With this post, I begin a three-part posting of the essay I wrote in 1985 for delivery at the Pacific Division of the American Philosophical Association. The paper appears to have been prepared as part of a panel duscussing a recent book by James Buchanan, who the next year won the Nobel prize in Economics for his work on public choice, but I confess that I have compeletly forgotten the details.

THE INDEXING PROBLEM PART ONE

Professor Buchanan has explicated for us, both in his paper today and in the book which this session serves to celebrate, the limitations of the sorts of unanimity partial orderings to which Vilfredo Pareto has given his name. In my remarks today, I should like to explore some of the ways in which economists and philosophers have sought to extend the scope of inter-systematic comparisons, and to suggest reasons for believing that intersystemic comparisons must always implicitly or otherwise embody some evaluative presuppositions. My thesis is one more instance of a much broader theme, to which I have many times returned in writing and teaching, namely that supposedly value-neutral models of formal analysis usually contain powerful unacknowledged value assumptions which shape their formal structure as well as their substantive content.

The problem with unanimity partial orderings is that although they are transitive, they are not complete. If everyone at our picnic prefers chocolate ice cream to vanilla, then we can be sure that switching the dessert from vanilla to chocolate will

produce an increase in social welfare, assuming that everything else remains unchanged, and that there are no externalities. Furthermore, if we all prefer vanilla to pistachio as well, then the transitivity of individual preference guarantees that we will all prefer chocolate to pistachio, and therefore a switch of the dessert from pistachio to chocolate must increase social welfare. But suppose some of us prefer chocolate to vanilla and the rest prefer vanilla to chocolate. How shall we evaluate the move from vanilla to chocolate, as a collective or group decision?

Obviously, it becomes necessary, at the very least, to ask *how much* the chocolate lovers prefer chocolate to vanilla, and the vanilla lovers vanilla to chocolate. Some cardinal measure of preference intensity, pleasure, welfare, preference priority, or even, a la Plato and Mill, the relative objective value of the desire for chocolate versus the desire for vanilla, will have to be invoked if we are to aggregate the preferences or desires of the individuals at the picnic into a single group ranking suitable for the making of a collective social choice. In short, we shall have to define an *index*.

Bentham assumed that pleasure is the only good, pain the only evil, and that pleasure and pains, no matter whom they afflict, are intersubjectively comparable and hence commensurable. These assumptions do not, of themselves, suffice for the construction of an index, of course. It was still necessary for Bentham to stipulate an aggregation rule or, in the modern jargon, a social welfare function. His version of utilitarianism is just such a rule. We might state it in modern terms something like this:

1. As between two policies, actions, or states of affairs, A and B, if B provides to each individual in the society at least as much net happiness as does A, and if there is at least one person to whom B provides more net happiness than does A, then assign B a higher index number than A.

2. As between two policies, actions, or states of affairs, A and B, one of which provides more net happiness to some individuals and the other of which provides more net happiness to other individuals, measure the amounts of happiness accorded by each alternative to each individual, using the same scale of measurement. Then [this, strictly speaking, is the aggregation or indexing rule], following the rule 'everybody to count for one, nobody for more than one,' add the quantities of net happiness accorded by each alternative to all the individuals in the society, and assign to A or B whichever has the larger sum.

    We are accustomed, in the light of the New Welfare Economics of the late nineteenth and early twentieth century, to focus our attention on the phrase, 'using the same scale of measurement,' and then to invoke the supposed logical impossibility of interpersonal comparisons of utility as a reason for rejecting classical utilitarianism. But as Sen, Suppes, Harsanyi, and a number of other theorists have shown us, there are ways of getting around the problems of interpersonal comparisons which pose no greater philosophical difficulties than the extreme solipsism that generates the problem in the first place. The real problem is the purely normative clause, 'everybody to count for one, nobody for more than one.' We can defend the assumption that the welfare of the society consists in

the arithmetic sum of the welfares of its individual members only by positing the moral and political premise that all individuals are equally important, or that each individual's happiness deserves to be given equal weight in the social sum. And this premise simply begs all of the questions of policy that utilitarianism was designed to resolve.

Let us take a look, now, at a number of practical and theoretical contexts in which the indexing problem arises. My aim is to show you that in each case, a resolution of the problem requires a normative or prescriptive premise which must be exogenously introduced, as economists like to say.

My first example is drawn from the work of John Raw1s. Raw1s, you will recall, undertakes to extract a normative principle of distributive justice from non-normative, or minimally normative, premises, by means of the conceptual device of a bargaining game among rationally self-interested agents. In order to avoid certain theoretical difficulties which stand in the way of his establishing the principle that he wishes to promulgate, Raw1s introduces into his theoretical construction a limitation on the knowledge available to the participants in the bargaining game which he labels 'the veil of ignorance.'

Unfortunately, the veil of ignorance deprives the players in the game of so much information that they no longer have any rational reason to care about its outcome. So Raw1s is forced to re-equip them with knowledge that they have coherent life–plans whose fulfillment they are rationally committed to pursuing. But even this information is insufficient, for what one wishes to

bargain for depends on what in particular one has chosen as a life plan. Hence Rawls must add the notion of primary goods, which is to say those things – 'rights and liberties, opportunities and powers, income and wealth' – which, as he says 'a rational man wants whatever else he wants.' The idea is simply that no matter what life plan one turns out to have chosen, possession of these primary goods will serve to advance it.

But now the indexing problem rears its head. Clearly, as between two principles of distributive justice, A and B, if B promises at least as much of each primary good as does A, and more of at least one, then B is to be preferred to A. But suppose B promises more opportunity and less wealth, or greater income but less power. How then shall the rational man behind the veil of ignorance choose? [I say 'rational man,' because as a careful reader of A THEORY OF JUSTICE will discover, Rawls' world contains only men.] The answer is to construct an index of primary goods. It is this number which the individuals in the original position bargain over.

Although Rawls is aware of the problems of indexing, he glosses over them, admitting that we must 'rely on our intuitive capacities.' Nevertheless, he stands by the fundamental claim on which his entire philosophy rests, namely that his theory allows him' to replace moral judgments by those of rational prudence…' [THEORY OF JUSTICE p. 94]

Rawls' actual discussion of the indexing problem is arbitrary in the extreme. First he stipulates, with very little ground, that bargainers in the original position will choose to make rights and liberties lexically prior to all other primary

goods. This has the effect of eliminating the need for an index that aggregates rights and liberties with the other primary goods, for lexical priority stipulates that any increase in rights and liberties, however small, will take precedence, for example, over any loss of wealth or income, however large.

This still leaves the problem of aggregating wealth and income with opportunities and powers. Since this is manifestly impossible – how, for example, shall we compare an increase of ten percent in the opportunity to pursue a medical career as against a decrease in income of five thousand dollars a year? – Rawls make yet another simplifying assumption. Reminding us that the Difference Principle concerns itself primarily with the least well-off representative man, Rawls simply asserts that the least advantaged tend to have both the least wealth and income and the least powers and opportunities. In short, Rawls assumes away any indexing problem at all.

But clearly the issue is not so simple resolved. One of the major points of controversy in modern social welfare policy concerns precisely the relationship, in the lives of the least advantaged, of income or power. Radical critics of current welfare practices have argued that transfer payments, particularly payments in kind, have the effect of depriving the poor of social and political power, and indeed may even have that as their purpose. Hence, as between two social policies, one of which increases the income of the least advantaged while making them impotent clients of the welfare bureaucracy, the other of which increases economic or political power but at the cost of a lowered income, it becomes a matter of substantive and evaluative social philosophy which to espouse.

Rawls himself has finally recognized the inescapably normative element in his notion of life plans and primary goods. In a recent volume of essays titled UTILITARIANISM AND BEYOND, edited by Amartya Sen and Bernard Williams, Rawls returns to the subject in an essay on 'Social Unity and Primary Goods.' In the following passages, Rawls virtually acknowledges that the formation of an index of primary goods <u>presupposes</u> normative constraints on what will count as an acceptable life plan.

Imagine two persons, one satisfied with a diet of milk, bread and beans, while the other is distraught without expensive wines and exotic dishes. In short one has expensive tastes, the other does not. If the two principles of justice are understood in their simplest form (as I assume here), then we must say, the objection runs, that with equal incomes both are equally satisfied. But this is plainly not true…. The reply is that as moral persons citizens have some part in forming and cultivating their final ends and preferences. It is not by itself an objection to the use of primary goods that it does not accommodate those with expensive tastes. One must argue in addition that it is unreasonable, if not unjust, to hold such persons responsible for their preferences and to require them to make out as best they can. But to argue this seems to presuppose that citizens' preferences are beyond their control as propensities or cravings which simply happen.

And Rawls continues:

The idea of holding citizens responsible for their ends is plausible, however, only on certain assumptions. First, we must assume that citizens can regulate and revise their ends and preferences in the light of expectations of primary goods. [And so forth]

In short we can hope to arrive at a usable definition of an index of primary goods, only if we require that our prudentially self-interested bargainers constrain their life-plans by considerations of fairness and, as Rawls says a bit later in the same essay, the higher-order interests of moral persons.' I think we can fairly conclude that Rawls has failed, in his own words, 'to replace moral judgments by those of rational prudence.'

The same indexing problem surfaces in a quite different context, in the proposal currently being debated to award women equal pay for jobs comparable in worth to those performed by men. It may not be immediately obvious that the comparable worth dispute is really an argument about indexing, but a few moments of reflection will make this clear.

Consider a firm that employs three groups of workers: machine operators, truck drivers, and office clerks. What wages shall it pay? The answer popular with neo-classical economists is, of course, Let the labor market decide. The firm should offer the lowest wage with which it can secure competent help. If the going market price, say for machine operators, is so high that the firm cannot make a profit when paying that wage, then it must either shift to a different production technique or else go out of business. If some extremely simplifying assumptions are made about the production techniques available to the firm, the

behavior of workers and consumers, and the motivation of the firm's managers, then in long-run equilibrium, each worker will earn a wage precisely equal to his or her marginal product, which, under some additional strong assumptions, might plausibly be construed as a fair wage.

There are essentially three things wrong with this story, which you will all recognize as the standard story told in beginning courses in economic theory. The three things wrong with the story are, First, that it fails to establish its normative claims even in the impossibly restrictive theoretical case of which it is supposed to hold, Second, that it does not hold at all for theoretical cases whose assumptions are somewhat less restrictive, and Third, that it bears no relation at all to what happens in the real world.

For a demonstration of the first claim, I refer you to the first chapter of David Schweickart's fine book, CAPITALISM OR WORK CONTROL?   The third claim, that marginal productivity theory totally fails to predict what actually happens, is widely acknowledged. For an extended discussion, you can consult Lester Thurow's suggestive work, GENERATING INEQUALITY, or a forthcoming Oxford Press Book, CHOOSING THE RIGHT POND, by a young Cornell economist, Robert Frank.

I wish to focus my attention on the second problem – the inadequacy of marginal productivity theory for more complicated theoretical cases. What I wish to show you is that under certain theoretical assumptions designed to model more accurately the modern firm, a problem of wages policy arises

which, in its broadest outlines, is inescapably normative, and in which the issue of comparable worth plays a central role. There, as we shall see, indexing again proves to be the stumbling block.

So long as firms are small, single-product producers purchasing all inputs, including semi-finished parts, at competitive market prices, performing a single transformation on the inputs, and selling the output at the same competitive prices, the theory of wage determination is relatively simple. But things go seriously awry as soon as firms grow large enough to engage in multi-stage production processes with joint product outputs.

Consider a meatpacking firm, for example, that fattens the cattle, slaughters them, butchers the carcasses, packs the cuts of meat, and tans the hides. The managers of the firm must ascertain, by means if their internal accounting system, how much of the total cost of the firm to allocate to each final product, and also what prices to place on intermediate products within the firm for purposes of cost accounting.

Under these circumstances, it is theoretically impossible to determine the marginal productivity of a worker. Indeed, as firms grow into large bureaucratically organized institutions, it may in practice be impossible to identify any change in final output that can be associated with the presence or absence of a particular employee. Clearly, what is required is a positive wage policy which dictates what level of compensation is to be associated with each position in the firm.

The first rule that suggests itself – a normative rule, be it noted – is equal pay for equal work, where equal work is interpreted as meaning the occupying of bureaucratically identical positions. All beginning truck drivers, all clerks of grade three, all machine operators working the same machines, will receive equal pay. It is a good deal harder than one might think to come up with a moral rationale for this principle, although considerations of prudence and labor/management peace might suggest it. If the firm were dispensing justice, then one might invoke familiar considerations of procedural fairness, but in a competitive economy, mutual self-interest, and not justice, is supposed to regulate the relations between labor and management.

But equal pay for identical job position, although a principle capable of revolutionary potential in some circumstances, does not even begin to solve the problem of formulating a wages policy. From a formal point of view, that principle merely groups the workers into equivalence classes, without saying anything about the relative wages to be paid to the several classes. Paying all truck drivers the same wage and all file clerks the same wage leaves undetermined which class shall make more, and by how much.

Some progress can be made by invoking Pareto comparability, assuming that there is agreement on the dimensions along which different positions are to be compared. If machine operating requires the same physical effort as truck driving, more responsibility, at least as much dexterity, and more attentiveness, and if these are the only qualities or characteristics of the work process which ought to count in

determining wage levels, then we can agree that machine operators ought to make more than truck drivers.

But now the old familiar indexing problems reappear! How shall we compare machine operators with office workers, whose job demands greater literacy skills, less physical effort, more independence of judgment, less manual dexterity, and roughly the same degree of attentiveness? Once again, we must define an index which allows us to map heterogeneous characteristics onto a one-dimensional measure.

This is by no means an issue of purely theoretical significance, you may be interested to learn. In a number of large corporations in this country, top management has found it necessary to develop a detailed policy of compensation and raises which will possess some objective bureaucratic rationale and be perceived as fair by the employees affected. In response to this need, a number of management consultant firms, such as the Hay Company, have developed systems of job evaluation designed to generate a unidimensional index, or numerical measure, of the relative difficulty of the jobs performed by employees, particularly at the lower and middle management levels.

Consider, as an example, Sears, Roebucks, and Company, the great retail merchandising firm. Sears employs thousands of men and women who occupy such job positions as store manager, large appliances salesman, overhead fan buyer, truck driver, cashier, and vice president in charge of the Middle Western states. These are manifestly incommensurable jobs, requiring skills, talents, efforts and personal characteristics that

vary along many dimensions. Sears faces two problems with regard to formulating a compensation policy in the face of this diversity: First, at any given time, what wages or salary shall it pay each position, and how shall it justify that compensation; and Second, how shall it determine what relative raise to give each position annually?

Along comes the Hay Company with a systematic answer. A middle level executive at Sears – who, as it happens, is currently my brother-in-law – is assigned the task of evaluating each of the hundreds of positions in the Sears system. This executive travels around the country making on-site inspections. He assigns to each job so many points for the amount of physical effort required, so many points for the manual dexterity required, so many points for independence of judgment, imagination, responsibility, direction of subordinates, and so forth, all according to a complex process provided by Hay. He totals the assignments and arrives thereby at the index of Hay points [as they are called] associated with each position. The top management then decides how many dollars in compensation will be paid per Hay point throughout the corporation, and a simple multiplication gives the salary the Sears will pay to anyone occupying the position. If the position of manager of a "B" store earns 5,134 Hay points, and if Sears decides to pay eleven dollars a point, then any manager of a "B" store will be paid 56,474 dollars.

As for raises, Sears at the end of each year chooses an amount – let us say 87 cents – which it will pay per Hay point as a raise. Our store manager then receives a raise of 4,466.58.

How does the Hay Company, or my brother-in-law, decide, when implementing this system, how much weight to assign to industry, initiative, independence, manual dexterity, or the ability to operate a word processor? It should by now be obvious that the answer cannot possibly be in terms of relative profitability to the firm of its employees' possession of these various characteristics. If anyone could actually ascertain directly such a measure of profitability, there would be no need for the Hay system.

In fact, as we might expect, the system embodies a number of normative or evaluative presuppositions which are only thinly concealed by a putatively impartial rationale. Head work is routinely assigned more Hay points than hand work. Any position requiring its holder to direct or control the performance of others is valued especially highly. It is not too simple to say that the Hay Company has constructed an index designed to confirm and legitimate the greater worth and hence higher salaries of the positions at the top of the executive ladder, by assigning the greatest weight to whatever talents, skills, traits of character, or modes of activity are in fact performed by those executives.

But how could it be otherwise? During the Culture Revolution, the Chinese counterparts of the Hay Company dictated an alternative set of evaluations, declaring manual labor to be superior to mental labor, and so forth. The result may have been morally superior – I leave that to your own judgment – but it was not, and could not be, more 'objective.'

As should be obvious, the existence in actual operation of practical systems of job evaluation like that of the Hay Company constitutes a continuing source of rueful embarrassment to conservative business men, like my brother-in-law, whose politics incline them to look askance at the demands by organized women workers for equal pay for comparable worth. One cannot operate the Hay system and claim that the concept of comparable worth is economically meaningless without badly fouling one's own nest! Nevertheless, the real thrust of my remarks is that my brother-in-law is right. Any system for the indexing of incommensurable tasks presupposes a set of normative or evaluative assumptions. Bringing those assumptions to light does not permit us to eliminate them, for without them we have no way of carrying out the indexing process.

Let me turn, finally, to a third example drawn from a very different sphere, namely Gerald Cohen's attempt in his important book, KARL MARX'S THEORY OF HISTORY, to define an objective measure of the increase in productivity of an economy. Cohen undertakes to defend a quite orthodox, uncomplicated version of Marx's theory of historical materialism, one that many would call economistic, technological, and determinist. After distinguishing, by some careful conceptual analysis and textual exegesis, between the productive forces of an economy and the social relations of production, Cohen summarizes his version of Marx in two theses, which he labels the Development Thesis and the Primacy Thesis.

The development thesis states that 'the productive forces tend to develop throughout history.' The primacy thesis offers a functional explanation of the social relations of production in terms of their suitability for furthering the development of the productive forces. The thesis states: 'The nature of the production relations of a society is explained by the level of development of its productive forces.' [Cohen, p.134] Cohen then goes on to give an original and controversial defense of functional explanation in terms of what he calls consequence laws.

Most of the comment on Cohen's book, not surprisingly, has concentrated on the notion of consequence laws, but there is, it seems to me, a prior problem concerning the development thesis, a problem which, oddly enough, involves the same issue of indexing that we have been examining in connection with Rawls' work and the problem of wage determination and comparable worth.

At the risk of appearing to have wandered away from Professor Buchanan's work into a critique of Cohen, let me elaborate a bit the structure of Cohen's argument, so that we can see precisely where and how an indexing problem arises.

At this point, since the precise statement of Cohen's thesis will become rather involved, I will ask you to refer to the handouts distributed at the beginning of my remarks.

According to Cohen, consequence laws have the following doubly hypothetical form: {see handout, number 1}

IF   it is the case that **if** an event of type E were to occur at t1, **then** it would bring about an event of type F at t2

THEN an event of type E occurs at t3.

To put the matter less technically and more provocatively, what explains the occurrence of event E is the fact that if it were to occur, it would bring about event F. Or, even more succinctly, E is explained by the fact that it is functional for F.

Using this formal structure we can now state Cohen's primacy thesis in proper consequence law form, namely:

IF   it is the case that **if** the production relations conductive to the use and development of the productive forces available in a society at that time come into being, **then** the productive forces available at that time will be used and developed,

THEN the production relations conductive to the use and development of the productive forces available in that society at that time come into being.

To defend his primacy thesis, Cohen must do four things. First, he must explain what he means by 'productive forces available in a society' and 'production relations of a society' with sufficient precision and clarity that we can tell them apart, and also ascertain, for a given society, what productive forces are available and what the production relations are in the society. Second, he must explain what he means by the

'development' of productive forces, and specify some way of telling as between two states of affairs in society, which constitutes a higher development of the productive forces. Third, he must defend explanation by consequence laws in general. And finally, he must offer some evidence or argument in support of the particular consequence laws that express the primacy thesis. It is in his attempt to meet the second of these needs that Cohen runs of afoul of the indexing problem, in my judgment.

Cohen defines an increase in productivity as an increase in the quantity of product or output that can be produced with a given amount of direct labor. For example, in a simple one-commodity economy that uses corn and labor to produce corn, an increase in productivity is an increase in the net output of corn per unit input of labor.

This measure of productivity becomes problematical, as Cohen recognizes, as soon as there are two or more commodities being produced, for a new technique might permit us to produce more of the first commodity but less of the second, with a given quantity of labor. Would this be an increase, a decrease, or no change in productivity? Some technological innovations, of course, might enable us to produce more of every commodity with the same labor, or at least more of some and no less of others. In those cases we could appeal to a Pareto principle to establish a rank ordering of relative productivity. But in the general case, some way must be found to make what Cohen calls 'global productivity' comparisons. Here is Cohen's solution:

Of course, if everything producible at stage $s\underline{1}$ is producible at stage $s\underline{2}$, and each thing at $s2$ in less time than $s\underline{1}$, then we need

no common measure of the magnitude of products to claim that productivity is higher at s2. But suppose forces at s2 outclasses those at s1 with respect to some products, and are less powerful with respect to others. How can we then make a global productivity comparison between s1 and s2?

   In certain instances of the type just identified comparison will still be possible without a common measure of product size. Thus supposed that at both s1 and s2 twelve hours per day is the length of time each producer is able to labor productively: marginal product is negative beyond that point. Imagine that there are just three products, p, q, and r. At s1 it takes 3 hours to produce a unit of p, 4 hours to produce a unit of q, and 5 hours to produce a unit of r. At s2 it takes 2 hours to produce a unit of p, 3 hours to produce a unit of q, and 6 hours to produce a unit of r. Then s2 is more productive with respect to p and q, and less productive with respect to r.   Note, however, that only 11 of the 12 hours available at s2 are used up when it produces one unit each of p, q, and r. Suppose the remaining hour were allocated to producing r: then as long as some r were produced in that hour, we should be able to say that s2 is globally more productive than s1, even though we have stated no ratios between units of one product and units of any other. [Cohen, p.57]

        But Cohen's argument is quit incorrect. To see why, let us suppose that the technologies of s1 and s2 are just as Cohen specifies, but that final demand for commodities p, q, and r is different from that assumed by Cohen. In other words, let us suppose that these societies, using these technologies, do not wish to produce one unit each of p, q, and r.

Instead, let final demand be .75 units of p, .5 units of q, and 1.5 units of r. In that case, s$\underline{1}$ is globally more productive that s$\underline{2}$, for the desired final demand requires 12 units of labor in s$\underline{2}$ and only 11.75 units of labor in s$\underline{1}$.

Now assume final demand to be one unit of p, 4/9 units of q, and 13/9 units of r.   In that case, s$\underline{2}$ and s$\underline{1}$ are equally globally productive, for the desired final demand requires just 12 units of labor in each system.

But 'global productivity' is supposed to be an objective measure of the level of development of productive forces, independent of consumer taste and final demand. Thus Cohen's measure is unsatisfactory.

It should be obvious that this result is perfectly general. For any two technologies, one of which is more productive with respect to commodity i and the other of which is more productive with respect with commodity j, there will always be some final demand that makes the first technology globally more productive, and yet a third final demand that makes them equally globally productive.

In fact, of course, we are presented here with exactly the same need for a normative or evaluative principle as the basis for our indexing rule. Either we must assume that the final demand manifested in the market by consumer behavior has a moral sanction, so that consumer tastes will ultimately determine the relative productivity of two stages of capitalist development – an assumption which undermines any attempt to

mount a critique of the formation of consumer tastes- or else we must simply stipulate that some commodities are worthier than others, and hence will count for more in the index by which we measure productivity. For example, suppose that the advent of industrialization and the decline of craft skills made it less costly in labor hours to produce food, but more costly to produce hand-carved furniture. Is that technological change an advance in productivity or not? It depends on our moral evaluation of the relative importance of food and beautiful furniture.

Lest we imagine that this is a purely theoretical quibble, let us reflect that current debates about the effects of the economy on the environment are, from a certain point of view, really arguments about the proper weights to use in an index designed to measure increases in productivity.

I hope it is clear from these three examples – Rawls, comparable worth, and Cohen – both that the indexing problem arises repeatedly in theoretical and practical contexts, and that it is always impossible to solve in a value-neutral manner. Here, as in so many other cases, supposedly objective formal methods of analysis carry with them covert evaluation presuppositions which, if not acknowledged, serve the ideological function of rationalizing particular political or economic positions. I take this as one important example of the general truth that politics cannot be reduced to rational administration, or class conflict to impartial calculation.