

3. FURTHER QUESTIONS

What is the utility of macro-historical comparisons of this kind? It is difficult to assess the significance and causal mechanisms of a particular historical development—such as the creation of precious-metal coinage—without considering alternatives, be it hypothetical counterfactuals (asking what would have had to be different in order to generate different outcomes, which in turn helps identify the critical features that resulted in observed outcomes) or actual counterexamples, such as the bronze-coinage tradition of imperial China (enabling us to ask what did in fact happen differently, and why). Thus far, my survey has focused on explaining specific developments in China—what I have termed Chinese ‘monetary exceptionalism’—as if developments in other parts of the world could safely be considered ‘normal’, that is, not in comparable need of explication.

In some sense, this position, while undoubtedly politically incorrect (imputing as it does normative status to ‘Western’ conventions), need not be entirely without merit. ‘Normal’, understood in purely quantitative terms, does not necessarily entail value judgements but merely denotes relative frequency. In this respect, ‘Aegean’ coinage, in its manifold global manifestations, would seem to have a strong claim to normative status: many different societies across the world saw some merit in coins made of gold and silver, and issued them accordingly. At the same time, we must bear in mind that the expansion of ‘Aegean’ conventions owed much to successful imperialism (most notably the eastern conquests of Alexander the Great or the western conquests of Rome) or its indirect consequences. The adoption of precious-metal coinage by societies that had previously had little use for it (such as Carthaginians or Romans, or various Central Asian regimes succeeding the Graeco-Bactrian kings) in the context of their incorporation into an established Hellenistic ‘world system’ may reflect another case of—self-reinforcing—path dependence: the more prevalent these coins became, and the more they were

associated with dominant powers, the more likely they were to be adopted by outsiders and newcomers.

In the final analysis, there is nothing inherently 'normal' or inevitable about the conversion of gold and silver into standardized coin: the minting of precious metals entails losses through surface wear that could be reduced by the exchange of more substantial ingots (although the apportioning of gold or silver into small slivers similarly causes wastage), and—from the vantage point of established elites—might have the socially and politically undesirable consequences of undermining traditional hierarchies by concentrating considerable wealth in standardized and exceedingly mobile units of exchange, an aspect that has recently attracted attention in studies of the impact of Archaic Greek coinage.⁴³ The main pragmatic advantage of precious-metal coin may be located at the intermediate level between the use of individual base-metal denominations for petty transactions and the—functionally interchangeable—use of either gold and silver bars or large numbers of gold and silver coins. The *Jiuzhang suanshu*, a mathematical manual of the Western Han period, suggests that seven cows could change hands for 173 grams of gold, whereas in other examples the same transaction would require between 27 and 41 kilograms of bronze coins: no (official) intermediate media were available (8.7–8 and 11). Yet it is primarily—and perhaps even exclusively—in the military sphere that the portability and fungibility of normed units of silver in particular would greatly outweigh the utility of either tiny amounts of cut precious metal or large numbers of bronze coins.

The Phoenician and Carthaginian experience shows that there is nothing inevitable about coinage: for a considerable amount of time, trade and other interaction with the coin-bearing Greeks prompted little or no desire for imitation.⁴⁴ Coins are not inherently irresistible. Nor, as the Chinese case demonstrates, is the coining of gold and

⁴³ L. Kurke, *Coins, Bodies, Games, and Gold: The Politics of Meaning in Archaic Greece* (Princeton, 1999), esp. 41–64, 101–29.

⁴⁴ On Phoenician coinage—produced from the mid-fifth century BC onwards under Greek influence and presumably for trade with Greeks, and more widely used only in the fourth century BC, see J. Elayi and A. G. Elayi, *Trésors de monnaies phéniciennes et circulation monétaire (Ve–IVe siècles avant J.-C.)* (Paris, 1993). Carthage did not mint coins until the end of the fifth century BC, and from then on for conflict with the Greeks (cf. Lee, 'Entella' [n. 4]).

silver a logical corollary of the minting of bronze: the latter may occur on a vast scale even in the complete absence of the former. It also shows that superficially similar conditions fail to encourage comparable design choices. Both Archaic Greek coins and the utensil money and round coins of Warring States China developed in environments of political fragmentation and inter-state competition: yet whereas Greek issues from the beginning emphasized sacred images and other community-related symbols, Chinese states favoured the less intuitively distinctive combination of central hole and peripheral legend. A comparative appraisal of the cultural contexts and possible causes of these contrasting developments is long overdue but cannot be attempted here.

The eventual near-global success of the 'Aegean' tradition might tempt us to assume that gold and silver issues with pictorial imagery represent a default position in coin production. The Chinese experience, however, establishes that large-scale coin use requires neither precious metals nor pictures. Inevitably, a sample of two (that is, two independent instances of the invention of coinage) makes it impossible to judge the 'typicality' of either case. As I argued above, both the circumstances surrounding the creation of the ancient Chinese imperial currency system and the reasons for its long-term durability (alongside greater flexibility within China's own sphere of monetary influence, such as in Japan) warrant careful consideration and comparative analysis. Yet the same applies in equal measure to the specific characteristics of the 'Aegean' model: was an appetite for putting small normed precious-metal objects with vibrant imagery in the hands of commoners a peculiar function of the nature of the Greek polis? Recent research suggests that there may well have been something quintessentially 'Greek' about this process.⁴⁵ Enhanced awareness of the 'Chinese alternative' and its genesis will aid us in the vital task of defamiliarizing and reproblematising the 'Aegean' experience.

⁴⁵ e.g. S. von Reden, *Exchange in Ancient Greece* (London, 1995); ead. 'Money, Law, and Exchange: Coinage in the Greek polis', *JHS* 117 (1997), 154–76; Kurke, *Coins* [n. 43]; Schaps, *IC* 108–9.

References

For reasons of space, reports of coin finds in the Danube provinces mentioned only in the appendices to Chapter XII have been omitted.

- ALFÖLDI, M. R., 'Der Stater des T. Quinctius Flamininus', *Numismatische Zeitschrift* 98 (1984), 19–26.
- ALSTON, R., 'Roman Military Pay from Caesar to Diocletian', *JRS* 84 (1994), 113–23.
- *Soldier and Society in Roman Egypt* (London, 1995).
- *The City in Roman and Byzantine Egypt* (London, 2002).
- ANDREAU, J., *Les Affaires de Monsieur Jucundus* (Rome, 1974).
- 'M. I. Finley, la banque antique et l'économie moderne', *Annali della Scuola Normale Superiore di Pisa*, ser. 3, 7 (1977), 1130–52.
- 'Histoire des métiers bancaires et évolution économique', *Opus* 3 (1984), 99–114.
- 'L'État romain face au monde de la banque et du crédit', in *État, fiscalités, économies. Actes du V^e Congrès de l'Association Française des Historiens Économistes* (Paris, 1985), 3–11, repr. in id., *Patrimoines, échanges*, 203–18.
- 'Declino e morte dei mestieri bancari nel Mediterraneo occidentale (II–IV d.C.)', in A. Giardina (ed.), *Società romana e impero tardoantico* (Rome, 1986), i. 601–15, repr. in id., *Patrimoines, échanges*, 133–55.
- *La Vie financière dans le monde romain. Les métiers de manieurs d'argent (IV^e siècle av. J.-C.–III^e siècle apr. J.-C.)* (Rome, 1987).
- 'Les Comptes bancaires en nature', *Index* 15 (1987), 413–22, repr. in id., *Patrimoines, échanges*, 189–201.
- *Patrimoines, échanges et prêts d'argent: l'économie romaine* (Rome, 1997).
- *Banking and Business in the Roman World*, trans. J. Lloyd (Cambridge, 1999).
- 'Commerce and Finance', in *CAH XI*² (2000), 769–86.
- 'Markets, Fairs and Monetary Loans', in Cartledge, Cohen, and Foxhall (eds.) (2002), 113–29.
- 'Le Système monétaire partiellement "fermé" de l'Égypte romaine', in Picard and Duyrat (eds.) (2005), 329–38.

- ANDREAU, J., and MAUCOURANT, J., 'À propos de la "rationalité économique" dans l'antiquité gréco-romaine', *Topoi* 9 (1999), 47–102.
- BRIANT, P., and DESCAT, R. (eds.), *Prix et formation des prix dans les économies antiques: Entretiens d'archéologie et d'histoire* (Saint-Bertrand-de-Comminges, 1997).
- BROISE, H., CATALI, F., GALEOTTI, L., and JOLIVET, V., *Musarna, i. Les Trésors monétaires* (Rome, 2002).
- APERGHIS, G. G., *The Seleukid Royal Economy. The Finances and Financial Administration of the Seleukid Empire* (Cambridge, 2004).
- ARCHIBALD, Z., DAVIES, J. K., and GABRIELSEN, V. (eds.), *Making, Moving and Managing: The New World of Ancient Economies, 323–31 BC* (Oxford, 2005).
- ARDOVINO, A. M., 'Nuovi oggetti sacri con iscrizioni in alfabeto acheo', *Archeologia Classica* 32 (1980), 50–66.
- 'Lingotto in argento con impronte monetarie arcaiche da Paestum', *RIN* 93 (1993), 287–93.
- ARNOLD-BIUCCHI, C., BEER-TOBY, L., and WAGGONER, N. M., 'A Greek Archaic Silver Hoard from Selinus', *American Numismatic Society Museum Notes* 33 (1988), 1–35.
- ARSLAN, M., 'A Hoard of Coins of Zeugma and Antioch from the Mid-Third Century AD', in Ashton and Hurter (eds.) (1998), 47–8.
- ASHTON, R., and HURTER, S. (eds.), *Studies in Greek Numismatics in Memory of Martin Jessop Price* (London, 1998).
- ASHTON, E., *A Social and Economic History of the Near East in the Middle Ages* (Berkeley and Los Angeles, 1976).
- ATWOOD, C. P., *Encyclopedia of Mongolia and the Mongol Empire* (New York, 2004).
- AUBERT, J.-J., 'Monetary Policy and Gresham's Law in the Late Third Century A.D.', in *CM* 245–63.
- BABELON, E., *Traité des monnaies grecques et romaines*, 8 vols., (Paris, 1901–32).
- 'Trouvaille de Tarente', *RN* 4th ser., 16 (1912), 1–40 (repr. in *Mélanges Numismatiques* (Paris, 1912), iv. 304–43).
- BACKENDORF, D., *Römische Münzschatze des zweiten und ersten Jahrhunderts v. Chr. vom Italienischen Festland* (Berlin, 1998).
- BADIAN, E., *Publicans and Sinners* (Oxford, 1972).
- BAER, K., 'The Low Price of Land in Ancient Egypt', *Journal of the American Research Center in Egypt* 1 (1962), 25–45.
- BAGNALL, R. S., *Currency and Inflation in Fourth Century Egypt* (Chico, Calif., 1985).
- 'Agricultural Productivity and Taxation in Later Roman Egypt', *Transactions of the American Philological Association* 115 (1985), 289–308.

- review of H. Cadell and G. Le Rider, *Prix du blé et numéraire*, *Revue Suisse de Numismatique* 78 (1999), 197–203.
- and BOGAERT, R., ‘Orders for Payment from a Banker’s Archive’, *Ancient Society* 6 (1975), 79–108.
- BALL, W., ‘Seh Qubba, A Roman Frontier Post in Northern Iraq’, in French and Lightfoot (eds.) (1989), 7–18.
- BALMUTH, M. S. (ed.), *Hacksilber to Coinage. New Insights into the Monetary History of the Near East and Greece* (New York, 2001).
- BANAJI, J., *Agrarian Change in Late Antiquity. Gold, Labour, and Aristocratic Dominance* (Oxford, 2001).
- BANNERT, H., and PICCOTTINI, G., *Die Fundmünzen vom Magdalensberg* (Klagenfurt, 1972).
- BARATTE, F., *Le Trésor d’orfèvrerie romaine de Boscoreale* (Paris, 1985).
- ‘Il tesoro di Boscoreale’, in *Il tesoro di Boscoreale. Una collezione di argenti da mensa tra cultura ellenistica e mondo romano. Pittura, suppellettili, oggetti vari dalla ‘Pisanella’* (exhibition catalogue) (Milan, 1988), 27–32.
- BARBET, A., and MINIERO, P. (eds.), *La villa San Marco a Stabia* (Naples, 1999).
- BARKER, E., *The Politics of Aristotle* (Oxford, 1946).
- BARLOW, C. T., ‘The *Sanctius Aerarium* and the *Argento Publico* Coinage’, *American Journal of Philology* 98 (1977), 290–302.
- ‘Bankers, Moneylenders and Interest Rates in the Roman Republic’ (Ph.D. thesis, North Carolina, 1978).
- ‘The Roman Government and the Roman Economy, 92–80 B.C.’, *American Journal of Philology* 101 (1980), 202–19.
- BEER-TOBEY, L., GALE, N. H., KIM, H. S., and STOS-GALE, Z. A., ‘Lead Isotope Analysis of Four Late Archaic Silver Ingots from the Selinus Hoard’, in A. Oddy and M. Cowell (eds.), *Metallurgy in Numismatics* 4 (London, 1998), 385–90.
- BELLINGER, A. R. (ed.), *The Excavations at Dura Europos. Final Reports*, vi. *The Coins* (New Haven, 1949).
- BELONGIA, M., ‘Measurement Matters: Recent Results from Monetary Economics Revisited’, *Journal of Political Economy* 104 (1996), 1065–83.
- and CHALFANT, J., ‘The Changing Empirical Definition of Money: Some Estimates from a Model of the Demand for Money Substitutes’, *Journal of Political Economy* 96 (1989), 387–97.
- BETLYON, J. W., ‘Coins, Commerce, and Politics: Coins from the Limes Arabicus Project, 1976–1985’, in S. T. Parker (ed.), *The Roman Frontier in Central Jordan: Interim Report of the Limes Arabicus Project, 1980–1985* (BAR-IS 340 (ii)) (Oxford, 1986), 655–89.

- BERGER, A. *Encyclopedic Dictionary of Roman Law* (Philadelphia, 1953).
- BINGEN, J., *Papyrus Revenue Laws*, Sammelbuch griechischer Urkunden aus Ägypten 1 (Göttingen, 1952).
- *Le Papyrus Revenue-Laws. Tradition grecque et adaptation hellénistique* (Opladen, 1978).
- 'Économie grecque et société égyptienne au IIIe siècle', in Maehler and Strocka (eds.) (1978), 211–19.
- 'Les Tensions structurelles de la société ptolémaïque', in *Atti del XVII Congresso internazionale di papirologia* (Naples, 1984), 921–37.
- BIRO-SEY, K., *Coins from Identified Sites of Brigetio and the Question of Local Currency* (Budapest, 1977).
- BISCARDI, A., *Actio pecuniae traiecticiae*, 2nd edn. (Turin, 1974).
- BOARDMAN, J., *Excavations in Chios 1952–1955. Greek Emporio*, ABSA Suppl. 6 (London, 1967).
- BOGAERT, R., *Les Origines antiques de la banque de dépôt* (Leiden, 1966).
- *Banques et banquiers dans les cités grecques* (Leiden, 1968).
- 'Note sur l'emploi du chèque dans l'Égypte ptolémaïque', *Chronique d'Égypte* 58 (1983), 245–52.
- *Trapezitica Aegyptiaca: recueil de recherches sur la banque en Égypte gréco-romaine* (Florence, 1994).
- 'Liste géographique des banques et des banquiers de l'Égypte romaine', *Zeitschrift für Papyrologie und Epigraphik* 109 (1995), 133–73.
- 'Les Opérations en nature des banques en Égypte gréco-romaine', *Ancient Society* 19 (1998), 213–24.
- BONGHI JOVINO, M. (ed.), *Ricerche a Pompei, L'insula 5 della Regio 6 dalle origini al 79 d.C.* (Rome, 1984).
- BORDO, M. D., and JONUNG, L., 'The Long Run Behavior of the Income Velocity of Money in Five Advanced Countries, 1870–1975: An Institutional Approach', *Economic Inquiry* 19 (1981), 96–116.
- BOREN, H. C., 'Studies Relating to the *stipendium militum*', *Historia* 32 (1983), 427–60.
- BORGONGINO, M., and STEFANI, G., 'Intorno alla data dell'eruzione del 79 d.C.', *RSP* 12–13 (2001–2), 177–215.
- BOSWINKEL, E., and PESTMAN, P. W., *Les Archives privées de Dionysios, fils de Kephala*, Papyrologica Lugduno-Batava 22 (Leiden, 1982).
- BOWMAN, A. K., *Egypt after the Pharaohs* (Berkeley and Los Angeles, 1986).
- BRAUDEL, F., *Civilization and Capitalism, 15th–18th Century*, ii. *The Wheels of Commerce*, transl. S. Reynolds (London, 1982) (original edn.: *Les Jeux de l'échange* (Paris, 1979)).
- BRAUND, D. C., 'Coping with the Caucasus: Roman Responses to Local Conditions in Colchis', in French and Lightfoot (eds.) (1989), 31–9.

- *Georgia in Antiquity: A History of Colchis and Transcaucasian Iberia 550 BC–AD 562* (Oxford, 1994).
- and INAISHVILI, N., ‘Excavation Reports: The Lazika Project’, *Anatolian Archaeology: Research Reports of the British Institute of Archaeology at Ankara* 48 (1998), 3.
- BREGLIA, L., ‘Circolazione monetaria ed aspetti della vita economica a Pompei’, in *Pompeiana, Raccolta di studi per il secondo centenario degli Scavi di Pompei* (Naples, 1950), 41–59.
- BRESCIANI, E., ‘Registrazione catastale e ideologia politica nell’Egitto tolemaico. A completamento di “la spedizione di Tolemeo II in Siria in un ostrakon demotico inedito da Karnak”’, *Egitto e vicino oriente* 6 (1983), 15–31.
- BRESSON, A., ‘Coinage and Money Supply in the Hellenistic Age’, in Archibald, Davies, and Gabrielsen (eds.) (2005), 44–72.
- BRIANT, P., *From Cyrus to Alexander. A History of the Persian Empire* (Winona Lake, Ind., 2002).
- BRIDEL, P., et al., *Tell el Hajj in Syrien. Zweiter vorläufiger Bericht Grabungskampagne 1972* (Bern, 1974).
- BRUNT, P. A., *The Fall of the Roman Republic and Other Essays* (Oxford, 1988).
- BÜLOW-JACOBSEN, A., ‘The Traffic on the Road and the Provisioning of the Station’, in H. Cuvigny (ed.), *La Route de Myos Hormos* (Cairo, 2003), ii. 399–426.
- BUNKER, E. C., ‘Gold in the Ancient Chinese World: A Cultural Puzzle’, *Artibus Asiae* 53 (1993), 27–50.
- ‘The Enigmatic Role of Silver in China’, *Orientalism* 25/11 (1994), 73–9.
- BÜRGE, A., review of J. Andreau, *Vie financière, Gnomon* 61 (1989), 318–25.
- BURKHALTER, F., and PICARD, O., ‘Le Vocabulaire financier dans les papyrus et l’évolution des monnayages lagides en bronze’, in Picard and Duyrat (eds.) (2005), 53–80.
- BURNETT, A. M., ‘The Currency of Italy from the Hannibalic War to the Reign of Augustus’, *AJN* 29 (1982), 125–37.
- ‘Africa’, in Burnett and Crawford (eds.) (1987), 175–85.
- *Coinage in the Roman World* (London, 1987).
- and CRAWFORD, M. H. (eds.), *The Coinage of the Roman World in the Late Republic* (BAR-IS 326) (Oxford, 1987).
- AMANDRY, M., and CARRADICE, I. (eds.), *Roman Provincial Coinage* (London and Paris, 1999), ii/1.
- — and RIPOLLÈS, P. P. (eds.), *Roman Provincial Coinage*, 2 vols. (London, 1992), i.

- BURSTEIN, S. M., *The Hellenistic Age from the Battle of Ipsos to the Death of Kleopatra VII* (Cambridge, 1985).
- BUTCHER, K., 'The Mint at Zeugma', in D. Kennedy, *The Twin Towns of Zeugma on the Euphrates: Rescue Work and Historical Studies*, *JRA Suppl.* 27 (Portsmouth, RI, 1998), 233–6.
- and PONTING, M., 'Rome and the East: Production of Roman Provincial Coinage for Caesarea in Cappadocia under Vespasian', *Oxford Journal of Archaeology* 14 (1995), 63–77.
- BUTTREY, T. V., 'The Athenian Currency Law of 375/4 B.C.', in *Greek Numismatics and Archaeology: Essays in Honor of Margaret Thompson* (Wetteren, 1979), 33–45.
- 'Calculating Ancient Coin Production: Facts and Fantasies', *NC* 153 (1993), 335–51.
- 'The Content and Meaning of Coin Hoards', *JRA* 12 (1999), 526–32.
- and BUTTREY, S. E., 'Calculating Ancient Coin Production, Again', *AJN* 9 (1997), 113–35.
- and COOPER, D., 'Calculating Ancient Coin Production II: Why It Cannot Be Done', *NC* 154 (1994), 341–52.
- CADELL, H., 'Le Prix de vente des terres dans l'Égypte ptolémaïque d'après les papyrus grecs', in S. Allam (ed.), *Grund und Boden in Altägypten* (Tübingen, 1994), 289–305.
- and LE RIDER, G., *Prix du blé et numéraire dans l'Égypte de 305 à 173*, *Papyrologica Bruxellensia* 30 (Brussels, 1997).
- CAHILL, N., and KROLL, J. H., 'New Archaic Coin Finds at Sardis', *AJA* 109 (2005), 589–616.
- CAIRNS, F., 'Chremata dokima: IG XII, 9, 1273 and 1274 and the Early Coinage of Eretria', *Zeitschrift für Papyrologie und Epigraphik* 54 (1984), 145–55.
- CALLU, J.-P., *La Politique monétaire des empereurs romains de 238 à 311* (Paris, 1968).
- BRENOT, C., BARRANDON, J.-N., and POIRIER, J., 'Aureus obryziacus', in *L'Or monnayé* (Paris, 1985), i, 81–112.
- CAMODECA, G., 'Per una riedizione dell'archivio puteolano dei Sulpicii', *Puteoli* 9–10 (1985–6), 3–40.
- *Tabulae Pompeianae Sulpiciorum*, 2 vols. (Rome, 1999).
- 'Il credito negli archivi campani: il caso di Puteoli e di Herculaneum', in *CM* 69–98.
- CANTILENA, R., 'Monete', in M. Bonghi Jovino (ed.), *Ricerche a Pompei, L'insula 5 della Regio 6 dalle origini al 79 d.C.* (Rome, 1984), i, 69.
- CARRADICE, I., 'The "Regal" Coinage of the Persian Empire', in I. Carradice (ed.), *Coinage and Administration in the Athenian and Persian Empires* (BAR-IS 343) (Oxford, 1987), 73–108.

- and PRICE, M., *Coinage in the Greek World* (London, 1988).
- CARRIÉ, J.-M., 'Solidus et crédit: qu'est-ce que l'or a pu changer?', in *CM* 265–79.
- 'L'Arithmétique sociale de l'économie agraire. Prix de la terre, rente foncière et prix des céréales dans l'Égypte romano-byzantine', in *FPF* 121–46.
- and ROUSSELLE, A., *L'Empire romain en mutation des Sévères à Constantin* (Paris, 1999).
- 'Aspects concrets de la vie monétaire en province', *RN* 159 (2003), 175–203.
- 'L'Institution annonaire de la première à la deuxième Rome: continuité et innovation', in B. Marin and C. Virlouvet (eds.), *Nourrir les cités de Méditerranée. Antiquité—temps modernes* (Paris, 2003), 153–211.
- CARRUTHERS, B. G., 'The Sociology of Money and Credit', in N. J. Smelser and R. Swedberg (eds.), *The Handbook of Economic Sociology*, 2nd edn. (Princeton, 2005), 355–78.
- CARTLEDGE, P., COHEN, E. E., and FOXHALL, L. (eds.), *Money, Labour and Land. Approaches to the Economies of Ancient Greece* (London, 2002).
- CASEY, P. J., *Roman Coinage in Britain* (Aylesbury, 1980).
- *Understanding Ancient Coins: An Introduction for Archaeologists and Historians* (London, 1986).
- CASSON, L., 'New Light on Maritime Loans: P.Vindob. G 19792 (= SB VI 9571)', in *Studies in Roman Law in Memory of A. Arthur Schiller* (Leiden, 1986), 11–17.
- CASTIGLIONE MORELLI, V., 'Un gruzzolo dalla stanza degli Ori di Oplontis', *RSP* 11 (2000), 187–234.
- and VITALE, R., 'L'insula 8 della Regione 1: un campione di indagine socio-economica', *RSP* 3 (1989), 185–221.
- CERATO, I., 'La casa 1, 11, 9–15 di Pompei', *RSP* 11 (2000), 117–31.
- CHANDAVARKAR, A. G., 'Monetization of Developing Economies', *International Monetary Fund Staff Papers* 24 (1977), 665–721.
- CHIRILĂ, E., CHIDIOSAN, N., LUCACEL, V., and MILEA, Z., *Descoperiri monetare antice în Transilvania*. Acta Musei Napocensis 2 (Cluj, 1965).
- and GUDEA, N., 'Descoperiri monetare antice in Banat', *Apulum* 10 (1972), 713–17.
- — and MOLDOVAN, G., *Münzen aus der Sammlung des Museums der Stadt Sighisoara (Schässburg)* (Sighisoara, 1972).
- CHRISTIANSEN, E., *Coinage in Roman Egypt: The Hoard Evidence* (Aarhus, 2004).
- CLARYSSE, W., 'The Archive of the praktor Milon', in K. Vandorpe and W. Clarysse (eds.), *Edfu, an Egyptian Provincial Capital in the Ptolemaic Period* (Brussels, 2003), 17–27.

- CLARYSSE, W., and THOMPSON, D., *Counting the People in Hellenistic Egypt*, 2 vols. (Cambridge, 2006).
- and VANDORPE, K., ‘Viticulture and Wine Consumption in the Arsinoite Nome (P. Köln V 221)’, *Ancient Society* 28 (1997), 67–73.
- — ‘The Ptolemaic Apomoirā’, in H. Melaerts (ed.), *Le Culte du souverain dans l’Égypte ptolémaïque au III^e siècle avant notre ère. Actes du colloque international, Bruxelles 10 mai 1995* (Leuven, 1998), 5–42.
- CLEMENTE, G., ‘Le leggi sul lusso e la società romana tra III e II secolo a.C.’, in A. Giardina and A. Schiavone (eds.), *Società romana e produzione schiavistica* (Bari, 1981), iii. 1–14.
- COHEN, E. E., ‘Commercial Lending by Athenian Banks: Cliometric Fallacies and Forensic Methodology’, *Classical Philology* 85 (1990), 177–90.
- *Athenian Economy and Society: A Banking Perspective* (Princeton, 1992).
- ‘Introduction’, in Cartledge, Cohen, and Foxhall, (eds.) (2002), 1–7.
- ‘A Legal Fiction: “The Athenian Law of Sale”’, in *Agoronomia: Studies in Money and Exchange Presented to John H. Kroll* (New York, 2006), 87–98.
- COOK, C. A., and MAJOR, J. S. (eds.), *Defining Chu: Image and Reality in Ancient China* (Honolulu, 1999).
- COOK, R. M., ‘Speculations on the Origins of Coinage’, *Historia* 7 (1958), 257–62.
- CORBIER, M., ‘Coinage and Taxation: the State’s Point of View’, in *CAH XII²* (2005), 326–92.
- ‘Coinage, Society and Economy’, in *CAH XII²*, (2005), 393–439.
- CORCORAN, S., *The Empire of the Tetrarchs: Imperial Pronouncements and Government AD 284–324*, revised edn. (Oxford, 2000).
- CORNELL, T. J., *The Beginnings of Rome* (London, 1995).
- CORNFORD, F. M., *Thucydides Mythistoricus* (London, 1907).
- COWELL, M. R., and HYNE, K., ‘Scientific Examination of the Lydian Precious Metal Coinages’, in A. Ramage and P. Craddock (eds.), *King Croesus’s Gold: Excavations at Sardis and the History of Gold Refining* (Cambridge, Mass., 2000), 169–74.
- CRAWFORD, D. J. ‘The Good Official of Ptolemaic Egypt’, in Maehler and Strocka (eds.) (1978), 195–202.
- CRAWFORD, M. H., ‘Plated Coins—False Coins’, *NC* 7th ser., 8 (1968), 55–9.
- ‘The Edict of M. Marius Gratidianus’, *Proceedings of the Cambridge Philological Society* 14 (1968), 1–14.
- ‘Coin Hoards and the Pattern of Violence in the Late Republic’, *Papers of the British School at Rome* 37 (1969), 76–81.
- *Roman Republican Coin Hoards* (London, 1969).

- 'Money and Exchange in the Roman World', *JRS* 60 (1970), 40–8.
- 'Paestum and Rome—The Form and Function of a Subsidiary Coinage', in *La monetazione di bronzo di Poseidonia-Paestum. Atti del III Convegno del Centro di Studi Numismatici* (Rome, 1973), 47–110.
- *Roman Republican Coinage*, 2 vols. (Cambridge, 1974).
- 'Finance, Coinage and Money from the Severans to Constantine', in H. Temporini (ed.), *Aufstieg und Niedergang der römischen Welt* (1975), ii/2. 560–93.
- *La moneta in Grecia e in Roma* (Rome, 1982).
- *Coinage and Money under the Roman Republic. Italy and the Mediterranean Economy* (London, 1985).
- 'Sicily', in Burnett and Crawford (eds.) (1987), 43–51.
- (ed.), *Roman Statutes*, 2 vols. (London, 1996).
- and WHITEHEAD, D. (eds.), *Archaic and Classical Greece. A Selection of Ancient Sources in Translation* (Cambridge, 1983).
- CROOK, J. A., *Law and Life of Rome, 90 B.C.–A.D. 212* (London, 1967).
- CUVIGNY, H., 'The Amount of Wages Paid to the Quarry-Workers at Mons Claudianus', *JRS* 86 (1996), 139–45.
- 'Πέμπειν/ ἀγοράζειν τῆς τιμῆς dans l'épistolographie grecque d'Égypte', *Chronique d'Égypte* 80 (2005), 270–6.
- DAGUET-GAGEY, A., *Septime Sévère. Rome, l'Afrique et l'Orient* (Paris, 2000).
- D'AMBROSIO, A., 'Oplontis, Attività dell'Ufficio Scavi: 1984–1985', *RSP* 1 (1987), 172–6.
- D'ANGOUR, A., 'How the Dithyramb Got Its Shape', *Classical Quarterly* 47 (1997), 331–51.
- DANZIG, G., and SCHAPS, D. M., 'The Economy: What Plato Saw and What he Wanted', in F. L. Lisi (ed.), *Plato's Laws and its Historical Significance* (Sankt Augustin, 2001), 143–7.
- DAPOTO, P., 'Circolazione monetale a Pompei', *RSP* 1 (1987), 107–10.
- D'ARMS, J. H., 'Ville rustiche e ville di "otium"', in F. Zevi (ed.), *Pompei 79* (Naples, 1979), 65–86, repr. in *Romans on the Bay of Naples and Other Essays on Roman Campania* (Bari, 2003), 350–83.
- *Commerce and Social Standing in Ancient Rome* (Cambridge, Mass., 1981).
- DAUBE, D., *Roman Law: Linguistic, Social and Philosophical Aspects* (Edinburgh, 1969).
- DAUMAS, F., 'Le Problème de la monnaie dans l'Égypte antique avant Alexandre', *Mélanges de l'École Française de Rome* 89 (1977), 425–42.
- DAVIES, G., *A History of Money from Ancient Times to the Present Day* (Cardiff, 1994).

- DAVIES, J. K., 'Ancient Economies: Models and Muddles', in H. Parkins and C. Smith (eds.), *Trade, Traders and the Ancient City* (London, 1998), 225–56.
- 'Temples, Credit, and the Circulation of Money', in A. Meadows and K. Shipton (eds.), *Money and its Uses in the Ancient Greek World* (Oxford, 2001), 117–28.
- DE CALLATAÏ, F., 'Les Trésors achéménides et les monnayages d'Alexandre: espèces immobilisées et espèces circulantes', *Revue des études anciennes* 91 (1989), 259–74.
- 'Calculating Ancient Coin Production: Seeking a Balance', *NC* 155 (1995), 289–311.
- 'A Quantitative Survey of Hellenistic Coinages: Recent Achievements', in Archibald, Davies, and Gabrielsen (eds.) (2005), 73–91.
- DE CECCO, M., 'Monetary Theory and Roman History', *Journal of Economic History* 45 (1985), 809–22.
- DE LIGT, L., 'Demand, Supply, Distribution: The Roman Peasantry between Town and Countryside', *MBAH* 9/2 (1990), 24–56, and 10/1 (1991), 33–77.
- *Fairs and Markets in the Roman Empire* (Amsterdam, 1993).
- DENTAMARO, F., 'Pompei, La casa di L. Cecilio Giocondo. Un'ipotesi di ricostruzione delle fasi edilizie mediante analisi stratigrafica delle strutture murarie', *RSP* 12–13 (2001–2), 131–41.
- DEPAUW, M., *The Archive of Teos and Thabis from Early Ptolemaic Thebes. P. Brux. Dem. Inv. E. 8252–8256* (Turnhout, 2000).
- *A Companion to Demotic Studies*, *Papyrologica Bruxellensia* 28 (Brussels, 2000).
- DEPEYROT, G., 'Economy and Society', in N. Lenski (ed.), *The Cambridge Companion to the Age of Constantine* (Cambridge, 2006), 226–52.
- and HOLLARD, D., 'Pénurie d'argent—métal et crise monétaire au III^e siècle après J.-C.', *Histoire et mesure* 2 (1987), 57–85.
- DE ROOVER, R., *Money, Banking, and Credit in Mediaeval Bruges* (Cambridge, Mass., 1948).
- DESCAT, R., 'Approche d'une histoire économique de l'or dans le monde grec aux époques archaïque et classique', in B. Cauuet (ed.), *L'Or dans l'antiquité, de la mine à l'objet* (Bordeaux, 1999) (*Aquitania Suppl.* 9), 429–39.
- 'Monnaie multiple et monnaie frappée en Grèce archaïque', *RN* 157 (2001), 69–81.
- DEVELIN, R., 'The Army Pay Rises under Severus and Caracalla, and the Question of *annona militaris*', *Latomus* 30 (1971), 687–95.
- DE VRIES, J., and VAN DER WOUDE, A., *The First Modern Economy* (Cambridge, 1997) (original edn., 1995).

- DICK, F., *Die Fundmünzen der römischen Zeit in Oesterreich* (Vienna, 1978), ix.
- DREXHAGE, H.-J., *Preise, Mieten/Pachten, Kosten und Löhne im römischen Ägypten bis zum Regierungsantritt Diokletians* (St Katharinen, 1991).
- DUBS, H., 'An Ancient Chinese Stock of Gold', *Journal of Economic History* 2 (1942), 36–9.
- *The History of the Former Han Dynasty* (Baltimore, 1955), iii.
- DUNCAN, G. *Coin Circulation in the Danubian and Balkan Provinces of the Roman Empire, AD 294–578* (London, 1993).
- DUNCAN-JONES, R. P., *The Economy of the Roman Empire: Quantitative Studies*, 2nd edn. (Cambridge, 1982).
- 'Weight-Loss as an Index of Coin-Wear in Currency of the Roman Principate', in G. Depuyrot, T. Hackens, and G. Moucharte (eds.), *Rythmes de la production monétaire de l'antiquité à nos jours* (Louvain, 1987), 235–54.
- *Money and Government in the Roman Empire* (Cambridge, 1994).
- 'The Denarii of Septimus Severus and the Mobility of Roman Coin', *NC* 161 (2001), 75–89.
- 'Roman Coin Circulation and the Cities of Vesuvius', in *CM* 161–80.
- EDWARDS, M. W., *The Iliad, a Commentary. Books 17–20* (Cambridge, 1991).
- EHREND, H., *Wang Mang und seine Münzen—The Coins of Wang Mang* (Speyer, 2000).
- EINZIG, P., *Primitive Money*, 2nd edn. (Oxford, 1966).
- ELAYI, J., and ELAYI, A. G., *Trésors de monnaies phéniciennes et circulation monétaire (Ve–IVe siècles avant J.-C.)* (Paris, 1993).
- ELTON, H., *Frontiers of the Roman Empire* (London, 1996).
- 'Military Supply and the South Coast of Anatolia in the Third Century AD', in S. Mitchell and C. Katsari (eds.), *Patterns in the Economy of Roman Asia Minor* (Swansea, 2005), 289–304.
- ERCOLANI, E. C., 'Repertorio dei ritrovamenti di pani di rame. Contributo allo studio delle fasi premonetali in Italia', *RIN* 6th ser., 77 (1975), 7–47.
- ERDKAMP, P., 'Introduction', in Erdkamp (ed.), *The Roman Army and the Economy* (Amsterdam, 2002), 5–16.
- ERIM, K. T., REYNOLDS, J., and CRAWFORD, M. H., 'Diocletian's Currency Reform: A New Inscription', *JRS* 61 (1971), 171–7.
- ERMATINGER, J. W., 'The Economic Reforms of Diocletian' (Ph.D. thesis, Indiana University, 1988).
- EVANS, A. J., 'Recent Discoveries of Tarentine Terra-Cottas', *JHS* 7 (1887), 1–50.
- FELLMAN, R., and DUNAN, C., *Le Sanctuaire de Baalshamin à Palmyre: Kleinfunde* (Rome, 1975), vi.

- FIKHMAN, I. F., 'State and Prices in Byzantine Egypt', *Scripta Classica Israelica* 11 (1991–2), 139–48.
- FINK, R. O., *Roman Military Records on Papyrus* (Cleveland, 1971).
- FINLEY, M. I., 'Aristotle and Economic Analysis', *Past and Present* 47 (1970), 3–25, repr. in *Studies in Ancient Society* (London, 1974), 26–52.
- *The Ancient Economy*, 2nd edn. (London, 1985).
- *Studies in Land and Credit in Ancient Athens*, revised edn. (New Brunswick, 1985).
- FISCHER, S., DORNBUSCH, R., and SCHMALENSSEE, R., *Introduction to Macroeconomics* (New York, 1988).
- FISHER, N. R. E., *Hybris* (Warminster, 1992).
- FITZ, J., *Der Geldumlauf der römischen Provinzen in Donaugebiet Mitte des 3. Jahrhunderts* (Budapest, 1978).
- FLYNN, D. O., 'Use and Misuse of the Quantity Theory of Money in Early Modern Historiography', in Van Cauwenberghe and Irsigler (eds.) (1984), 383–417.
- FORABOSCHI, D., 'Free coinage e scarsezza di moneta', in *CM* 231–44.
- and GARA, A., 'L'economia dei crediti in natura (Egitto)', *Athenaeum* 70 (1982), 69–83.
- FOXHALL, L., and LEWIS, A. D. E., 'Introduction', in id. (eds.), *Greek Law in its Political Setting* (Oxford, 1996), 1–8.
- FRANCE, J., *Quadragesima Galliarum: l'organisation douanière des provinces alpestres, gauloises et germaniques de l'Empire romain* (Rome, 2001).
- FREDERIKSEN, M. W., 'Caesar, Cicero and the Problem of Debt', *JRS* 56 (1966), 128–41.
- FRENCH, D. H., and LIGHTFOOT, C. S., *The Eastern Frontier of the Roman Empire* (BAR-IS 553(i)) (Oxford, 1989).
- FREYBERG, H.-U. VON, *Kapitalverkehr und Handel im römischen Kaiserreich* (Freiburg im Breisgau, 1989).
- FRIEDMAN, M., *Studies in the Quantity Theory of Money* (Chicago, 1956).
- FRIER, B. W., 'The Rental Market in Early Imperial Rome', *JRS* 67 (1977), 27–37.
- 'Roman Coinage and Army Pay: Techniques for Evaluating Statistics', *Numismatica e antichità classiche* 10 (1981), 285–95.
- FUKS, A., 'Plato and the Social Question: The Problem of Poverty and Riches in the Republic', *Ancient Society* 8 (1977), 49–83.
- 'Plato and the Social Question: The Problem of Poverty and Riches in the Laws', *Ancient Society* 10 (1979), 33–78.
- FÜLEP, F., *Sopiana. The History of Pécs during the Roman Era and the Problem of the Continuity of the Late Roman Population* (Budapest, 1984).
- GAGARIN, M., 'The Unity of Greek Law', in id. and D. Cohen (eds.), 29–40.
- and COHEN, D. (eds.), *The Cambridge Companion to Ancient Greek Law* (Cambridge, 2005).

- GALE, N. H., GENTNER, W., and WAGNER, G. A., 'Mineralogical and Geographical Silver Sources of Archaic Greek Coinage', in D. M. Metcalf and W. A. Oddy (eds.), *Metallurgy in Numismatics* 1 (London, 1980), 3–49.
- GARDINER, A. B., 'A Protest against Unjustified Tax-Demands', *Revue d'Égyptologie* 6 (1951), 115–33.
- GARNSEY, P., *Famine and Food Supply in the Graeco-Roman World* (Cambridge, 1988).
- *Cities, Peasants and Food in Classical Antiquity* (Cambridge, 1998).
- GARUD, R., and KARNØE, P., (eds.), *Path Dependence and Creation* (Mahwah, NJ, 2001).
- GASPERINI, L., 'Vecchie e nuove epigrafi del Bruzio Ionico', in *Decima Miscellanea Greca e Romana* (Rome, 1986), 141–5.
- GAZDAC, C., 'Monetary Circulation in the Province of Dacia in the Period from Trajan to Constantine I (AD 106–337)' (D.Phil. thesis, Oxford, 2002).
- GERNET, L., *Démosthène, Plaidoyers Civils*, 4 vols. (Paris, 1954).
- *Droit et société dans la Grèce ancienne* (Paris, 1955).
- GIARDINA, A. (ed.), Anonimo, *Le cose della guerra* (Milan, 1989).
- GIOVE, T., 'Le monete e l'economia domestica', in M. Borriello, A. D'Ambrosio, S. De Caro, and P. G. Guzzo (eds.), *Pompei, abitare sotto il Vesuvio* (Ferrara, 1997), 187–91.
- GITIN, S., and GOLANI, A., 'The Tel Miqne-Ekron Silver Hoards: The Assyrian and Phoenician Connections', in Balmuth (ed.) (2001), 27–48.
- GLAHN, R. VON, *Fountain of Fortune: Money and Monetary Policy in China, 1000–1700* (Berkeley and Los Angeles, 1996).
- GLANVILLE, S. R. K., *A Theban Archive of the Reign of Ptolemy I Soter, Catalogue of Demotic Papyri in the British Museum* 1 (London, 1939).
- GÖBL, R., *Die Fundmünzen der römischen Zeit in Oesterreich* (Vienna, 1976), iii.
- *Antike Numismatik*, 2 vols. (Munich, 1978).
- GOLAS, P. J., *Science and Civilization in China*, v. *Chemistry and Chemical Technology*. Part XIII: *Mining* (Cambridge, 1999).
- GOLDIN, P. R., 'Ancient Chinese Civilization: Bibliography of Materials in Western Languages' (24 February 2006), at <www.lib.uchicago.edu/earlychina/res/bib/Ancient_Chinese_Civilization_Bibliography.pdf>, accessed 21 June 2007.
- GOLDSMITH, R. W., 'An Estimate of the Size and Structure of the National Product of the Early Roman Empire', *Review of Income and Wealth* 30 (1984), 263–88.
- *Premodern Financial Systems. A Historical Comparative Study* (Cambridge, 1987).

- GÖLITZER, E. *Entstehung und Entwicklung des alexandrinischen Münzwesens von 30 v. Chr. bis zum Ende der julisch-claudischen Dynastie* (Berlin, 2004).
- GONZALEZ, J., 'The Lex Irnitana: A New Copy of the Flavian Municipal Decree', *JRS* 76 (1986), 147–243.
- GOODHART, C., *Monetary Theory and Practice* (London, 1984).
- 'The Endogeneity of Money', in *Money, Macroeconomics and Keynes: Essays in Honour of Victoria Chick* (London, 2002), 14–24.
- GORTON, G., 'Clearinghouses and the Origin of Central Banking in the United States', *Journal of Economic History* 45 (1985), 277–83.
- GRAFF, D. A., *Medieval Chinese Warfare, 300–900* (London, 2002).
- GRAINGER, J. D., *The Cities of Seleucid Syria* (Oxford, 1990).
- GRANDJEAN, C., 'À propos de "The Monetization of the Marketplace in Athens"', in *PPF* 405–8.
- 'Introduction', *Revue Numismatique* 157 (2001), 9–13.
- GREENE, K., *The Archaeology of the Roman Economy* (Berkeley, 1986).
- GRENFELL, B. P., and MAHAFFY, J. P., *The Revenue Laws of Ptolemy Philadelphus* (Oxford, 1896).
- GRIERSON, P., *Numismatics* (London and Oxford, 1975).
- GROENMAN-VAN WAATERINGE, W., 'Urbanization and the North-west Frontier of the Roman Empire', in W. S. Hanson and L. J. F. Keppie (eds.), *Roman Frontier Studies 1979: Papers Presented to the 12th International Congress of Roman Frontier Studies* (BAR-IS 71(iii)) (Oxford, 1980), iii. 1037–44.
- GUARDUCCI, M., 'Tripodi, lebeti, oboli', *Rivista di filologia classica* 22–3 (1944), 171–80.
- 'Dedica arcaica alla Hera di Posidonia', *Archeologia Classica* 4 (1952), 145–52.
- *Epigrafia greca*, 3 vols. (Rome, 1974).
- GUDEA, N., 'Monedele din castrul roman de la Mehadia', *SCIVA* 26/1 (1975), 147–51.
- 'The Defensive System of Roman Dacia', *Britannia* 10 (1979), 63–87.
- *Inlăceni. Incercare de monografie*, *Acta Musei Prolissensis* 3 (1979).
- *Porolissum. Un complex daco-roman la marginea de nord a Imperiului Roman* (Zalau, 1997).
- and POPESCU, I., *Castrul roman de la Risnov, Cumidava* (Braşov, 1971).
- HAATVEDT, R., *Coins from Karanis. The University of Michigan Excavations 1924–1935* (Ann Arbor, 1964).
- HARL, K., *Coinage in the Roman Economy* (Ann Arbor, 1996).
- HARPER, R. P., 'Two Excavations on the Euphrates Frontier 1968–1974: Pagnik Oreni (Eastern Turkey) 1968–1971, and Dibsi Faraj (Northern Syria) 1972–1974', in *Studien zu den Militärgrenzen Roms: Vorträge des 10.*

- internationalen Limeskongresses in der Germania Inferior* (Cologne and Bonn, 1977), ii. 453–60.
- HARRIS, E. M., 'When is a Sale not a Sale? The Riddle of Athenian Terminology for Real Security Revisited', *Classical Quarterly* 38 (1988), 351–81.
- HARRIS, W. V., 'Between Archaic and Modern: Problems in Roman Economic History', in id. (ed.), *The Inscribed Economy: Production and Distribution in the Roman Empire in the Light of instrumentum domesticum* (Ann Arbor, 1993), 11–29.
- 'A Revisionist View of Roman Money', *JRS* 96 (2006), 1–24.
- 'The Late Republic', forthcoming in *The Cambridge Economic History of the Greco-Roman World*.
- HARRISON, A. R. W., *The Law of Athens*, 2 vols. (Oxford, 1968).
- HAZZARD, R. A., *Ptolemaic Coins. An Introduction for Collectors* (Toronto, 1995).
- HEICHELHEIM, F., *Wirtschaftliche Schwankungen der Zeit von Alexander bis Augustus* (Jena, 1930).
- 'Roman Syria', in T. Frank, *An Economic Survey of Ancient Rome* (Baltimore, 1938), iv. 123–254.
- HELLEINER, E., 'Electronic Money: A Challenge to the Sovereign State?', *Journal of International Affairs* 51 (1998), 387–409.
- HERMAN, G., *Ritualised Friendship and the Greek City* (Cambridge, 1987).
- HÉRON DE VILLEFOSSE, A., *L'Argenterie et les bijoux d'or du trésor de Boscor-eale* (Paris, 1903).
- HERSH, C. A., 'Notes on the Chronology and Interpretation of the Roman Coinage: Some Comments on Crawford's *Roman Republican Coinage*', *NC* 137 (1977), 19–36.
- HICKS, J., *Critical Essays in Monetary Theory* (Oxford, 1967).
- *A Theory of Economic History* (Oxford, 1969).
- HODGSON, N., 'The East as Part of the Wider Roman Imperial Frontier Policy', in French and Lightfoot (eds.) (1989), 177–89.
- HODKINSON, S., *Property and Wealth in Classical Sparta* (London, 2000).
- HOGARTH, D. G., *Excavations at Ephesus: The Archaic Artemisia* (London, 1908).
- HOLLANDER, D. B., 'Veterans, Agriculture, and Monetization in the Late Roman Republic', in *A Tall Order: Writing the Social History of the Ancient World. Essays in Honor of William V. Harris*, Beiträge zur Altertumskunde 216 (Munich, 2005), 229–39.
- HOLLOWAY, R. R., 'La ricerca attuale sull'origine della moneta', *RIN* 80 (1978), 7–14.
- *Catalogue of the Classical Collection, Museum of Art, Rhode Island School of Design. Ancient Greek Coins*, Archaeologia Transatlantica 15 (Louvain-la-Neuve, 1998).

- HOLLOWAY, R. R., 'Remarks on the Taranto Hoard of 1911', *Revue Belge de Numismatique* 146 (2000), 1–8.
- HONG, S., CANDELONE, J.-P., PATTERSON, C. C., and BOUTRON, C. F., 'Greenland Evidence of Hemispheric Lead Pollution Two Millennia Ago by Greek and Roman Civilizations', *Science* 265 (1994), 1841–3.
- 'History of Ancient Copper Smelting Pollution during Roman and Medieval Times Recorded in Greenland Ice', *Science* 272 (1996), 246–9.
- — J.-P., SOUTIF, M., and BOUTRON, C. F., 'A Reconstruction of Changes in Copper Production and Copper Emissions to the Atmosphere during the Past 7000 Years', *The Science of Total Environment* 188 (1996), 183–93.
- HOPKINS, K., 'Taxes and Trade in the Roman Empire (200 B.C.–A.D. 400)', *JRS* 70 (1980), 101–25.
- 'Rome, Taxes, Rents and Trade', *Kodai* 6/7 (1995/96), 41–75 (repr. in Scheidel and von Reden (eds.) (2002), 190–230).
- 'On the Political Economy of the Roman Empire', <<http://www.stanford.edu/group/sshi/Conferences/1999–2000/empires/hopkins.pdf>>, accessed 15 June 2007.
- HOPPER, R., *Trade and Industry in Classical Greece* (London, 1979).
- HORSMANN, G., 'Athens Weg zur eigenen Währung: Der Zusammenhang der metrologischen Reform Solons mit der timokratischen', *Historia* 48 (2000), 259–77.
- HOU, D., 'A Supplementary Study of the Units of Measurement of Chu Gold Currency, and a Discussion of Three Groups of Bronze Weights with Inscriptions from Chu Tombs', *Zhongguo qianbi* (1996), fasc. 1, 10–12 (in Chinese; English abstract in *China Archaeology and Art Digest* 2/1–2 [1997], 145–6).
- HOWGEGO, C. J., *Greek Imperial Countermarks* (London, 1985).
- 'Why Did Ancient States Strike Coins?', *NC* 150 (1990), 1–25.
- 'The Supply and Use of Money in the Roman World 200 B.C. to A.D. 300', *JRS* 82 (1992), 1–31.
- 'Coin Circulation and the Integration of the Roman Economy', *JRA* 7 (1994), 5–21.
- *Ancient History from Coins* (London, 1995).
- 'The Circulation of Silver Coins, Models of the Roman Economy', in King and Wigg (eds.) (1996), 219–36.
- review of Duncan-Jones, *MG*, *JRS* 86 (1996), 208–9.
- HULSEWÉ, A. F. P., *Remnants of Ch'in Law: An Annotated Translation of the Ch'in Legal and Administrative Rules of the 3rd century BC, Discovered in Yün-meng Prefecture, Hu-pei Province, in 1975* (Leiden, 1985).
- HUMPHREYS, S., *Anthropology and the Greeks* (London, 1978).

- HURST, G. C., 'Insei', in D. H. Shively and W. H. McCullough (eds.), *The Cambridge History of Japan* (Cambridge, 1999), ii, 576–613.
- HURTER, S., and PÁSZTHORY, E., 'Archaischer Silberfund aus dem Antilibanon', in *Studies in Honor of Leo Mildenberg* (Wetteren, 1984), 111–25.
- INGHAM, G. K. *The Nature of Money* (Cambridge, 2004).
- IOANNATOU, M., 'Le Code de l'honneur des paiements: créanciers et débiteurs à la fin de la République romaine', in J. Andraeu, J. France, and S. Pittia (eds.), *Mentalités et choix économiques des romains* (Bordeaux, 2004), 87–107.
- ISAAC, B., 'An Open Frontier', in Isaac (ed.), *The Near East under Roman Rule: Selected Papers* (Leiden, 1998), 105–14.
- IVOTCHKINA, N. V., 'The Early Chinese Chu Gold Plates, 5th–3rd cent. B.C.', in *Proceedings of the 11th International Numismatic Congress* (Louvain-la-Neuve, 1993), iii, 329–32.
- JANSSEN, J. J., 'Prolegomena to the Study of Egypt's Economic History during the New Kingdom', *Studien zur altägyptischen Kultur* 3 (1975), 127–85.
- JEFFERY, L. H., *The Local Scripts of Archaic Greece*, 2nd edn., with suppl. by A. W. Johnston (Oxford, 1990).
- JOHNSON, J. H., '“Annuity Contracts” and Marriage', in *For his ka. Essays Offered in Memory of Klaus Baer*, *Studies in Ancient Oriental Civilization* 55 (Chicago, 1994), 113–32.
- JONES, A. H. M., *Ancient Economic History* (London, 1948).
- *The Cities of the Eastern Roman Provinces*, 2nd edn. (Amsterdam, 1983).
- JONES, D., *The Bankers of Puteoli: Finance, Trade and Industry in the Roman World* (Stroud, 2006).
- JONES, G. D. B., 'The Roman Mines at Riotinto', *JRS* 70 (1980), 146–63.
- JONGMAN, W. M., 'A Golden Age: Death, Money Supply and Social Succession in the Roman Empire', in *CM* 181–96.
- 'Consumption in the Early Roman Empire', in R. P. Saller, I. Morris, and W. Scheidel (eds.), *The Cambridge Economic History of the Greco-Roman World* (Cambridge, forthcoming).
- JONUNG, L., 'The Long-Run Demand for Money—A Wicksellian Approach', *Scandinavian Journal of Economics* 80 (1978), 216–30.
- KAGAN, J. H., 'Small Change and the Beginning of Coinage at Abdera', in *Agoranomia: Studies in Money and Exchange Presented to John H. Kroll* (New York, 2006), 49–60.
- KARWIESE, S., *Die Münzprägung von Ephesus* (Vienna, 1995), i.
- KATARY, S. L. D., *Land Tenure in the Ramesside Period* (London, 1989).

- KATSARI, C., 'Bimetallism and the Circulation of Gold Coins during the Third and Fourth Centuries AD?', *MBAH* 22/1 (2003), 22–41.
- KEHOE, D. P., *Investment, Profit, and Tenancy: The Jurists and the Roman Agrarian Economy* (Ann Arbor, 1997).
- KEMP, B. J., 'The Birth of Economic Man', in *Ancient Egypt. Anatomy of a Civilization* (London, 1989), 232–60.
- KENNEDY, D. L., *Archaeological Explorations on the Roman Frontier in North-East Jordan: The Roman and Byzantine Military Installations and Road Network on the Ground and from the Air* (BAR-IS 134) (Oxford, 1982).
- 'The Garrisoning of Mesopotamia in the Late Antonine and Early Severan Period', *Antichthon* 21 (1987), 57–66.
- (ed.), *The Roman Army in the East* (JRA Suppl. 18) (Ann Arbor, 1996).
- *The Twin Towns of Zeugma on the Euphrates: Rescue Work and Historical Studies* (JRA Suppl. 27) (Portsmouth, RI, 1998).
- and RILEY, D., *Rome's Desert Frontier: From the Air* (London, 1990).
- KEYNES, J. M., *The General Theory of Employment, Interest and Money* (New York, 1936).
- KIM, H. S., 'Archaic Coinage as Evidence for the Use of Money', in Meadows and Shipton (eds.) (2001), 7–21.
- 'Small Change and the Moneyed Economy', in Cartledge, Cohen, and Foxhall (eds.) (2002), 44–51.
- KING, C. E., and WIGG, D. G. (eds.), *Coin Finds and Coin Use in the Roman World, The Thirteenth Oxford Symposium on Coinage and Coinage History* 25–27. 3. 1993, *Studien zu Fundmünzen der Antike* 10 (Berlin, 1996).
- KINNS, P., 'Asia Minor', in Burnett and Crawford (eds.) (1987), 105–19.
- KNAPP, R. C., 'Spain', in Burnett and Crawford (eds.) (1987), 19–41.
- KONOPHAGOS, K., *To Arxaiο Λαυριο* (Athens, 1980).
- KONUK, K., *Sylloge Nummorum Graecorum, Turkey, i. The Muharrem Kayhan Collection* (Istanbul, 2002).
- KOS, P., 'The Monetary Circulation in the Southeastern Alpine Region ca 300 BC–AD 1000', *Situla* 24 (1986), 59–79.
- KRAAY, C. M., 'The Archaic Owls of Athens: Classification and Chronology', *NC* 6th ser., 16 (1956), 43–68.
- *Archaic and Classical Greek Coins* (Berkeley and Los Angeles, 1976).
- KROLL, J. H., 'Silver in Solon's Laws', in *Studies in Greek Numismatics in Memory of Martin Jessop Price* (London, 1998), 225–32.
- 'Observations on Monetary Instruments in Pre-Coinage Greece', in Balmuth (ed.) (2001), 77–92.
- 'A Small Find of Silver Bullion from Egypt', *AJN* 2nd ser., 13 (2001), 1–20.

- review of G. Le Rider, *La Naissance de la monnaie*, *Schweizerische Numismatische Rundschau* 80 (2001), 199–206.
- review of Schaps, IC, *Classical Review* 55 (2005), 344–6.
- and HEATH, S., ‘The British Museum Lot of Silver from the Taranto 1911 Hoard (*Inventory of Greek Coin Hoards* (1973)), no. 1874’, <<http://www.numismatics.org/dpubs/taranto1911/indeximages.html>> (2002), accessed 12 June 2007.
- and WAGGONER, N. M., ‘Dating the Earliest Coins of Athens, Corinth and Aegina’, *AJA* 88 (1984), 325–40.
- KURKE, L., *Coins, Bodies, Games, and Gold: The Politics of Meaning in Archaic Greece* (Princeton, 1999).
- KUTTNER, A. L., *Dynasty and Empire in the Age of Augustus: The Case of the Boscoreale Cups* (Berkeley, 1995).
- LAET, S. J. DE, *Portorium: étude sur l’organisation douanière chez les romains, surtout à l’époque du haut-empire* (Bruges, 1949).
- LAIDLER, D. E. W., *The Demand for Money: Theories, Evidence and Problems* (New York, 1985).
- LANGDON, M., ‘Poletai Records’, in G. Lalonde, M. Langdon, and M. Walbank (eds.), *Inscriptions: Horoi, Poletai Records, and Leases of Public Lands, The Athenian Agora* 19 (Princeton, 1991), 57–143.
- LAUM, B., *Heiliges Geld* (Tübingen, 1924).
- LEE, I., ‘Entella: The Silver Coinage of the Campanian Mercenaries and the Site of the First Carthaginian Mint 410–409 BC’, *NC* 160 (2000), 1–66.
- LEMONS, A. A., *Archaic Pottery of Chios* (Oxford, 1991).
- LONDON, J. E., ‘The Face on the Coins and Inflation in Roman Egypt’, *Klio* 72 (1990), 106–34.
- LENORMANT, F., ‘Les Graffiti monétaires de l’antiquité’, *RN NS* 15 (1874–7), 325–46.
- LE RIDER, G., *La Naissance de la monnaie. Pratiques monétaires de l’orient ancien* (Paris, 2001).
- and VERDAN, S., ‘La Trouvaille d’Erétrie: réserve d’un orfèvre ou dépôt monétaire?’, *Antike Kunst* 45 (2002), 141–52.
- LESLIE, D. D., and GARDINER, K. H. J., *The Roman Empire in Chinese Sources* (Rome, 1996).
- LEWIS, M. E., ‘Warring States Political History’, in M. Loewe and E. L. Shaughnessy (eds.), *The Cambridge History of Ancient China from the Origins of Civilization to 221 B.C.* (Cambridge, 1999), 620–32.
- ‘The Han Abolition of Universal Military Service’, in H. van de Ven (ed.), *Warfare in Chinese History* (Leiden, 2000), 33–75.
- LEWIS, N., *Greeks in Ptolemaic Egypt. Case Studies in the Social History of the Hellenistic World* (Oxford, 1986).

- LI, Z., 'A Preliminary Study of Qin and Han Gold Currency', *Zhongguo shi yanjin* (1997), fasc. 1, 52–61 (in Chinese; English abstract in *China Archaeology and Art Digest* 2/1–2 (1997), 146–7).
- LINDGREN, J., 'Measuring the Value of Slaves and Free Persons in Ancient Law', in *Chicago-Kent Law Review* 71/1 (1995), 150–2.
- LINTOTT, A., 'Electoral Bribery in the Roman Republic', *JRS* 80 (1990), 1–16.
- LO CASCIO, E., 'Carbone, Druso e Gratidiano: la gestione della *res nummaria* a Roma tra la Lex Papiria e la Lex Cornelia', *Athenaeum* 57 (1979), 215–38.
- 'La riforma monetaria di Nerone: l'evidenza dei ripostigli', in *Mélanges de l'École Française de Rome—Antiquité* 92 (1980), 445–70.
- 'State and Coinage in the Late Republic and Early Empire', *JRS* 71 (1981), 76–86.
- 'Spesa militare, spesa dello stato e volume delle emissioni nella tarda Repubblica', *AJIN* 29 (1982), 75–97.
- Intervento in *AJIN* 29 (1982), 203–8.
- 'Dall'*antoninianus* al "laureato grande": l'evoluzione monetaria del III secolo alla luce della nuova documentazione di età diocleziana', *Opus* 3 (1984), 133–201.
- 'Teoria e politica monetaria a Roma tra III e IV d.C.', in A. Giardina (ed.), *Società romana e impero tardoantico* (Rome, 1986), i, 535–57, 779–801.
- 'Prezzo dell'oro e prezzi delle merci', in *L' 'inflazione' del IV secolo* (Rome, 1993), 155–88.
- 'Dinamiche economiche e politiche fiscali fra i Severi e Aureliano', in A. Schiavone (ed.), *Storia di Roma* (Turin, 1993), iii/1, 247–82.
- 'Aspetti della politica monetaria nel IV secolo', in *Atti del X Convegno Internazionale dell'Accademia Romanistica Costantiniana* (Naples, 1995), 481–502.
- 'How Did the Romans View Their Coinage and Its Function?', in King and Wigg (eds.) (1996), 273–87.
- 'Produzione monetaria, finanza pubblica ed economia nel principato', *Rivista Storica Italiana* 109 (1997), 650–77.
- 'Prezzi in oro e prezzi in unità di conto tra il III e IV sec. d. C.', in *PPF* 161–82.
- (ed.). *Credito e moneta nel mondo romano* (Bari, 2003).
- 'Il *denarius* e gli scambi intermediterranei', in G. Urso (ed.), *Moneta mercanti banchieri. I precedenti greci e romani dell'Euro* (Pisa, 2003), 147–65.
- 'La "New Institutional Economics" e l'economia imperiale romana', in M. Pani (ed.), *Storia romana e storia moderna. Fasi in prospettiva* (Bari, 2005), 69–83.

- LOCKYEAR, K., 'Hoard Structure and Coin Production in Antiquity—an Empirical Investigation', *NC* 159 (1999), 215–43.
- LU, D., and WU, Y., 'Chu Gold Coins Unearthed in Hubei', *Zhongguo qianbi* (1997), fasc. 1, 38 (in Chinese; English abstract in *China Archaeology and Art Digest* 2/1–2 (1997), 147).
- LÜDDECKENS, E., *Ägyptische Eheverträge*, Ägyptologische Abhandlungen 1 (Wiesbaden, 1960).
- MACDOWELL, D. M., *The Law in Classical Athens* (London, 1978).
- MACMULLEN, R., 'How Big Was the Roman Imperial Army?', *Klio* 62 (1980), 451–60.
- 'The Roman Emperor's Army Cost', *Latomus* 43 (1984), 570–80.
- MACREA, M., GUDEA, N., and MOTU, I., *Praetorium. Castrul si asezarea romană de la Mehadia* (Bucharest, 1993).
- MACRO, A. N., 'Imperial Provisions for Pergamum: OGIS 484', *Greek, Roman, and Byzantine Studies* 17 (1976), 169–79.
- MAEHLER, H., and STROCKA, V. M. (eds.), *Das Ptolemäische Ägypten. Akten des Internationalen Symposions 27.–29. September 1976 in Berlin* (Mainz, 1978).
- MAFFI, A., 'Family and Property Law', in Gagarin and Cohen (eds.) (2005), 254–66.
- MANGANARO, G., 'SGDI, IV, 4, n. 49 (DGE, 707) e il bimetallismo monetale di Creso', *Epigraphica* 36 (1974), 57–77.
- 'Due studi di numismatica greca', *Annali della Scuola Normale Superiore di Pisa* ser. 3, 20 (1990), 409–27.
- MANKIW, N. G., *Macroeconomics*, 5th edn. (New York, 2002).
- MANNING, J. G., 'The Auction of Pharaoh', in *Gold of Praise. Studies in Honor of Edward F. Wente* (Chicago, 1999), 277–84.
- 'A Ptolemaic Agreement Concerning a Donkey with an Unusual Warranty Clause. The Strange Case of P. dem. Princ. 1 (inv. 7524)', *Enchoria* 28 (2002–3), 46–61.
- *Land and Power in Ptolemaic Egypt. The Structure of Land Tenure* (Cambridge, 2003).
- MARESCH, K., *Bronze und Silber. Papyrologische Beiträge zur Geschichte der Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.*, *Papyrologica Coloniensia* 25 (Cologne, 1996).
- MARSHALL, F., *The Collection of Ancient Greek Inscriptions in the British Museum*, Part IV, sect. II: 'Supplementary and Miscellaneous Inscriptions' (Oxford, 1916).
- MARTIN, C. J., 'A Twenty-Seventh Dynasty "Marriage Contract" from Saqqara', in *Studies in Honour of H. S. Smith* (London, 1999), 193–9.
- MATEI, I. B., *Castrul roman de la Romita-Certiae* (Zalău, 1997).

- MATTHA, G., and HUGHES, G. R., *The Demotic Legal Code of Hermopolis West*, Bibliothèque d'Étude 45 (Cairo, 1975).
- MATTINGLY, D., and SALMON, J. (eds.), *Economies beyond Agriculture in the Classical World* (London, 2001).
- MAZZARINO, S., *L'impero romano* (Rome, 1956).
- MCCULLOUGH, W. H., 'The Capital and Society', in D. H. Shively and W. H. McCullough (eds.), *The Cambridge History of Japan* (Cambridge, 1999), ii. 97–182.
- MCCUSKER, J. J., and RILEY, J. C., 'Money Supply, Economic Growth and the Quantity Theory of Money: France, 1650–1788', in Van Cauwenberghe and Irsigler (eds.) (1984), 255–98.
- MCGING, B. C., 'Revolt Egyptian Style. Internal Opposition to Ptolemaic Rule', *Archiv für Papyrusforschung* 43 (1997), 273–314.
- MEADOWS, A., and SHIPTON, K. (eds.), *Money and Its Uses in the Ancient Greek World* (Oxford, 2001).
- MEIJER, F., 'The Financial Aspects of the *Leges Frumentariae* of 123–58 BC', *MBAH* 9/2 (1990), 14–23.
- MEIKLE, S., 'Modernism, Economics, and the Ancient Economy', in Scheidel and von Reden (eds.) (2002), 233–50.
- MÉLÈZE-MODRZEJEWSKI, J., 'The Septuagint as *Nomos*: How the Torah Became a "Civic Law" for the Jews of Egypt', in J. W. Cairns and Olivia F. Robinson (eds.), *Critical Studies in Ancient Law, Comparative Law, and Legal History* (Oxford, 2001), 183–99.
- MELITZ, J., 'The Polanyi School of Anthropology on Money: An Economist's View', *American Anthropologist* 72 (1970), 1020–40.
- MELVIN, M., *International Money and Finance* (New York, 1985).
- MENU, B., 'Modalités et réglementation du prêt en Égypte à l'époque de la première domination perse', in *Colloque international de l'ASPEP* (Paris, 1994), repr. in and quoted from *Recherches sur l'histoire juridique, économique et sociale de l'ancienne Égypte*, Bibliothèque d'études 122 (Cairo, 1998), ii. 385–99.
- 'Le Système économique de l'Égypte ancienne', *Méditerranées* 17 (1998), 71–97.
- METCALF, W. E., *The Silver Coinage of Caesarea in Cappadocia* (New York, 1966).
- 'Notes on Severan Caesarea', in *Internationales Kolloquium zur kaiserzeitlichen Münzprägung Kleinasien*, Munich 1994 (Milan, 1997), 173–81.
- MICHAŁOWSKI, K., *Palmyra: Fouilles Polonaises 1961* (Warsaw, 1963).
- *Palmyra: Fouilles Polonaises 1962* (Warsaw, 1964).
- *Palmyra: Fouilles Polonaises 1963 et 1964* (Warsaw, 1966).

- MICKWITZ, G., *Geld und Wirtschaft im römischen Reich des vierten Jahrhunderts n. Chr.* (Helsinki, 1932).
- MIGEOTTE, L., *L'Emprunt public dans les cités grecques* (Québec, 1984).
- MILETI, M. C., 'La casa 1, 11, 6–7 a Pompei, un esempio di edilizia privata minore', *RSP* 11 (2000), 101–16.
- MILLAR, F., 'Caravan Cities: The Roman Near East and Long Distance Trade by Land', in *Modus Operandi: Essays in Honour of Geoffrey Rickman* (London, 1998), 121–37.
- 'The World of the Golden Ass', *JRS* 71 (1981), 63–75, repr. in S. J. Harrison (ed.), *Oxford Readings in the Roman Novel* (Oxford, 1999), 247–68, and in F. Millar, *Rome, the Greek World, and the East* (Chapel Hill, 2004), ii. 313–35.
- MILLETT, P., 'The Attic *Horoi* Reconsidered in the Light of Recent Discoveries', *Opus* 1 (1982), 219–49.
- 'Sale, Credit and Exchange in Athenian Law and Society', in P. Cartledge, P. Millett, and S. Todd (eds.), *Nomos: Essays in Athenian Law, Politics and Society* (Cambridge, 1990), 167–94.
- *Lending and Borrowing in Ancient Athens* (Cambridge, 1991).
- 'Productive to Some Purpose? The Problem of Ancient Economic Growth', in Mattingly and Salmon (eds.) (2001), 17–48.
- MILNE, J. G., 'The Early Coinages of Sicily.' *NC* 5th ser., 18 (1938), 36–52.
- MINIERO, P., 'Ricerche sull'ager *Stabianus*', in R. I. Curtis (ed.), *Studia Pompeiana et Classica, in Honor of Wilhelmina Jashemski* (New Rochelle, NY, 1988–9), i. 231–92.
- MIRHADY, D., 'Contracts in Athens', in *Law, Rhetoric and Comedy in Classical Athens: Essays in Honour of Douglas M. MacDowell* (Swansea, 2004), 51–64.
- MISHKIN, F. S., *The Economics of Money, Banking, and Financial Markets*, 3rd edn. (New York, 1992).
- MITCHELL, L. G., *Greeks Bearing Gifts* (Cambridge, 1997).
- MITCHELL, S., *Anatolia: Land, Men and Gods in Asia Minor*, 2 vols. (Oxford, 1993).
- MOCSY, A., *Pannonia and Upper Moesia*, trans. S. Frere (London, 1974).
- MOLINARI, M. C., 'Gli aurei a nome di Giulio Cesare e Aulo Irzio', *RIN* 104 (2003), 165–253.
- MOORE, B. J., *Horizontalists and Verticalists: The Macroeconomics of Credit Money* (Cambridge, 1988).
- MORGAN, D., *The Mongols* (Oxford, 1986).
- MORLEY, N., *Metropolis and Hinterland: The City of Rome and the Italian Economy, 200 B.C.–A. D. 200* (Cambridge, 1996).
- *Theories, Models and Concepts in Ancient History* (London, 2004).

- MØRKHOLM, O., *Early Hellenistic Coinage*, ed. P. Grierson and U. Westermark (Cambridge, 1991).
- MROZEK, S., 'À propos du "marbre" de Thorigny: salarium in auro (CIL XIII 3162)', *Bulletin de la Société Française de Numismatique* (1973), 335–6.
- 'Zum Kreditgeld in der frühen römischen Kaiserzeit', *Historia* 34 (1985), 310–23.
- MUHS, B., *Tax Receipts, Taxpayers, and Taxes in Early Ptolemaic Thebes: Demotic and Greek Ostraca in the Oriental Institute Collection*, Oriental Institute Publications 126 (Chicago, 2005).
- MULDREW, C., *The Economy of Obligation* (London, 1998).
- MUNRO, J. H., 'The Medieval Origins of the Financial Revolution: Usury, Rentes, and Negotiability', *International History Review* 25 (2003), 505–62.
- NAOHIRO, A., 'The Sixteenth-Century Unification', in *The Cambridge History of Japan* (Cambridge, 1991), iv. 40–95.
- NICOLET, C., 'Les Variations des prix et la "théorie quantitative de la monnaie" à Rome, de Cicéron à Pline l'Ancien', *Annales E.S.C.* 26 (1971), 1203–27.
- NICOLET-PIERRE, H., 'Monnaies archaïques d'Athènes sous Pisistrate de les Pisistratides (c.545–c.510). II. Recherches sur la composition métallique des *Wappenmünzen* en collaboration avec Jean-Noël Barrandon et Jean-Yves Calvez', *RN* 6th ser., 27 (1985), 23–44.
- and BARRANDON, J.-N., 'Monnaies d'*electrum* archaïques. Le trésor de Samos de 1894 (IGCH 1158) conservé à Paris', *RN* 6th ser., 39 (1997), 121–35.
- NOUHAUD, M. (ed.), *Dinarque, Discours* (Paris, 1990).
- OAKLEY, S. P., *A Commentary on Livy, Books VI–X*, 4 vols. (Oxford, 1997–2005).
- OATES, D., *Studies in the Ancient History of Northern Iraq* (Oxford, 1968).
- OKAMURA, L., 'Coin Hoards and Frontier Forts: Problems of Interpretation', in H. Vetters and M. Kandler (eds.), *Akten des 14. Internationalen Limeskongresses 1986 in Carnuntum: Der römische Limes in Oesterreich* (Vienna, 1990), 45–54.
- OLIVER, J. H., *Greek Constitutions*, ed. K. Clinton (Philadelphia, 1989).
- PAGANO, M., 'Scavi sull'antica marina: ambienti secondo e quinto', *RSP* 3 (1989), 273–8.
- 'Ufficio Scavi di Ercolano', *RSP* 10 (1999), 217–20.
- PAINTER, K. S., *The Insula of the Menander at Pompeii*, iv. *The Silver Treasure* (Oxford, 2001).
- PARKER, A. J., *Ancient Shipwrecks of the Mediterranean and the Roman Provinces* (Oxford, 1992).
- PARKER, R., *Athenian Religion: A History* (Oxford, 1996).

- PEACOCK, D. P. S., and Williams, D. F., *Amphorae and the Roman Economy: An Introductory Guide* (London, 1986).
- PEDLEY, J. G., *Paestum: Greeks and Romans in South Italy* (London, 1990).
- PEISKER, T., 'The Asiatic Background', in *The Cambridge Medieval History*, 1st edn. (Cambridge, 1911), i. 323–59.
- PENG, K., 'Coinage and Commercial Development in Eastern Zhou China' (Ph.D. thesis, Chicago, 2000).
- PENG XINWEI, *A Monetary History of China*, trans. E. H. Kaplan, 2 vols. (Bellingham, Wash., 1994).
- PESTMAN, P. W., 'Loans Bearing no Interest?', *Journal of Juristic Papyrology* 16–17 (1971), 7–29.
- 'L'Origine et l'extension d'un manuel de droit égyptien: quelques réflexions à propos du soi-disant code de Hermopolis', *Journal of the Economic and Social History of the Orient* 26 (1983), 14–21.
- PICARD, O., 'L'Apport des monnaies des fouilles d'Alexandrie', in Picard and Duyrat (eds.) (2005), 81–90.
- and DUYPAT, F. (eds.), *L'exception égyptienne? Production et échanges monétaires en Égypte hellénistique et romaine* (Cairo, 2005).
- PIGOU, A. C., 'The Value of Money', *Quarterly Journal of Economics* 32 (1917), 38–65, repr. in E. Dean (ed.), *The Controversy over the Quantity Theory of Money* (Lexington, 1965), 29–48.
- PIROZZI, V., 'I rinvenimenti del fondo Valiante', *RSP* 14 (2003), 49–84.
- PLEKET, H. W., 'Urban Elites and the Economy in the Greek Cities of the Roman Empire', *MBAH* 3/1 (1984), 3–36.
- POENARU BORDEA, G., ORCHEŞANU, R., and NICOLAE, E., 'Axiopolis aux IIIe–VIIe siècles de n.è. à la lumière des découvertes monétaires', *Studii si Cercetari de Numismatica* 9 (1989), 53–73.
- POLANYI, K., *The Great Transformation* (New York, 1944).
- *Primitive, Archaic, and Modern Economies: Essays of Karl Polanyi*, ed. G. Dalton (New York, 1968).
- *The Livelihood of Man* (New York, 1977).
- ARENSBURG, C., and PEARSON, H. (eds.), *Trade and Markets in the Early Empires* (New York, 1957).
- POLLARD, N., *Soldiers, Cities and Civilians in Roman Syria* (Ann Arbor, 2000).
- 'The Roman Army as "Total Institution" in the Near East: Dura Europos as a Case Study', in Kennedy (ed.) (1996), 211–27.
- 'Roman Material across Imperial Frontiers? Three Case Studies from Parthian Dura-Europos', in S. Colvin (ed.), *The Graeco-Roman East: Politics, Culture, Society* (Cambridge, 2004), 119–44.
- POMERANZ, K., *The Great Divergence* (Princeton, 2000).

- POZZI PAOLINI, E., 'Circolazione monetale a Pompei', in B. Andreae and H. Kyrieleis (eds.), *Neue Forschungen in Pompeji* (Recklinghausen, 1975), 299–307.
- PRÉAUX, C., *L'Économie royale des Lagides* (Brussels, 1939).
- PREDA, C., and NUBAR, H., *Histria*, iii. *Descoperirile monetare 1914–1970* (Bucharest, 1973).
- PREISIGKE, F., *Girowesen im griechischen Ägypten* (Strasburg, 1910).
- PRICE, M. J. (ed.), *Coins: an Illustrated Survey, 650 BC to the Present Day*. (New York, 1980).
- 'Southern Greece', in Burnett and Crawford (eds.) (1987), 95–103.
- *Studies in Greek Numismatics in Memory of Martin Jessop Price: see under Ashton and Hurter*.
- PRINGSHEIM, F., *The Greek Law of Sale* (Weimar, 1950).
- QUIGGIN, A. H., *A Survey of Primitive Money* (London, 1949).
- RAMSAY, W. M., 'Studies in the "Roman Province Galatia" VI—Some Inscriptions of Colonial Caesarea Antiochea', *JRS* 14 (1924), 172–205.
- RAN, W., 'Gold and Silver Production in the Spring and Autumn and Warring States Periods in the Light of Archaeological Findings', *Xibei Daxue xuebao* (1997), fasc. 2, 96–100 (in Chinese; English abstract in *China Archaeology and Art Digest* 1/2 (1997), 131–2).
- RATHBONE, D. W., 'The Ancient Economy and Graeco-Roman Egypt', in L. Criscuolo and G. Geraci (eds.), *Egitto e storia antica dall'ellenismo all'età araba. Bilancio di un confronto* (Bologna, 1989), 159–76.
- *Economic Rationalism and Rural Society in Third-century A.D. Egypt* (Cambridge, 1991).
- 'Monetisation, not Price-Inflation, in Third-Century A.D. Egypt?', in King and Wigg (eds.) (1996), 321–39.
- 'The Imperial Finances', *CAH X²* (1996), 309–23.
- 'Prices and Price Formation in Roman Egypt', in *PPF* 183–244.
- 'The "Muziris" Papyrus (SB XVIII 13167): Financing Roman Trade with India', *Bulletin. Société archéologique d'Alexandrie* 46 (2001), 39–50.
- 'The Financing of Maritime Commerce in the Roman Empire, I–II AD', *CM* 197–229.
- RAUH, N. K., 'Finance and Estate Sales in Republican Rome', *Aevum* 63 (1989), 45–76.
- *The Sacred Bonds of Commerce: Religion, Economy, and Trade at Hellenistic Delos, 166–87 B.C.* (Amsterdam, 1993).
- REDEN, S. VON, *Exchange in Ancient Greece* (London, 1995).
- 'Money, Law, and Exchange: Coinage in the Greek polis', *JHS* 117 (1997), 154–76.

- 'Money and Coinage in Ptolemaic Egypt: Some Preliminary Remarks', in *Akten des 21. Internationalen Papyrologenkongresses: Berlin, 13–19.8.1995. Archiv für Papyrusforschung und verwandte Gebiet* 3, ed. B. Kramer, W. Luppe, H. Maehler, and G. Poethke (Stuttgart, 1997), 1003–8.
- 'The Politics of Monetization in Third-century BC Egypt', in Meadows and Shipton (eds.) (2001), 65–76.
- 'Money in the Ancient Economy: A Survey of Recent Research', *Klio* 84 (2002), 141–74.
- *Money in Ptolemaic Egypt* (Cambridge, forthcoming).
- REDFORD, D. B., 'The So-called "Codification" of Egyptian Law under Darius', in J.W. Watts (ed.), *Persia and Torah. The Theory of Imperial Authorization of the Pentateuch* (Atlanta, 2001), 135–59.
- REECE, R., *Coinage in Roman Britain* (London, 1987).
- 'Coins and Villas', in K. Branigan and D. Miles (eds.), *Villa Economies: Economic Aspects of Romano-British Villas* (Sheffield, 1989), 34–41.
- *Roman Coins from 140 Sites in Britain* (Cirencester, 1991).
- 'British Sites and their Roman Coins', *Antiquity* 67 (1993), 863–9.
- 'Site Finds in Roman Britain', *Britannia* 26 (1995), 179–206.
- REEKMANS, T., 'The Ptolemaic Copper Inflation', *Studia Hellenistica* 7 (1951), 61–119.
- REGER, G., *Regionalism and Change in the Economy of Independent Delos, 314–167 B.C.* (Berkeley, 1994).
- RENBERG, I., PERSSON, M. W., and ENTERYD, O., 'Pre-industrial Atmospheric Lead Contamination Detected in Swedish Lake Sediments', *Nature* 368 (1994), 323–6.
- RHODES, P. J., 'Solon and the Numismatists', *NC* 7th ser., 15 (1975), 1–11.
- *A Commentary on the Aristotelian Athenaion Politeia* (Oxford, 1981).
- RICHARDS, J. F. (ed.), *Precious Metals in the Later Medieval and Early Modern Periods* (Durham, NC, 1983).
- RICKMAN, G., *Roman Granaries and Store Buildings* (Cambridge, 1971).
- *The Corn Supply of Ancient Rome* (Oxford, 1980).
- RIDGEWAY, W., *The Origin of Metallic Currency and Weight Standards* (Cambridge, 1892).
- RIHLL, T., 'Making Money in Classical Athens', in Mattingly and Salmon (eds.) (2001), 115–42.
- ROBINSON, E. S. G., 'The Coins from the Ephesian Artemision Reconsidered', *JHS* 71 (1951), 156–67.
- ROCHON, L.-P., 'On Money and Endogenous Money: Post-Keynesian and Circulation Approaches', in id. and S. Rossi (eds.), *Modern Theories of Money: The Nature and Role of Money in Capitalist Economies* (Cheltenham, 2003), 115–41.

- ROGER, B., 'The Bronze Coinage of Gordian III from Caesarea in Cappadocia', in R. Ashton (ed.), *Studies in Ancient Coinage from Turkey* (London, 1996), 49–95.
- ROSIVACH, V. J., *The System of Pubic Sacrifice in Fourth-Century Athens* (Atlanta, Ga., 1994).
- ROSTOVITZEFF, M. I., review of J. Hasebroek, *Griechische Wirtschafts- und Gesellschaftsgeschichte*, *Zeitschrift für die gesamte Staatswissenschaften* 92 (1932), 333–9, repr. in his *Scripta Varia*, *Ellenismo e Impero Romano*, ed. A. Marcone (Bari, 1995), 459–64.
- ROTH, J. P., *The Logistics of the Roman Army at War (264 BC–AD 235)*, *Columbia Studies in the Classical Tradition* 23 (Leiden, 1999).
- 'The Army and the Economy in Judaea and Palestine', in P. Erdkamp (ed.), *The Roman Army and the Economy* (Amsterdam, 2002), 375–97.
- ROUGÉ, J., *Recherches sur l'organisation du commerce maritime en Méditerranée sous l'empire romain* (Paris, 1966).
- ROWLANDSON, J., 'Money Use among the Peasantry of Ptolemaic and Roman Egypt', in Meadows and Shipton (eds.) (2001), 145–55.
- RUTTER, N. K., 'Athens and the Western Greeks in the Fifth Century B.C.', in *Kraay-Mørkholm Essays: Numismatic Studies in Memory of C. M. Kraay and O. Mørkholm* (Louvain-la-Neuve, 1989), 245–57.
- *Historia Numorum. Italy* (London, 2001).
- SACCONI, G., *Ricerche sulla delegazione in diritto romano* (Milan, 1971).
- SALLER, R. P., 'Framing the Debate over Growth in the Ancient Economy', in Scheidel and von Reden (eds.) (2002), 251–69.
- SAMUEL, A. E., *From Athens to Alexandria: Hellenism and Social Goals in Ptolemaic Egypt*, *Studia Hellenistica* 26 (Leuven, 1983).
- 'The Money Economy and the Ptolemaic Peasantry', *Bulletin of the American Society of Papyrologists* 21 (1984), 187–206.
- *The Shifting Sands of History: Interpretations of Ptolemaic Egypt* (Lanham, Md., 1989).
- SAMUELSON, P. A., and NORDHAUS, W. D., *Macroeconomics*, 16th edn. (Boston, 1998).
- SARGENT, T. J., and VELDE, F. R., *The Big Problem of Small Change* (Princeton, 2002).
- SCHAPS, D. M., review of D. Tandy, *Warriors into Traders*, *Bryn Mawr Classical Review* (1998), 98.11.1.
- 'The Conceptual Prehistory of Money and its Impact on the Greek Economy', in Balmuth (ed.) (2001), 93–103.
- *The Invention of Coinage and the Monetization of Ancient Greece* (Ann Arbor, 2004).

- SCHEIDEL, W. 'Prices and Other Monetary Valuations in Roman History: Ancient Literary Evidence and Modern Scholarship', <<http://www.stanford.edu/~scheidel/NumIntro.htm>>, accessed 7 June 2007.
- 'Population and Demography', <<http://www.princeton.edu/~pswpc/pdfs/scheidel/040604.pdf>>, accessed 22 June 2007. *Princeton/Stanford Working Papers in Classics* (Stanford, April 2006).
- 'Real Income Growth in Roman Italy' (forthcoming).
- 'The Monetary Systems of the Han and Roman Empires', forthcoming in W. Scheidel (ed.), *Rome and China: Comparative Studies in Ancient World Empires*.
- and REDEN, S. VON (eds.), *The Ancient Economy* (Edinburgh, 2002).
- SCHENTULEIT, M., *The Carlsberg Papyri 9: Aus der Buchhaltung des Weinmagazins im Edfu-Tempel. Der demotische P. Carlsberg 409*, CNI Publications 32 (Copenhagen, 2006).
- SCHMIDT-DICK, F., *Die Fundmünzen der römischen Zeit in Oesterreich* (Vienna, 1989), ii/3.
- SCHULTZ, W. C., 'The Monetary History of Egypt, 642–1517', in C. F. Petry (ed.), *The Cambridge History of Egypt* (Cambridge, 1998), i. 318–38.
- SCHURMANN, H. F., 'Mongolian Tributary Practices of the Thirteenth Century', *Harvard Journal of Asiatic Studies* 19 (1956), 304–89.
- SCHWARTZ, J., 'La Monnaie et l'évolution des prix en Égypte romaine', in *Les 'Dévaluations' à Rome* (Rome, 1978), 169–79.
- SEAFORD, R., 'The "Hyporchema" of Pratinas', *Maia* 29 (1987–8), 81–94.
- 'Tragic Money', *JHS* 118 (1998), 19–39.
- 'The Social Function of Attic Tragedy: A Response to Jasper Griffin', *Classical Quarterly* 50 (2000), 30–44.
- 'Dionysos, Money, and Drama', *Arion* ser. 3, 11/2 (2003), 1–19.
- 'Tragic Tyranny', in K. Morgan (ed.), *Popular Tyranny* (Austin, Tex., 2003), 95–115.
- *Money and the Early Greek Mind* (Cambridge, 2004).
- 'Monetisation, Ritual, and the Genesis of Tragedy', in D. Yatromanolakis and P. Roillos (eds.), *Greek Ritual Poetics* (Cambridge, Mass., 2004), 71–93.
- SELDEN, R. T., 'Monetary Velocity in the United States', in M. Friedman (ed.), *Studies in the Quantity Theory of Money* (Chicago, 1956), 179–260.
- SERLETIS, A., *The Demand for Money: Theoretical and Empirical Approaches* (Boston, 2001).
- SEVIN, V., and DERIN, Z., 'A Fortified Site to the East of Malatya', in French and Lightfoot (eds.) (1989), 437–60.
- SHATZMAN, I., *Senatorial Wealth and Roman Politics* (Brussels, 1975).

- SHIPTON, K., *Leasing and Lending: The Cash Economy in Fourth-century BC Athens* (London, 2000).
- SHOTYK, W., WEISS, D., APPLEBY, P. G., CHEBURKIN, A. K., FREI, R., GLOOR, M., KRAMERS, J. D., REESE, S., and VAN DER KNAAP, W. O., 'History of Atmospheric Lead Deposition since 12,370 ¹⁴C yr BP from a Peat Bog, Jura Mountains, Switzerland', *Science* 281 (1998), 1635–40.
- SIRKS, B., *Food for Rome* (Amsterdam, 1991).
- SMITH, J. M., JR., 'Mongol and Nomadic Taxation', *Harvard Journal of Asiatic Studies* 30 (1970), 46–85.
- SODO, A. M., 'Regio II, insula 9', *RSP* 2 (1988), 195–202.
- SOGLIANO, A., 'Pompei, Relazione degli scavi fatti durante il mese di maggio 1899', *Notizie degli Scavi* (1899), 203–8.
- SOMMERFELD, C., *Gerätegeld Sichel* (Berlin, 1994).
- SORDA, S., 'A proposito di un rinvenimento di punte di freccia', *AiIN* 26 (1979), 185–206.
- SPEIDEL, M. P., 'Roman Army Pay Scales', *JRS* 82 (1992), 87–106.
- STANCOMB, W., 'Arrowheads, Dolphins and Cast Coins in the Black Sea Region', *Classical Numismatic Review* 18/3 (1993), 5.
- STROBEL, K., 'Geldwesen und Währungsgeschichte des Imperium Romanum im Spiegel der Entwicklung des 3. Jahrhunderts n.Chr.', in Strobel (ed.), *Die Ökonomie des Imperium Romanum* (St Katharinen, 2002), 86–168.
- SWANN, N. L., *Food and Money in Ancient China: The Earliest Economic History of China to A.D. 25. Han Shu 24 with Related Texts, Han Shu 91 and Shih-chi 129* (Princeton, 1950).
- TALAMANCA, M., *L'arra della compravendita in diritto greco e in diritto romano* (Milan, 1953).
- TALAMO, C., 'Sull'Artemision di Efeso', *Parola del Passato* 39 (1984), 197–216.
- TALIERCIO MENSITIERI, M. (ed.), *Pompei. Rinvenimenti monetali nella Regio IX* (Rome, 2005).
- TATE, G., 'The Syrian Countryside during the Roman Era', in S. E. Alcock (ed.), *The Early Roman Empire in the East* (Oxford, 1997), 55–71.
- TATSUYA, T., 'Politics in the Eighteenth Century', *The Cambridge History of Japan* (Cambridge, 1991), iv. 425–77.
- TCHERNIA, A., 'Remarques sur la crise de 33', in *CM* 131–46.
- TEMIN, P., 'A Market Economy in the Early Roman Empire', *JRS* 91 (2001), 169–81.
- 'Financial Intermediation in the Early Roman Empire', *Journal of Economic History* 64 (2004), 705–33.

- 'Mediterranean Trade in Biblical Times', in R. Findlay, R. G. H. Henrikson, H. Lindgren, and M. Lundahl (eds.), *Eli Heckscher, International Trade, and Economic History* (Cambridge, Mass., 2006), 141–56.
- 'Estimating GDP in the Early Roman Empire', in E. Lo Cascio (ed.), *Innovazione tecnica e progresso economico nel mondo romano* (Bari, 2006), 31–54.
- THEMELIS, P. G., 'An 8th Century Goldsmith's Workshop at Eretria', in R. Hägg (ed.), *The Greek Renaissance of the Eighth Century B.C.* (Stockholm, 1983), 189–93.
- THIERRY, F., 'De la nature fiduciaire de la monnaie chinoise', *Bulletin du Cercle d'Etudes Numismatiques* 30/1 (1993), 1–12.
- 'Sur les spécificités fondamentales de la monnaie chinoise', in A. Testart (ed.), *Aux origines de la monnaie* (Paris, 2001), 109–44.
- 'Die Geschichte des chinesischen Geldes von den Ursprüngen bis zum Beginn des 20. Jahrhunderts', in W. Seipel (ed.), *Geld aus China* (Vienna, 2003), 25–89.
- *Monnaies chinoises*, i. *L'Antiquité préimpériale* (Paris, 1997); ii. *Des Qin aux Cinq Dynasties* (Paris, 2004).
- THOMPSON, C. M. 'Sealed Silver in Iron Age Cisjordan and the "Invention" of Coinage', *Oxford Journal of Archaeology* 22 (2003), 67–107.
- THOMPSON, D. J., 'Egypt, 146–31 BC', in *CAHIX²* (Cambridge, 1994), 310–26.
- THOMPSON, M., MØRKHOLM, O., and KRAAY, C. M. (eds.), *An Inventory of Greek Coins Hoards* (New York, 1973).
- THOMSEN, R., *Early Roman Coinage*, 3 vols. (Copenhagen, 1957–61).
- *Ambition and Confucianism: A Biography of Wang Mang* (Aarhus, 1988).
- THÜR, G., 'Zum Seedarlehen kata Mouzeirin P.Vindob. G40822', *Tyche* 3 (1988), 229–33.
- *Beweisführung von den Schwurgerichtshöfen: Die Proklesis zur Basanos* (Vienna, 1993).
- TODD, S., *The Shape of Athenian Law* (Oxford, 1993).
- TOEPEL, L. R., 'Studies in the Administrative and Economic History of Tebtunis in the First Century A.D.' (Ph.D. diss., Duke University, 1973).
- TOURATSOGLU, I., 'Macedonia', in Burnett and Crawford (eds.) (1987), 53–78.
- TRAVAGLINI, A., 'Presenza di moneta romana repubblicana in Puglia', in C. Marangio (ed.), *La Puglia in età repubblicana; Atti del I convegno di studi sulla Puglia romana, Mesagne, 20–22 marzo 1986* (Galatina, 1988), 65–76.
- TRÖIANOS, S., and VÉLISSAROPOULOS-KARAKOSTAS, J., *Ιστορία Δικαίου*, 2nd edn. (Athens, 1997).

- TRÖIANOS, S., *Ιστορία Δικαίου, από την αρχαία στη νεώτερη Ελλάδα* (Athens, 1997).
- TUCKER, I. B., *Economics for Today* (Minneapolis and St Paul, 1997).
- TUDOR, D., 'Sucidava (II)', *Dacia* 7–8 (1937–40), 359–400.
- 'Sucidava (III)', *Dacia* 11–12 (1945–7), 145–208.
- TURNER, E. G., 'Ptolemaic Egypt', in *CAH*, 2nd edn. (Cambridge, 1984), vii/1. 118–74.
- VAN ALFEN, P. G., 'Herodotos' "Aryandic" Silver and Bullion Use in Persian-Period Egypt', *AJN* 2nd ser., 14 (2004–5), 7–29.
- (ed.), *Agoronomia: Studies in Money and Exchange Presented to John H. Kroll* (New York, 2006).
- 'Problems in Ancient Imitative and Counterfeit Coinage', in Archibald, Davies, and Gabrielsen (eds.) (2005), 322–54.
- VAN BERCHEM, D., *Les Distributions de blé et d'argent à la plèbe romaine sous l'Empire* (Geneva, 1939).
- 'L'annone militaire est-elle un mythe?', in A. Chastagnol, C. Nicolet, and H. van Effenterre (eds.), *Armées et fiscalité dans le monde antique* (Paris, 1997), 331–4.
- VAN BUREN, A. W., 'Newsletter from Rome', *AJA* 65 (1961), 377–88.
- VAN CAUWENBERGHE, E., and IRSIGLER, F. (eds.), *Minting, Monetary Circulation and Exchange Rates: Akten des 8th International Economic History Congress* (Trier, 1984).
- VAN DE MIEROOP, M., 'The Invention of Interest', in W. N. Goetzmann and K. Geert Rouwenhorst (eds.), *The Origins of Value. The Financial Innovations that Created Modern Capital Markets* (Oxford, 2005), 17–30.
- VANDORPE, K., 'Interest in Ptolemaic Loans of Seed-Corn from the "House of Hathor" (Pathyris)', in *Egyptian Religion, the Last Thousand Years. Studies Dedicated to the Memory of Jan Quaegebeur Orientalia Lovaniensia Analecta* 84–5 (Leuven, 1998), 1459–68.
- *The Bilingual Family Archive of Dryton, his wife Apollonia and their Daughter Senmouthis*, *Collectanea Hellenistica* 4 (Brussels, 2002).
- VAN MINNEN, P., 'The Changing World of the Cities of Later Roman Egypt', in J.-U. Krause and C. Witschel (eds.), *Die Stadt in der Spätantike—Niedergang oder Wandel?* (Stuttgart, 2006), 153–79.
- VARGAS, P., 'Kaspu ginnu and the Monetary Reform of Darius I', *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 89 (1999), 247–68.
- 'Money in the Ancient Near East Before and After Coinage', *American Society of Oriental Research Newsletter* 49, 3 (1999), 15–16.
- VÉISSE, A.-E., *Les 'Révoltes égyptiennes'. Recherches sur les troubles intérieurs en Égypte du règne de Ptolémée III à la conquête romaine*, *Studia Hellenistica* 41 (Leuven, 2004).

- VÉLISSAROPOULOS-KARAKOSTAS, J. 'Remarques sur la clause *κυρία ἡ συγγραφή*,' in E. Cantarella and G. Thür (eds.), *Symposion 1997* (Cologne, 2001), 103–15.
- VERBOVEN, K., 'The Monetary Enactments of M. Marius Gratidianus,' in C. Deroux (ed.), *Studies in Latin Literature and Roman History* 7 (1994), 117–31.
- 'Caritas Nummorum. Deflation in the Late Roman Republic?', *MBAH* 16/2 (1997), 40–78.
- 'L'Organisation des affaires financières des C. Sulpicii de Pouzzoles,' *Cahiers du Centre Gustave-Glotz* 11 (2000), 161–71.
- *The Economy of Friends. Economic Aspects of Amicitia and Patronage in the Late Republic* (Brussels, 2002).
- '54–44 BCE: Financial Crisis or Monetary Crisis?', in *CM* 49–68.
- VERHOOGT, A., *Regaling Officials in Ptolemaic Egypt*, *Papyrologica Lugduno-Batava* 32 (Leiden, 2005).
- VIRLOUVEF, C., *Tessera frumentaria: les procédures de distribution du blé public à la fin de la République et au début de l'Empire* (Rome, 1995).
- VLEEMING, S. P., *Some Coins of Artaxerxes and Other Short Texts in the Demotic Script Found on Various Objects and Gathered from Many Publications* (Leuven, 2001).
- *The Gooseherds of Hou (Pap. Hou). A Dossier Relating to Various Agricultural Affairs from Provincial Egypt of the Early Fifth Century BC* (Leuven, 1991).
- VOGEL, K., *Neun Bücher arithmetischer Technik: Ein chinesisches Rechenbuch für den praktischen Gebrauch aus der frühen Hanzeit (220 v. Chr. bis 9 n. Chr.)* (Braunschweig, 1968).
- VOLK, T. R., 'Mint Output and Coin Hoards,' *Numismatica Lovaniensia* 7 (1987), 141–222.
- VON MISES, L., *The Theory of Money and Credit* (New Haven, 1953).
- VUAT, F., 'La casa 1, 11, 5–8 e le sue fasi edilizie,' *RSP* 11 (2000), 133–51.
- WALBANK, F. W., *The Awful Revolution: The Decline of the Roman Empire in the West* (Liverpool, 1969).
- WALKER, A., 'Excavation Coins: the Use and Misuse of Numismatic Evidence in Archaeology,' in K. A. Sheedy and C. Papageorgiadou-Banis (eds.), *Numismatic Archaeology, Archaeological Numismatics* (Oxford, 1996), 17–28.
- WALLACE, R. W., 'The Origin of Electrum Coinage,' *AJA* 91 (1987), 385–97.
- WALLACE-HADRILL, A., *Houses and Society in Pompeii and Herculaneum* (Princeton, 1994).
- WALLICH, H., 'The Evolution of the International Monetary System,' in M. Connolly (ed.), *The International Monetary System: Choices for the Future* (New York, 1982), 280–92.

- WALTERS, H. B., *Catalogue of the Silver Plate (Greek, Etruscan and Roman) in the British Museum* (London, 1921).
- WANG, Y.-C., *Early Chinese Coinage* (New York, 1951).
- WARBURTON, D. A., *State and Economy in Ancient Egypt. Fiscal Vocabulary of the New Kingdom*, *Orbis Biblicus et Orientalis* 151 (Fribourg, 1997).
- WATSON, G. R., 'The Pay of the Roman Army: The Auxiliary Forces', *Historia* 8 (1959), 372–8.
- *The Roman Soldier* (London, 1969).
- WEBSTER, T. B. L., *Life in Classical Athens* (London, 1969).
- WEIDAUER, L., *Probleme der frühen Elektronprägung* (Fribourg, 1975).
- WEISSL, M., 'Grundzüge der Bau- und Schichtenfolge im Artemision von Ephesos', *Österreichische Jahreshefte* 71 (2002), 313–46.
- WELLS, H. B., 'A Further Study of the Arrowhead-Money', *SAN* [the journal published by the Society for Ancient Numismatics] 12 (1981), 53–4.
- WELTER, G., 'Aeginetica XXV. Aiginetische "Schildkröten"', *Archäologischer Anzeiger* (1954), 28–30.
- WHITTAKER, C. R., *Frontiers of the Roman Empire: A Social and Economic Study* (Baltimore, 1994).
- WILLEMS, W. H. J., *Romans and Batavians: A Regional Study in the Dutch Eastern River Area* (Amsterdam, 1986).
- WILLIAMS, J. (ed.), *Money: A History* (London, 1997).
- WILSON, A., 'Machines, Power and the Ancient Economy', *JRS* 92 (2002), 1–32.
- WILSON, J. P., 'The "Illiterate Trader"?', *Bulletin of the Institute of Classical Studies* (University of London) 42 (1997–8), 29–53.
- WILSON, P. J., *The Athenian Institution of Khoregia* (Cambridge, 2000).
- WINKLER, I., 'Despre circulatia monetară la Porolissum', *AMN* 1 (1964), 215–23.
- 'Circulatia monetară la Apulum', *AMN* 2 (1965), 213–56.
- and HOPÂRTEAN, A., *Moneda antică la Potaissa* (Cluj, 1973).
- 'Descoperiri monetare in Ulpia Traiana Sarmizegetusa', *Sargetia* 11–12 (1974–5), 117–36.
- WOLFF, H.-J., 'Die Grundlagen des griechischen Vertragsrechtes', *Zeitschrift der Savigny-Stiftung für Rechtsgeschichte. Romanistische Abteilung* 74 (1957), 26–72.
- 'Plurality of Laws in Ptolemaic Egypt', *RIDA* 3 (1960), 191–223.
- *Beiträge zur Rechtsgeschichte Altgriechenlands und des hellenistisch-römischen Ägyptens* (Weimar, 1961).
- 'Debt and Assumpsit in the Light of Comparative Legal History', *The Irish Jurist* 1 (1966), 316–27, repr. in *Opuscula Dispersa* (Amsterdam, 1974), 123–34.
- WOLTERS, R., *Nummi signati. Untersuchungen zur römischen Münzprägung und Geldwirtschaft* (Munich, 1999).

- WOOLF, G., 'Imperialism, Empire and the Integration of the Roman Economy', *World Archaeology* 23 (1992), 283–93.
- YARKIN, U., 'An Unpublished Coin for Ariarathes III for Cybistra in Cappadocia', *NC* 141 (1981), 144–5.
- YOUNG, G. K., *Rome's Eastern Trade: International Commerce and Imperial Policy, 31 BC–AD 305* (London, 2001).
- ZANCANI MONTUORO, P., 'L'edificio quadrato nello Heraion alla Foce del Sele', *Atti e Memorie della Società Magna Grecia*, ns 6–7 (1965–6), 23–195.
- ZAUZICH, K.-T., 'Einleitung', in P. J. Frandsen (ed.), *The Carlsberg Papyri i. Demotic Texts from the Collection* (Copenhagen, 1991), 1–11.
- ZIEGLER, R., *Kaiser, Heer und städtisches Geld: Untersuchungen zur Münzprägung von Anazarbos und anderer ostkilikischer Städte* (Vienna, 1993).
- 'Civic Coins and Imperial Campaigns', in Kennedy (ed.) (1996), 119–227.
- ZUCKERMAN, C., *Du village à l'empire. Autour du registre fiscal d'Aphroditô (525/526)* (Paris, 2004).

This page intentionally left blank

Index

Gold, silver and bronze have not been indexed, and the entries for 'coinage', 'Greece', 'metals', and 'Rome' are very selective.

- Achaemenid Empire 14, 268–9
'Aegean' model (coins made of precious metals) 8, 267–71, 272, 282, 284–6
Aegina 36 n.
aerarium 220–1
aerarium sanctius 127–8
aes rude 12
agriculture, in Roman
 Egypt 229–34; *and see* farmers
Alexander of Macedon 14, 269
Alexandria 96, 110, 177, 195, 236–8, 239
Amsterdam *Wisselbank* 201
Andreau, J. 3, 9, 177, 186, 187, 194–5, 204
annona 155, 157
Antioch, Pisidian 141, 143
Antonine Plague 227, 228–9, 233
Apsaros (Roman town in Georgia) 260–1
Apuleius 9, 169–70, 215
Ardovino, A. M. 27–8
argentarii, decline of 204
argentum infectum: *see* bullion
Arion 56, 57–8
Aristotle 12; Ps., *Oikonomika* 61, 86, 93
armaria (for the storage of valuables) 214–15
army, supplying the Roman 247
Assyrian Empire, Neo- 13
Athens 36 n., 47, 66–83, 248; *and see* festivals
atmospheric pollution under
 Roman Empire 163
Augustus 154, 155, 156
Aurelian 205, 206
aurum infectum: *see* bullion
Axum coinage 271
Babelon, E. 32
Babylonian Empire, Neo- 13
Backendorf, D. 116–17
Bactria 269
Banaji, J. 168, 173
bankers, banking 44–5, 46, 76–82, 133, 186–9, 218–20; in Egypt 92, 104, 189, 206, 236; *see also* money-changing
Barlow, C.T. 133
barter 44, 105, 164, 195, 243
Bingen, J. 103, 108
Bocchoris, King 98, 99
Borgongino, M. 217
Boscoreale villa 223; hoard 168
Breglia, L. 208, 210
Britain, Roman 242
bullion 3, 12–37, 44, 121, 160, 176–7, 220
Burnett, A. 135
Butcher, K. 259–60
Buttrey, T. 114–15, 117

- Caecilius Iucundus
documents 194–5, 217–20
- Caesarea in Cappadocia 260
- Camodeca, G. 166, 190, 221–2
- Cappadocia 253–4
- Caria 24
- Carrié, J.-M. 206
- Carthage 285
- Casey, J. 245
- Casson, L. 188
- Castiglione Morelli, V. 216
- cattle as unit of account 41
- cauldrons as money 40–1
- Celtic coinage 270
- Chandavarkar, A. 134
- China, pre-coinage money of 272;
exceptional gold coinage in
ancient 279–81; conservatism
with respect to coinage 281–3
- Chinese model (coinage constituted
by base metals) 8, 267–8, 271–84
- Cicero: *see* Tullius
- city-dwellers in late-Roman
Egypt 228
- Claudius 157
- Claudius Gothicus 206
- clearing banks, houses 82, 181,
201–2
- Clodia 221
- closed currency system, in Egypt 91
- codification of law in pre-Roman
Egypt 98
- Cohen, E. E. 5, 10, 45
- coinage, gold, beginnings of, at
Rome 160–1
- coinage, initial spread of 3–4,
268–9; token-value or non-
commodity 47–8, 68; *and see*
'Aegean' model, Chinese model
- coin-production, volume
of 114–17, 273 (in China)
- coins, definition of 267 n.; forgery
of 132–3; historical distortion
resulting from survival of 82;
inconvenience of, for large
transactions 77–9; 'life-curves'
of 116–17; 'small
denominations', survival of 248;
stock of, in Roman
Empire 202–3; transport of, over
long distances 198–9; very
small 4, 22–23, 270
- Colchis 261
- Colophon 23
- commerce: *see* traders
- commodities, making payments by
means of 126–7
- commodity-money 195–201
- Commodus 205
- Constantine 173, 228
- contracts, enforceable, at
Athens 73–4
- Cornelius Scipio Aemilianus P., 188
- Cornell, T. J. 13, 37
- Cornford, F. M. 46
- Crawford, M. H. 114–17, 135,
164, 244–5
- credit 46, 175 n., mechanisms in
Roman Empire, 166, typology of
Roman, 183
- credit-money: *see* money
- Croesus 19, 21
- Currency Edict of Diocletian
204
- Cuvigny, H. 195
- Dacia 245, 248–9, 263–6
- Danube provinces 244–52
- Danzig, G. 43
- Dapoto, P. 208
- debasement of silver coinage at
Rome 171, 200–1, 205–6

- debt 177–8, 180, 182–95; *and see*
 lending
- debt crises 13, 188
- De Cecco, M. 2
- decurion class 190, 203–4
- delegatio* 193
- De Ligt, L. 164, 243
- Delos 44
- Demand Theory of Money 122–36
- Demosthenes 74
- denarius, spread of to Rome's
 provinces 120–1
- Depauw, M. 108–9
- depositum* 187
- diagraphē* (cashless settlement of a
 debt through a bank entry) 81
- Diarbekir hoard 165
- dies 114–17
- Diocletian 172, 204, 206
- Diodorus Siculus in Egypt 100–1
- Dionysus 63–4
- dithyrambs 58, 62
- dowry, payment of 167–8, 223
- Duncan-Jones, R. P. 9, 137, 140,
 142, 161–3, 164–5, 166, 202–3,
 208–9, 212
- Dura Europos 257–8
- Edfu 95, 111
- Egypt 14; monetization of 7, 9–10;
 Persian 88–9, 94;
 Pharaonic 87–8, 94; prices
 in 141–2, 143;
 Ptolemaic 84–111; Roman
 annexation of 199;
 Roman 226–41, (as a partly
 closed currency zone) 238–40
- electrum 4, 17–20, 276
- Ephesus, Artemisium at 19–21;
 debt law of (85 BC) 183,
 194
- Eretria 34
- Euripides, *Bacchae* 63–4
- farmers, monetary needs of 113,
 125, 127, 128
- festivals, at Athens 51–4; financing
 of 49–55
- fideiussio* 190
- fiduciarity 10–11, 199–201, 273
- fines 13, 15
- Finley, M. I. 4, 10, 38, 43, 45,
 66, 84
- Fisher, I. 117, 205
- fish-mongering 194
- Flavian emperors 246–7
- Flynn, D. 122
- Francavilla Marittima, silver
 from 27, 28
- Frank, T. 142
- 'free coinage' 130 n.
- Freyburg, H.-U. von 201
- Friedman, M. 123
- frontier provinces 242–66;
 frontiers, bullion used for
 transactions across 177
- Galba 112, 166
- GDP of the Roman Empire 163–4,
 202
- Giove, T. 208
- Goldsmith, R. W. 162–3, 164, 203
- governments, monetary needs
 of 127–8; interventions of, in
 wheat market, 154–5
- grain as money in Pharaonic
 Egypt 87; in Ptolemaic
 Egypt 93–4, 95
- Greece, differences in use of bullion
 between different regions of 35
- Greek Law of Sale, so-called 69–74
- Greenland ice 163

- growth, economic, in ancient world 1–2, 135–6, 207
Hacksilber 25, 29, 31
 Hadrian 157
 Han dynasty 273–5
 Herculaneum 211; *and see* Vesuvian cities
 Hermopolis, land-leases
 from 229–30; legal code 98–9, 100
 Herodes Atticus 189
 Héron de Villefosse, A. 216–17
 Hicks, J. 94
 hoards, how constituted 34–5, 162, 176–7, 213, 238; *and see* individual place names
 Hogarth, D. G. 18–19, 22
 Hollander, D. B. 5–6
 Holloway, R. R. 4
 Homer 40, 50, 57
homologia (consensual agreement) 72–3, 183
 Hopkins, K. 114, 115, 117, 118–19, 121, 134–5, 137, 162, 165–6, 175
 Horace 194
horos-inscriptions: *see* mortgages
horreum (warehouse) 217–18, 220; (as a room for storing valuables), 215
 Howgego, C. J. 1, 135, 164, 175, 255
 Huns, White, coinage of 270

 Iberian coinage, early 270
 imperialism and coinage systems 284
 Indian coinage, early 269
 Indian Ocean trade 177, 237–8
infamia and the Roman debtor 180
 inflation, Roman 1–2, 134–5, 157–8, 171, 172, 205, 226–9

 Ingham, G. 2
 inheritance system, Roman 167, 223
 integration of markets in the Roman Empire 7–8, 137–59
 interest rates 192, 235–6
 investments, preferred, of Roman rich 185–6, 235–6
 iron spits 36, 40–1
 Italy, earliest coinage in 140, 143, 270
 Iulius Caesar, C. 10, 177–8
 ivory 241

 Japanese coinage 282–3
 jewellery 215–17
 Jongman, W. 128, 167–8

 Karanis 242
 Katsari, C. 7
 Kessler, D. 7–8
 Keynes, J. M. 123–4
khoregia 61–2
 Kim, H. 17, 22, 88
 Kroll, J. H. 3–4, 41, 177
 Kushan coinage 269–70, 282

 land, investment in 185;
 landowners in late-Roman Egypt 228, 233–4
 land-leases in Roman Egypt 229–34
 Laum, B. 38
 Laureion silver mines 67–8
 law, codification of, in pre-Roman Egypt 98
 legacies: *see* inheritance system
 legal tender 31, 34 n., 68
 lending, at Athens 69–82; by banks 77–8; by cities 184; in pre-Roman Egypt 106–8; in Roman Egypt 235–6
 Lewis, N. 107

- Lex Cornelia *testamentaria nummaria* 161
 Lex Irnitana 184
 Liberchies hoard 165
 loans: *see* lending
 Lo Cascio, E. 9, 175
 Lusitania 140, 143, 145, 152
 Lydia, Lydians 3, 17–18

 Magna Graecia 24–33
mancipatio 13
 Manganaro, G. 19, 21
 Manning, J. G. 7
 maritime loans at Athens 78–9, 81;
 in the Roman Empire, 187–8
 Marius Gratidianus 133 n., 200
 markets, nature of ancient 7–8, 43
 Martial 169
 Masada 256
 Mazzarino, S. 169
 mediaeval coinage 271
 Mediterranean, market integration
 in 138, 140, 142, 145
 Méléze-Modrejewski, J. 100
 Mesopotamia, Roman province
 of 254, 256
 metals, choice of, for coinage 8–9,
 267–86
 methodological problems 11
 military sites, Roman 246–66
 Millar, F. 169
 Milne, J. G. 33
 mines, mining 172, 276–8; *and see*
 Laureion silver mines
 minting, Ptolemaic 96;
 Roman 8 n.; *and see* reminting
 Moesia 251–2
 monetization 6–7, 84–111, 137–59,
 242–66
 money, credit- 4–5, 69, 74, 178–9,
 182–95, 237; created by Athenian
 banks 76–83; by British
 banks 179; by Roman
 banks 69 n.; in Roman
 Empire 174–207
 money, exogenous vs.
 endogenous 180–1; paper
 (in China) 275–6; special-
 purpose 40–2; as a standard of
 value in the Roman
 Empire 137–59; unbacked
 fiat 68; utensil- (in China) 272;
 and see coins, coinage
 money-changing, archaic 31;
 money-lending 44–5, *and see*
 lending; money-supply 6, 66–83,
 178, 203–4, 207
 Morley, N. 11
 mortgages 73–4, 75
 Muhs, B. 88
 Muldrew, C. 182–3
 multiplier effect 178, 201
 Murécine documents 190, 221–1;
 and see Sulpicii, Bank of
 Musarna hoards 213
 ‘Muziris’ papyrus 195, 237–8

 nard 241
 Naucratis 88
 ‘negotiable paper’ 193
 Nero 155
nomina (loans) 179, 184, 192–3
nummularii, decline of 204

 Olson, M. 100
 Oplontis villas 209–10, 216,
 222, 223
 Ovid 178
 Oxyrhynchus 235–7

 Paestum 25–8
 Pahlava coinage 269

- Palestine 142, 143
 Palmyra 258–9
 Pannonia 250–1, 266
 paper money: *see* money
 Parker, R. 52
 Parthia 258, 269
 Pasion, bank of 79–80, 81
 Paulus (jurist) 161
pecunia 181–2
 Peisistratids: *see* tyrants
permutatio 133
perscriptio 218–19
 Persia, Persians 44, 86, 87, 90; *and see* Achaemenid Empire, Egypt
persolvere 195, 218, 219
 Pestman, P.W. 98
 Phoenicians 35–6, 285
 Phrygia 252–4
 Pigou, A. C. 6, 122
 Plautus 194
plebs frumentaria 170–1
 Polanyi, K. 38
 politicians, monetary needs of 113
 politics, effects of late-republican, on need for money 131–2
 Pompeii 161; Casa del Fauno 212; Casa del Menandro 216, 223; Casa della Venere in Bikini 224; House of M. Epidius Primus 215; House of the Indian Statuette 215; House of L. Vetutius Placidus 214; *and see* Vesuvian cities
 Pompey 154
portoria (tariffs on trade) 151
 Poseidonia: *see* Paestum
 Pozzi, E. 208, 211
 Pratinas (author of satyr plays) 59, 60, 62
 Price-Edict of Diocletian 172
 prices 117–22, 137–59, 200; poor data on in Ptolemaic Egypt 93; in Roman Egypt 226–9; *and see* governments, inflation
 priests, role of in monetization 95, 97, 107, 111
 Pringsheim, F. 69–74
 prizes, cash 56
 professional singers and musicians, first 58–9
 property transfers in Ptolemaic Egypt 108–9
 Ptolemais 101, 110
 Ptolemies 4, 47, 84–111; Ptolemy I 101; II, 85, 90, 94, 98, 100, 101, 102, 109; III 102; IV, 93
 Puteoli 190

 quantity theory of money 113, 117–22

 Rathbone, D. 110, 141–2, 166, 175, 191, 195
 real estate, market in 128; payments for 73–4, 175–6, 197–8
 Reden, S. von 85, 95, 96, 97
 Reece, R. 245–6
 Reger, G. 43
 regression analysis, applied to wheat prices in the Roman Empire 147–52
 reminting 202–3
 rents, in Roman Egypt 231
repraesentare 198 n.
 ‘Revenue Laws papyrus’ 103
 Rhodes, P. J. 14, 15–16
 Rickman, G. 139, 140, 142
 Ridgeway, Sir W. 38
 Rome, wheat prices higher at 142
 Roover, R. De 187
 Rosivach, V. J. 53

- Rostovtzeff, M. I. 39
 Rowlandson, J. 95
 rural monetization 164, 242–3
- Saka coinage 269 ?
 salt taxes 21, 94–5
 Sambiasi 29
 Samuel, A. E. 105, 110, 111
 savings 123–5, 223–4
 Seaford, R. A. 6, 10, 42
 seasonal price differences 153
 Schaps, D. 4–5, 10, 142
 Scheidel, W. 8, 169
 Scipio Aemilianus: *see* Cornelius
 Selden, R. 118
 Selinus 32–3
 Septimius Severus 170
 Serletis, A. 125
 shells as money 272
 Sicily 25, 28–9, 30, 32–3, 140, 143, 144, 145
 soldiers' pay 170, 278–9
solidus 173, 227
 Solon 16, 52; laws of 14–17
 Spain 221; gold and silver mines in 172 n.
 Stabiae: *see* Vesuvian cities
 Stefani, G. 217
 Sulpicii, Bank of 188, 189, 190
 Sybaris 29
 Syria 255–9
- tabellae* as a means of payment 178
 Tarentum 30–2
 taxation, monetary effects of in Ptolemaic Egypt 80, 91–2, 94, 95, 104; level of, in Roman Egypt, 229–34
 tax-farming 94, 104
 tax-payments, at Ephesus 20; in Ptolemaic Egypt 85, 92, 95; in Roman Egypt 228, 237; *and see tributum*
 Temin, P. 7–8, 43, 162
 temples 95
 Thür, G. 195
 Tiberius 154–5, 188
 traders, monetary needs of 126–7
 tragedy, Attic, money in 6, 61–5
 transport costs 140–1
trapezai as banks 76
 Treasury, Roman: *see aerarium tributum* 13
 Trimalchio 169
 trimetallic coin system 92, 271
 tripods as money 40
 Tullius Cicero, M. and Q. 112, 175–6, 177, 197–8, 221
 Twelve Tables 13
 tyrants 54–5, 56, 57–8, 60, 61–2, 64–5
- Ulpian 181–2
 United States, monetary system of 82–3
 urbanization, level of, under Roman Empire 164, 244–52 (Danube provinces), 252–61 (Asia Minor and Syria)
 usury 16
- van Minnen, P. 7, 9–10, 77, 190
 'velocity' of money circulation 117–19, 121–2, 163, 164–5
 vendors as lenders at Athens 75
 Verboven, K. 121
 Vesuvian cities 9, 177, 208–225; *and see* Herculaneum, Pompeii

Wallace, R. W. 4

Watson, G. R. 170

wheat prices 138–59

Wilson, P.J. 61

wine, trade in 194, 217

women with bank accounts 219

Zeugma 259–60