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**Choice, Opportunities, and Procedures:
Collected Papers of Kotaro Suzumura**

Part VII Historically Speaking

Kotaro Suzumura
(Hitotsubashi University)

Naka 2-1, Kunitachi, Tokyo 186-8603, Japan
Phone: +81-42-580-9076   Fax: +81-42-580-9102
URL: http://www.econ.hit-u.ac.jp/~coe-res/index.htm
E-mail: coe-res@econ.hit-u.ac.jp

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Kotaro Suzumura

Institute of Economic Research, Hitotsubashi University
Kunitatchi, Tokyo 186-8603, Japan
suzumura@ier.hit-u.ac.jp

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Chapter 25
Introduction to Social Choice and Welfare[*]

1 Historical Background

Social choice theory is concerned with the evaluation of alternative methods of collective decision-making, as well as with the logical foundations of welfare economics. In turn, welfare economics is concerned with the critical scrutiny of the performance of actual and/or imaginary economic systems, as well as with the critique, design and implementation of alternative economic policies. This being the case, it goes without saying that the origin of social choice theory can be traced back all the way to antiquity. Indeed, as soon as multiple individuals are involved in making decisions for their common cause, one or other method of collective decision-making cannot but be invoked. As a reflection of this obvious fact, there are numerous examples in classic writings on the use and usefulness of alternative methods of collective decision-making. Suffice it to quote Aristotle in ancient Greece, and Kautilya in ancient India; they both lived in the fourth century B.C. and explored several possibilities of collective decision-making in their books entitled, respectively, *Politics* and *Economics*[1].

Likewise, as soon as any collective body designs and implements an economic mechanism and/or an economic policy, paying proper attention to the costs and benefits accruing to its constituent members, one or more social welfare judgements cannot be avoided. In this sense, Joseph Schumpeter [115, p.1069] was certainly right when he emphasized "the hallowed antiquity of welfare economics". He observed that "a large part of the work of Carafa and his successors as well as of the work of the scholastic doctors and *their* successors was welfare economics. We also know that the welfare point

[1]See Sen [129, p.350].

of view was much in evidence in the eighteenth century. ... For Bentham and the English utilitarians generally this point of view was, of course, an essential element of their creed. Hence, the positive spirit of Ricardian economics notwithstanding, we find it also in the English 'classics', particularly in J. S. Mill. So far as this goes, modern welfare economists merely revive the Benthamite tradition". It was in similar vein that Paul Samuelson [108, p.203] began his famous Chapter VIII on Welfare Economics in *Foundations of Economic Analysis* with the following remark: "Beginning as it did in the writings of philosophers, teleologians, pamphleteers, special pleaders, and reformers, economics has always been concerned with problems of public policy and welfare".

Without contradicting these authoritative verdicts on the long historical background of social choice theory, we may nevertheless claim that the instrumental concern with concrete methods of collective decision-making is one thing, and theoretical investigation into their logical performance is another thing altogether. The former concern may be as old as the origin of human society, but the latter development seems to be of more recent origin. Indeed, it seems fair to say that the real origin of the collective decision-making side of the coin can be attributed to the pioneering contributions by two eminent French precursors around the time of French revolution, viz. Marie-Jean de Condorcet, and Jean-Charles de Borda[2]. It was in the intellectual atmosphere of the European Enlightenment during the eighteenth century, with its conspicuous concern with human rights and its reasoned design and implementation of rational social order, that Condorcet [26] addressed the mathematical discipline of collective decision-making in terms of simple majority voting and related procedures[3]. He discovered the *paradox of voting*, or the *Condorcet paradox*, to the effect that the method of pairwise simple majority voting may yield a social preference cycle — a social alternative A defeating another alternative B by a simple majority, B defeating the third alternative C again by a simple majority, and C in its turn defeating A by a simple majority. This paradox sent an unambiguous signal that the logical performance of voting and related procedures for collective decision-making must be the subject of theoretical scrutiny. One of the logical implications of the Condorcet paradox is that, once a simple majority cycle occurs in the

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[2]Iain McLean and John London [82, p.107] maintained convincingly that they found "two medieval thinkers, hitherto unknown to historians of social choice [viz. Ramon Lull (c. 1235-1315), who proposed the Condorcet method of pairwise comparisons, and Nicolas Cusanus (1401-1464), who proposed the Borda method of rank-order comparisons], who anticipated the work of Condorcet, Borda and Dodgson by over 500 years". They aptly added, however, that "[n]either writer gives a mathematical or logical justification for his scheme: such justifications had to await Condorcet and Borda (McLean and London [82, p.106])". It was for this reason that McLean [80] later christened the period over which Borda, Condorcet, and their contemporaries worked on the theoretical performance of voting schemes "the first golden age of social choice".

[3]It is worthwhile to recollect that "Condorcet's work on social choice (1785-94) spans the most active constitution-making era in Western history until then, and the most active ever until 1989. Constitutions for the United States, Poland, and France were written, and Condorcet was connected with all three ... . In 1792, Condorcet was made the chairman of a committee to draw up a Constitution for France ... . After the Jacobin coup d'état of June 1793, Condorcet was out of power. His constitution was dumped in favor of one drawn up in great haste by Robespierre, who dropped all Condorcet's voting schemes (McLean [80, pp.23-26])". Condorcet's work on the theory of voting and human rights is translated into English by Iain McLean and Fiona Hewitt [81].

set of social alternatives $S = \{A, B, C\}$, there exists no *Condorcet winner* — a feasible alternative which is undefeated by any other feasible alternative — thereby excluding the possibility of basing social choice on the seemingly democratic method of collective decision-making. It is worthwhile to recollect in passing that Condorcet's first extended illustration of the paradox of voting was taken from voting on economic policy. Indeed, the three policy alternatives were[4]:

A = any restriction placed on commerce is an injustice;
B = only those restrictions placed through general laws can be just;
C = restrictions placed by particular orders can be just.

Condorcet's contribution seems to have been, at least partly and indirectly, inspired by an earlier work by Borda [21], who proposed what came to be known as the *Borda method* of rank-order decision-making[5]. For each voter, this method assigns a score of zero to the last ranked alternative, a score of one to the penultimate alternative, and so on all the way up to the top ranked alternative, which receives a score of $n - 1$ when there are n alternatives altogether. These individual scores are added for each candidate over all voters, and the candidate which earned the largest sum-total becomes the overall winner in the contest. According to Duncan Black [17, p.180], "[s]oon after hearing Borda's paper in 1794 the [French] Academy [of Science] adopted his method in elections to its membership. It remained in use until 1800, when it was attacked by a new member and was modified soon afterwards. The new member was Napoleon Bonaparte."

The same rank-order voting procedure was obtained from slightly different premises by Pierre-Simon Laplace [72][6]. Laplace also acutely observed an obstacle to the use of this procedure to the effect that "its working might be frustrated by electors placing the strongest opponents to their favorite candidates at the foot of their list. This would give a great advantage to candidates of mediocre merit, for while getting few top places they would also get few lowest places (Black [17, p.182])". As a matter of fact, the same difficulty was confronted by Borda himself, who, when his procedure was opposed precisely for this reason of strategic vulnerability, had retorted by saying that his scheme is "only intended for honest men (Black [17, p.182])". This episode seems to show us unambiguously that the apprehension about the *strategic manipulability of voting schemes* existed from the formative era of this side of social choice theory.

There was intermittent exploratory work on voting schemes in the nineteenth century, most notably by Charles Lutwidge Dodgson [31; 32; 33], who is better known by his literary pseudonym (Lewis Carroll). His works were circulated only within a limited

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[4]See Emma Rothschild [107, p.181].

[5]Borda's rank-order method was first proposed orally at the French Academy of Science in 1770, which remained unpublished until 1784. Condorcet was well aware of this method, and immediately recognized it to be an important challenge to his own pairwise comparison method. He stated in Condorcet [26, Discours préliminaire, p.clxxix] that he had heard of Borda's method orally, but that it was not published until after his own work was in press. According to McLean [80, p.16], however, it was actually Condorcet himself who published Borda's work.

[6]For Laplace's theory of elections, those who are interested should refer to Isaac Todhunter [154, pp.546-548] and Duncan Black [17, pp.180-183].

Oxford circle, and was virtually unknown in the outside world until Black [17, Appendix] made them widely accessible. Although ample circumstantial evidence (Black [17, pp.192-194]) exists that Dodgson was acquainted neither with Borda [21] nor with Condorcet [26], he was clearly aware of the ubiquity of cyclical majorities as well as of the rank-order method of voting, most probably through Isaac Todhunter [154, Chapters XVII and XIX], which every late Victorian scholar seems to have known about[7]. His major logical concern was to devise a voting procedure which would enable him to choose the Condorcet winner if one exists, and to lexically supplement the simple majority voting if and when the Condorcet winner failed to exist. Black seems certainly right in concluding that "Dodgson had been caught in the grip of the theory of elections and committees and his understanding of the subject was second only to that of Condorcet (Black [17, p.212])".

In the last part of the nineteenth century and the first half of the twentieth century, some sporadic contributions such as those by Edward J. Nanson [86] and Francis Galton [41] notwithstanding, not much seems to have been done in the theory of collective decisions, the major breakthrough having been accomplished only in the late 1940s by Duncan Black [16]. He found a simple sufficient condition on the profile of voters' preferences, to be called the assumption of *single-peaked preferences*, under which simple majority voting will be able to determine a social outcome, since there exists exactly one alternative which will receive a simple majority over any other alternative, provided that the number of voters is odd, and the Black assumption of single-peakedness is satisfied. This assumption has a simple geometric representation to the effect that the utility indicators for the voters' preferences are such that the social alternatives can be represented by a one-dimensional variable and that each of the graphs of voters' utility indicators has a single peak. Black's theorem is the first possibility result of this nature in social choice theory, and it opened up the gate wide towards the modern development of the theory of voting.

Let us now turn to the welfare economics side of the coin. In this arena too, it seems fair to say that the real origin of the critical and systematic approach to the economic mechanism design and policy evaluation belongs to the relatively recent past, and it may be safely attributed to the work of Jeremy Bentham [12]. He was a contemporary in England of Borda and Condorcet[8]. It is worthwhile to recollect that Condorcet wrote enthusiastically of the new society of the United States that "the spectacle of a great people where the rights of man are respected is useful to all others ... . It teaches us

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[7]Although Black [17, p.193] went as far as to deny even the indirect influence of Borda and Condorcet on Dodgson's theory of committees and elections through Todhunter's [154] authoritative account of Borda's and Condorcet's contributions, which "every mathematical lecturer in the country ought to have studied" in Black's own admission, I found his argument less than persuasive.

[8]John Hicks [56, p.307] was certainly right when he asserted that "[the] 'official' history [of welfare economics] begins with [Arthur Pigou's] *The Economics of Welfare* [96]. For it was certainly Pigou who gave its name to the subject. If it existed before Pigou, it must then have been called something else". However, the consideration of nomenclature alone should not vitiate the substantial fact that Pigou's welfare economics is nothing other than the lineal descendent of the long tradition of the Bentham-Mill-Edgeworth-Sidgwick utilitarian calculus.

that these rights are everywhere the same". He wrote as well as of the French Revolution that it had "opened up an immense scope to the hopes of the human species ... . [T]his revolution is not in a government, it is in opinions and wills"[9]. In sharp contrast, Bentham, a scholar in law and jurisprudence, was a stark critic of the concept of inviolable natural rights[10]. Indeed, it was in his harsh comment on the French "Declaration of the Rights of Man and the Citizen", which was embodied in the French Constitution of 1791, that he wrote the following famous passage: "[N]atural rights is simple nonsense: natural and imprescriptible rights, rhetorical nonsense, — nonsense upon stilts (Bentham [13, p.501])". Instead of basing the economic policies on the concept of inviolable human rights, Bentham took recourse to the *greatest happiness principle*, so-called, to the effect that the ultimate criterion for judging the goodness of an economic mechanism and economic policy is that it can bring about the "greatest happiness of the greatest number". In accordance with this utilitarian view on the goodness of a state of affairs, the legislator's task is construed to arrange law and other social and economic institutions so that each person in pursuit of his own interest will be led to act so as to bring about the greatest happiness for all persons involved. This utilitarian basis of economic policies permeated the work of John Stuart Mill, Francis Ysidro Edgeworth, and Henry Sidgwick, and it served as a natural basis for the synthesis of this tradition by the hands of Arthur Pigou [96] in the early twentieth century.

Pigou's so-called "old" welfare economics, being based on the Benthamite-utilitarian concept of economic welfare, presupposed that the utility of different individuals could be added to, or subtracted from, one another to define the social objective of total utility, viz. the greatest happiness[11]. It was against this epistemological basis of Pigou's "old"

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[9]Both citations from Condorcet are due to Rothschild [107, p.6].

[10]For Bentham, the only category of rights, whose existence he could recognize at all, were those which depended on law and legislation; a natural right was for him nothing other than a contradiction in terms: "[T]here are no such things as natural rights—no such things as rights anterior to the establishment of government—no such things as natural rights opposed to, in contradiction to, legal; [T]he expression is merely figurative: [W]hen used, in the moment you attempt to give it a literal meaning it leads to error, and to that sort of error that leads to mischief—to the exremity of mischief (Bentham [13, p.500])".

[11]At this juncture, two remarks seem to be in order. In the first place, while Pigou in principle subscribed to the utilitarian viewpoint, careful reading of *The Economics of Welfare* reveals how discriminatingly was the use he actually made of it. Having said this, however, it should be pointed out that Pigou's discussions of tax-subsidy policies related to externalities, with which he is much associated, were directly derived through a utilitarian way of reasoning. It is true that Pigou's use of the utilitarian principle is not as conspicuous in reference to income distribution as was the case with Edgeworth, but it was in fact Pigou who inspired Hugh Dalton's [27] famous utilitarian measure of inequality. In the second place, unlike Bentham, who was strongly and outspokenly against the idea of natural rights which goes squarely against the foundations of utilitarianism, Pigou [96, 1952 edition, p.759] made an early use of the non-welfarist notion of individual rights when he discussed people's claim to "minimum standard of real income", which "must be conceived, not as a subjective minimum of satisfaction, but as an objective minimum of conditions". Pigou's characterization of "an objective minimum of conditions" is close to what we now call the "basic needs", which consist of "some defined quantity and quality of house accommodation, of medical care, of education, of food, of leisure, of the apparatus of sanitary convenience and safety where work is carried on ... ." Pigou might have thought that such rights could be justified on utilitarian grounds in the Benthamite tradition of regarding rights as intrinsically unimportant, but instrumentally crucial, but *The Economics of Welfare* is completely reticent concerning the utilitarian

welfare economics that a harsh ordinalist criticism raged in the 1930s, kicked off by a famous essay by Lionel Robbins [101]. Note, however, that Robbins' criticism boils down to the categorical denial of the possibility of interpersonal comparisons of utility with inter-observer validity; careful reading of Robbins [101, pp.138-150; 102, pp.636-637; 103, p.5] convinces us that he did not reject the possibility of making "subjective" interpersonal comparisons of utility, nor did he claim that economists should not make "subjective" interpersonal comparisons of their own. What he actually asserted is that "subjective" interpersonal comparisons cannot claim any "objective" interpersonal validity.

By the end of the 1930s, it became widely recognized that the foundations of Pigou's "old" welfare economics were hopelessly eroded, and new foundations for welfare economics had to be discovered on the basis of *ordinal* and *interpersonally non-comparable* utility information, and nothing else, in order to salvage something of substance from the vestige of Pigou's theoretical superstructure. This is the same informational basis as that of the Borda-Condorcet theory of collective decision-making, which is a slightly ironical fact in view of the sharply contrasting background of the Borda-Condorcet theory on the methods of collective decision-making, on the one hand, and the Bentham-Pigou theory on the enhancement of social welfare, on the other.

The first ordinalist response to this plea was to go back to the ordinalist tradition pioneered by Vilfredo Pareto [89; 90], and invoke the seminal concept of the *Pareto principle* to the effect that a change from one social state to another social state can be judged as socially good if at least one individual is thereby made better off without making anybody else worse off in return. The characterization and implementation of the Pareto efficient resource allocation became the central exercise in this phase of the "new" welfare economics, which may be duly represented by John Hicks [54]. Note, however, that almost every economic policy cannot but favour some individuals at the cost of disfavouring some others, so that there would be almost no situation of real importance where the Pareto principle could claim relevance in isolation.

It was against this background that two distinct approaches were explored to rectify the unsatisfactory state of the post-Pigovian "new" welfare economics. The first approach was the introduction of *compensation criteria* by Nicholas Kaldor [64], John Hicks [55], Tibor Scitovsky [116] and Paul Samuelson [109], which endeavoured to expand the applicability of the Pareto principle by introducing hypothetical compensatory payments between gainers and losers from a change in economic policy[12]. According to Johannes de V. Graaff [47, pp.84-85], "[t]he compensation tests all spring from a desire to see what can be said about social welfare or 'real national income' ... without making interpersonal comparisons of well-being ... . They have a common origin in Pareto's definition of an increase in social welfare ... but they are extended to situations in which some people are made worse off".

The second approach was the introduction of the concept of a *social welfare function*

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justification of these rights.

[12]According to John Chipman and James Moore [25, p.548, footnote 2], Enrico Barone [10; 11] had developed the compensation principle much earlier than Kaldor and Hicks, "who mentioned it no less than four times". Barone's pioneering contribution was left unnoticed among English speaking economists, however, even after the Italian original was translated into English in von Hayek [158].

by Abram Bergson [14] and Paul Samuelson [108, Chapter VIII], which is deeply rooted in the belief that the pursuit of the logical consequences of any value judgements, irrespective of whose ethical beliefs they represent, whether or not they are widely shared in the society, or how they are generated in the first place, is a legitimate task of welfare economics. The social welfare function is meant to be the formal way of encompassing such an ethical belief. It was in terms of this concept of a social welfare function that Bergson and Samuelson tried to separate what belongs to the area of ethics, about which economists qua scientists do not have any qualification to say anything objective whatsoever, from what belongs to the area of welfare economics, about which economists as scientists have every reason as well as obligation to say something of objective validity[13].

Between these two schools of the "new" welfare economics, the former compensationist school met serious logical difficulties. Even before the scaffolds for construction were removed from the construction site, serious logical contradictions in the form of either the lack of asymmetry, or the lack of transitivity, could be found in the social welfare judgements based on the Kaldor-Hicks-Scitovsky compensation criteria by Tibor Scitovsky [116], William Gorman [45] and many others, which fatally vitiated the credibility of the "new" welfare economics of the compensationist school. The verdict on the Samuelson compensation principle, which was defined in terms of a uniform outward shift of the utility possibility frontier, is quite different. Indeed, the Samuelson compensation principle can always generate transitive social welfare judgements, so that its logical performance *in isolation* is impeccable. Nevertheless, it may still generate contradictory social welfare judgements *in combination with* the Pareto principle[14]. On the other hand, the second school of the "new" welfare economics, which is founded on the Bergson-Samuelson social welfare function, has been widely praised as the culmination of the ordinalist "scientific" approach to welfare economics[15].

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[13]The genesis of the Bergson-Samuelson social welfare function was traced as far back as Pareto [90] by Chipman [24] and Chipman and Moore [25]. True enough, Pareto was remarkably ahead of his time, and sympathetic eyes may catch the glimpse of social welfare function in Pareto's early writings. Nevertheless, it seems fair to say that, without Bergson [14] and Samuelson [108, Chapter VIII], the concept of social welfare function could not have established itself as the central piece of modern welfare economics. It is in this sense that Samuelson [112, p.248] is absolutely right when he wrote in a related context that "[a]fter, and only after, you have worked out a clear understanding of this subject are you able to recognize the bits of the puzzle that Pareto had already discerned".

[14]Let P_p, P_s and P stand, respectively, for the Pareto superiority relation, the Samuelson superiority relation, and the social preference relation. The social preference relation is said to respect the Pareto superiority relation as well as the Samuelson superiority relation if and only if it satisfies $P_p \subset P$ and $P_s \subset P$. It was shown by Suzumura [139; 147] that there exists a situation, which is not concocted at all, where we have four social states, say x, y, z and w, such that xP_py, zP_pw, yP_sz and wP_sx hold. If the social preference relation respects the Pareto superiority relation as well as the Samuelson superiority relation, then we cannot but obtain xPy, yPz, zPw and wPx, which clearly vindicate the social preference cycle.

[15]Thus, Samuelson [112, p.223] could assert without any reservation the following: "As I write, the new welfare economics is just over four decades old. This subject, in its essentials as we know it today, was born when the 24-year-old Abram Bergson — then still a Harvard graduate student — wrote his classic 1938 *Quarterly Journal of Economics* article. To one like myself, who before 1938 knew *all* the relevant literature on welfare economics and just could not make coherent sense of it, Bergson's work came like a flash of lightning, describable only in the words of the pontifical poet:

Broadly speaking, this was the intellectual atmosphere surrounding social choice theory when Kenneth Arrow published his Ph.D. Dissertation, *Social Choice and Individual Values*, in 1951. In view of its innovative nature as well as the revolutionary influence it exerted on the whole fields of social choice theory, it will be justifiable to devote the next section in its entirety to this work.

Quite apart from the Robbinsian criticism, which is epistemological in nature, there is a fundamental criticism of, and a proposal for a serious alternative to, the Benthamite utilitarianism by John Rawls [98; 99; 100], which is focused directly on the ethical nature of the Benthamite outcome morality. According to Rawls [100, p.22], the main idea of classical utilitarianism is that "society is rightly ordered, and therefore just, when its major institutions are arranged so as to achieve the greatest net balance of satisfaction summed over all the individuals belonging to it". Not only is this classical principle based on *welfarism* to the effect that "[t]he judgment of the relative goodness of alternative states of affairs must be based exclusively on, and taken as an increasing function of, the respective collections of individual utilities in these states", but also it invokes the aggregation rule of *sum-ranking* to the effect that "[o]ne collection of individual utilities is at least as good as another if and only if it has at least as large a sum total (Sen [126, p.468])". Rawls criticises the informational basis of welfarism and proposes the alternative informational basis of *social primary goods*, viz. "things that every rational man is presumed to want", which "normally have a use whatever a person's rational plan of life (Rawls [100, p.62])". Rawls also criticises the utilitarian aggregation rule of sum-ranking for its being "indifferent as to how a constant sum of benefits is distributed (Rawls [100, p.77])". His proposed alternative to the Benthamite utilitarianism is such that "[a]ll social primary goods — liberty and opportunity, income and wealth, and the bases of self-respect — are to be distributed equally unless an unequal distribution of any or all of these goods is to the advantage of the least favored (Rawls [100, p.303])". His own justification of this principle of justice makes use of a hypothetical situation called the *original position*, where individuals choose the basic principles of the society behind the *veil of ignorance*, viz. without knowing their own position in the resulting social order as well as being ignorant of their personal identities. In such a situation of primordial equality, Rawls claims that his principles of justice would be generally accepted as a fair agreement in the absence of ethically irrelevant vested interests[16].

The invocation of the logical device of primordial stage of ignorance with the purpose of securing a fair field for designing a set of social rules is not original to Rawls. Other notable examples are William Vickrey [156; 157] and John Harsanyi [50; 51; 52],

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Nature and Nature's laws lay hid in night:
God said, Let Newton be! and all was light."

[16]Rawls' theory of "justice as fairness" exerted a strong influence on the contemporary welfare economics in general, and social choice theory in particular. But it is predominantly, if not exclusively, in the modified welfaristic version in which the Rawlsian concern with the well-being of the least favoured individual is expressed with reference to the individual' welfare levels, which are assumed to be interpersonally comparable. Needless to say, Rawls' own "difference principle" focuses directly on the minimal availability of "social primary goods", and not on the minimal individual welfare.

who respectively made use of the same device to find a justification for the Benthamite utilitarianism. Vickrey [156] gave a brief, yet clear first statement of the original position idea. Harsanyi [51] proved the following important theorem: Suppose that social preferences as well as individual preferences satisfy the von Neumann-Morgenstern postulates of rationality, and if all individuals being indifferent implies social indifference, then social welfare must be the weighted sum of individual utilities. Under the additional requirement of anonymity, the Harsanyi representation for social welfare boils down to the unweighted sum-total of individual utilities, viz. the classical utilitarianism[17].

2   Social Choice and Individual Values

Without denying the importance of those pioneering contributions made by many pre cursors, it seems fair to say that Kenneth Arrow's *Social Choice and Individual Values* elevated social choice theory to a stage which is qualitatively different altogether.

To lend concrete substance to our sweeping assertion, let us start by referring to the pioneering studies of voting schemes by Condorcet, Borda, Dodgson, Black, and many others again. Important though these celebrated works are, it is undeniable that their studies were concerned exclusively with some specified voting schemes such as the method of simple majority voting, the Borda method, the Dodgson method, and so forth. In sharp contrast, Arrow [1; 2; 5 :6] developed an analytical method which allowed him to treat all conceivable voting schemes simultaneously within one unified conceptual framework. To bring the importance of this development into clearer relief, consider the simplest imaginable society with only two individuals, say 1 and 2, and three alternative social states, say x, y and z. Let us simplify our arena further by assuming away individual as well as social indifference relations altogether. It is clear, then, that there exist six distinct preference orderings of three social states[18]:

$$\alpha : \; x, y, z \quad \beta : \; x, z, y \quad \gamma : \; y, x, z \quad \delta : \; y, z, x \quad \epsilon : \; z, x, y \quad \zeta : \; z, y, x.$$

Each one of these orderings can represent an individual preference ordering for 1 and 2 over three social states. What Arrow christened the *social welfare function*, or *constitution* in his more recent terminology, is a function which maps each profile of individual preference orderings into a unique social preference ordering, which is meant to denote the process or rule for aggregating each profile of individual preference orderings into a social preference ordering. In other words, a social welfare function is a mapping defined on the Cartesian product $\Delta \times \Delta$, where $\Delta = \{\alpha, \beta, \gamma, \delta, \epsilon, \zeta\}$, and takes its values on Δ. Thus, even in our simplest conceivable society, there exist 6^{36} social welfare functions in the sense of Arrow, which is an astronomically large number indeed (roughly 10^{27}). It

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[17]However, as Sen [123] acutely pointed out, utility is only used to represent preferences in the theorem of Harsanyi [51]. Thus, there is an ample room for reservation on the claim that Harsanyi's argument can be interpreted as being an argument in support of utilitarianism. See also Prasanta Pattanaik [91].

[18]Alternatives are arranged horizontally, the more preferred alternative being to the left of the less preferred. Thus, the preference ordering α means that x is preferred to y, y is preferred to z, hence x is preferred to z.

is clearly impossible to check all these Arrovian social welfare functions one by one for their democratic legitimacy, on the one hand, and for informational efficiency, on the other. Instead of attempting to cope with this clearly hopeless task, Arrow pioneered the axiomatic approach in social choice theory, which enabled him to analyse these 6^{36} Arrovian social welfare functions all at once, by imposing a set of axioms which are deemed necessary for the Arrovian social welfare functions to be reasonable, hence acceptable. It is this novel methodology which enabled him to analyse all the relevant social welfare functions at one stroke, and led him to the celebrated *general possibility theorem*, or the *Arrovian impossibility theorem* in the currently prevailing terminology, to the effect that there exists no social welfare function satisfying a set of conditions necessary for democratic legitimacy and informational efficiency.

The novelty of Arrow's approach is no less conspicuous in the context of the "new" welfare economics as well. For Bergson and Samuelson, their social welfare function was an analytical device for separating what should duly belong to economics from what should duly be relegated to ethics. According to Samuelson [108, pp.220-221], "[i]t is a legitimate exercise of economic analysis to examine the consequences of various value judgments, whether or not they are shared by the theorist, just as the study of comparative ethics is itself a science like any other branch of anthropology". It was as an analytical vehicle for implementing this "scientific" research program of "new" welfare economics that Samuelson invoked what came to be known as the Bergson-Samuelson social welfare function: "Without inquiring into its origins, we take as a starting point for our discussion a function of all the economic magnitudes of a system which is supposed to characterize some ethical belief — that of a benevolent despot, or a complete egoist, or 'all men of good will', a misanthrope, the state, race, or group mind, God, etc. Any possible opinion is admissible ... . We only require that the belief be such as to admit of an unequivocal answer as to whether one configuration of the economic system is 'better' or 'worse' than any other or 'indifferent', and that the relationships are transitive ... ."

In contrast with the Bergson-Samuelson social welfare function, which Bergson and Samuelson assumed to be given from outside of economics, Arrow was of the conviction that the process or rule through which the social value to be represented by the Bergson-Samuelson social welfare function is formed should also be the subject of logical scrutiny. In other words, in order for the economic analysis not to lose social relevance, it is necessary that the process or rule for constructing the Bergson-Samuelson social welfare function on the basis of individual judgments of the goodness of the social states, viz. the Arrow social welfare function in this arena, must satisfy the minimal requirements of democratic legitimacy and informational efficiency. Interpreted in this new arena, the Arrow impossibility theorem turns out to be a basic criticism against the foundations of "new" welfare economics of the Bergson-Samuelson family. No wonder Arrow's theorem caused a stir among many reputable economists who created and promoted the "new" welfare economics. For example, Ian Little [74, pp.423-424] contrasted Bergson's and Arrow's social welfare functions with the purpose of criticizing the latter as follows: "Bergson's welfare function was meant as a 'process or rule' which would indicate the best economic state as a function of a changing environment (i.e. changing sets of possibilities

defined by different economic transformation functions), the individuals' tastes being given. ... If tastes change, we must expect a new ordering of all the conceivable states; but we do not require that the difference between the new and the old orderings should bear any particular relation to the changes of taste which has occurred. We have, so to speak, a new world and a new order; and we do not demand correspondence between the change in the world and the change in the order. ... Traditionally, tastes are given; indeed, one might almost say that the given individuals are traditionally defined as the possessors of the given tastes and that no sense is attached to the notion of given individuals with changing tastes"[19]. Samuelson [111, p.42], who has always been the most eloquent advocate of the Bergson-Samuelson school of "new" welfare economics, went as far as to declare that "the Arrow result is much more a contribution to the infant discipline of mathematical politics than to the traditional mathematical theory of welfare economics. I export Arrow from economics to politics because I do not believe that he has proved the impossibility of the traditional Bergson welfare function of economics, even though many of his less expert readers seem inevitably drawn into thinking so"[20].

What, then, are the axioms of democratic legitimacy and informational efficiency which Arrow demonstrated to be logically incompatible? In the 1963 revised version of the theorem (Arrow [3, pp.96-97; 6]), there are four transparent axioms altogether. The first axiom is that each and every individual is free to form and express whatever preference ordering he/she cares to specify, which represents his/her evaluations of the goodness of social states, and the Arrow social welfare function must be robust enough to be able to aggregate the profile of these individual preference orderings into a social preference ordering. The second axiom requires that the Arrow social welfare function must faithfully reflect the unanimous preference expressed by all individuals over a pair of social states, which makes the process or rule of preference aggregation minimally democratic. The third axiom requires that the Arrow social welfare function must be informationally efficient in that, in deciding whether one social state is better than, or worse than, or indifferent to another social state, it is necessary and sufficient to know how individuals rank just these two alternative social states vis-à-vis each other. The fourth and the least controversial axiom requires that there should be no *dictator* in the society, who can decide a strict social preference for a social state vis-à-vis another social state simply by expressing his personal preference for the former state against the latter.

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[19]Little's criticism to this effect was strongly supported by Samuelson [111, pp.48-49]: "For Bergson, one and only one of the ... possible patterns of individuals' orderings is needed. It could be *any* one, but it is *only* one. From *it* (not from each of them all) comes a social ordering. ... The only Axiom restricting a Bergson Social Welfare Function (of individualistic type) is a 'tree' property of Pareto-optimality type". It is this sharp contrast between the Arrow social welfare function and the Bergson social welfare function that created the widespread perception that the Arrow impossibility theorem, which requires the full force of multiple profiles of individual preference orderings, does not apply to the Bergson social welfare function which is rooted in the single profile framework.

[20]To keep the record straight, let us emphasize that the Arrovian impossibility theorem is not a theorem which negates the existence of the Bergson-Samuelson social welfare ordering; it is a theorem which negates the existence of a "reasonable" process or rule which can associate a Bergson-Samuelson social welfare ordering with each profile of individual preference orderings. See Suzumura [136; 143] and Arrow [4].

It is worth emphasizing that these demonstrably contradictory axioms are nothing other than the lineal descendents of what preceded *Social Choice and Individual Values*. Indeed, in the context of the methods of collective decision-making, the method of simple majority voting satisfies all of the Arrovian conditions except that the generated social preference relation lacks the general assurance of transitivity by virtue of the Condorcet paradox. In the alternative context of the foundations of welfare economics, the "new" welfare economics of the compensationist school of thought, as well as of the Bergson-Samuelson school of thought, is founded squarely on the ordinal and interpersonally non-comparable informational basis; it is also deeply rooted in the Paretian tradition to the effect of requiring social preference to reflect unanimous individual preferences faithfully. Because it respected the preceding tradition, the Arrow impossibility theorem was made not only more relevant, but also a clear indicator of the need of systematic scrutiny in the search for reasonable resolutions of the logical contradiction thereby identified. It is in this sense that the message of Arrow's general impossibility theorem is clearly positive, rather than negative.

Arrow [2, Chapter VII] also made another important contribution by developing a systematic logical method in the analysis of simple majority voting, which enabled him to pursue Black's geometric idea of single peaked preferences in the general case of any number of alternatives. This neat method of analysis enabled his successors to introduce some other restrictions on the admissible profiles of voters' preferences under which the method of simple majority voting can escape from the Condorcet paradox. Indeed, it was this method of analysis which eventually led Ken-Ichi Inada [60], on the one hand, and Sen and Pattanaik [132], on the other, to discover the necessary and sufficient conditions for this method of collective decision-making to work satisfactorily.

3 "Socialist Planning" Controversy

There is another controversy of historical importance, which was fought mainly in the 1930s. Maurice Dobb [30, p.183] had the strong opinion that "[t]he old debate about *Wirtschaftsrechnung* ... is nowadays sufficiently familiar ... for any suggestion of revisiting it to invite disinclination rather than attention". Nevertheless, it seems to us that there are several lessons of this harsh controversy with lasting importance in the evolution and orientation of the theory of decentralized planning procedures à la Edmond Malinvaud [75] and Geoffrey Heal [53], as well as of the related branch of social choice theory called the implementation theory, or of the theory of mechanism design, à la Leonid Hurwicz [57; 58; 59] and Eric Maskin [78; 79].

It was Ludwig von Mises [161] who kicked off this controversy. In his understanding, rational economic calculation is possible only when monetary prices exist, not only for consumption goods, but also for production goods of any order, since it is monetary calculation which "affords us a guide through the oppressive plentitude of economic potentialities. ... It renders their value capable of computation and thereby gives us the primary basis for all economic operations with goods of a higher order (von Hayek [158, p.101])". According to von Mises, however, it is impossible to find necessary monetary

prices for production goods of a higher order in a socialist state, because no production good will ever become the object of market exchange in a socialist state where, by definition, collective ownership prevails for all means of production.

It is clear that the impossibility thesis à la von Mises holds if and only if there are no prices for production goods in a socialist state with collective ownership of the means of production. It seemed obvious to Oscar Lange [70, p.61] that the latter thesis was clearly false: "Professor Mises seems to have confused prices in the narrower sense, i.e. the exchange ratios of commodities on a market, with prices in the wider sense of 'terms on which alternatives are offered'. ... It is only in the latter sense that 'prices' are indispensable for the allocation of resources ... ." As Lange correctly pointed out, "prices in the generalized sense", or "efficiency prices" in the circumlocution of modern economic theory, exist irrespective of the ownership structure of the means of production. This fact alone was enough to eradicate the impossibility thesis à la von Mises.

However, the controversy resurged in the hands of Friedrich von Hayek [158; 159; 160], taking a more sophisticated form. Unlike von Mises, von Hayek never denied the theoretical existence of efficiency prices for all goods including the means of production, which, if made available, would enable a socialist state to attain a rational allocation of resources. The problem which von Hayek pointed out, and made the foundations of *his* impossibility thesis, was how such efficiency prices could be made available in practice: "[T]his is not an impossibility in the sense that it is logically contradictory. But to argue that a determination of prices ... being logically conceivable in any way invalidates the contention that it is not a possible solution, only proves that the real nature of the problem has not been perceived (von Hayek [158, pp.207-208])". To understand why, von Hayek urges us to visualize what the determination of efficiency prices by computational method would imply in practice: "It is clear that any such solution would have to be based on the solution of some such system of equations [for general economic equilibrium] as that developed in [Enrico] Barone's article (Barone [10]). ... [W]hat is practically relevant ... is not the formal structure of this system, but the nature and amount of concrete information required if a numerical solution is to be attempted and the magnitude of the task which this numerical solution must involve ... (von Hayek [158, p.208])". To calculate efficiency prices by solving the general equilibrium equations, we must gather information about technology, primary and intermediate resources, and consumers' preferences, which are widely dispersed and privately owned by numerous economic agents. Given the nature and complexity of this privately held information, it would be prohibitively difficult, if not logically impossible, to motivate numerous private agents to comply with the request from the central planning board and submit this information faithfully for the purpose of computing efficiency prices. Thus, von Hayek concludes, "[i]t is probably evident that the mere assembly of these data is a task beyond human capacity (von Hayek [158, p.211])". To make this situation even worse, "[m]ost of [the technical information] consists in a technique of thought which enables the individual engineer to find new solutions rapidly as soon as he is confronted with new constellations of circumstances (von Hayek [158, pp.210-211])". This is the essence of the impossibility thesis à la von Hayek.

Once again, Lange was ready to confront von Hayek's impossibility thesis. Capitaliz-

ing and elaborating on the earlier works by Enrico Barone [10] and Fred M. Taylor [153], Lange developed a sophisticated trial and error method of price adjustment in a socialist state. To see how he designed this scheme, the so-called *Lange-Lerner market socialism* after Oscar Lange [69] and Abba Lerner [73], and how this scheme fares with respect to some performance criteria, is useful in identifying the areas of research called the theory of decentralized planning procedures and the theory of mechanism design.

Lange assumed a socialist state where freedom of choice in consumption and freedom of choice of occupation are guaranteed, and the preferences of consumers are the guiding criteria in production and in the allocation of resources. In this system, there exist market prices for consumption goods and for labour services, but the prices for capital goods and productive resources other than labour are prices in the generalized sense, i.e. mere accounting prices. Some appropriate rules are applied to the distribution of social dividend to the consumers. Subject to these rules of income formation and given market prices, the consumers are free to choose their demand for consumption goods and supply of labour services. Likewise, some appropriate rules are applied to the production units (in industry with many firms incurring set up costs) so that average cost of production will be minimized, and marginal cost will be made equal to the price of the product for each and every good produced. The accounting prices for capital goods and productive resources other than labour are formed and adjusted by the Central Planning Board through the instrumental use of the Walrasian tâtonnement process, where the Central Planning Board plays the role of the Walrasian auctioneer. The *modus operandi* of this successive trial and error process is exactly the same as the well-known Walrasian tâtonnement process, and the adjustment of the market price or the accounting price for each good and service are made in accordance with the aggregate excess demand for the good and service in question.

Two properties of this pseudo-Walrasian tâtonnement process deserve particular attention. In the first place, it enables the Central Planning Board to escape from the Hayekian task of gathering dispersed private information for computing accounting prices at the centre, which von Hayek maintained to be practically impossible to perform, since the necessary computation is in effect performed by each and every holder of private information. In the second place, the accounting prices found at the equilibrium of this pseudo-Walrasian tâtonnement process in a socialist state "have quite the same objective character as the market prices in the regime of competition. Any mistake made by the Central Planning Board in fixing prices would announce itself in a very objective way — by a physical shortage or surplus of the quantity of the commodity or resources in question — and would have to be corrected in order to keep production running smoothly (Lange [70, p.82])". On the basis of these nice properties of his scheme, Lange concluded that "a substitution of planning for the functions of the market is quite possible and workable", and the immediate successors of the lessons of the controversy gladly concurred. Indeed, "[a]s far as economics profession is concerned", wrote Paul Sweezy [152, p.232] in the Economics Handbook Series edited by Seymour Harris, "Lange's paper may be regarded as having finally removed any doubts about the capacity of socialism to utilize resources rationally". Upon careful scrutiny, however, this sweeping verdict turns

out to be untenable, to say the least.

To begin with, for the quasi-Walrasian tâtonnement process to serve as an algorithm for finding right market prices and accounting prices, it must be guaranteed to converge surely and rapidly to the system of general equilibrium prices. Unless some very special assumptions, such as gross substitutability, or the weak axiom of revealed preference, are imposed on the aggregate excess demand functions, however, there is no guarantee for the global stability of the Lange process of price adjustment[21]. In a postscript to the controversy written thirty years later, Lange [71, p.158] wrote that "[i]t was assumed without question that the *tâtonnement* process in fact converges to the system of equilibrium prices". Since there is no general guarantee of such a convergence property, the Lange-Lerner scheme of market socialism offers no assurance of non-wasteful workability[22]. More remarkably, Lange went on to maintain that "[w]ere I to rewrite my essay today my task would be much simpler. My answer to Hayek and Robbins would be: so what's the trouble? Let us put the simultaneous equations on an electric computer and we shall obtain the solution in less than a second. The market process with its cumbersome *tâtonnements* appears old-fashioned. Indeed, it may be considered as a computing device of the pre-electronic age". This statement is truly remarkable, as it "proves that the real nature of the problem has not been perceived". Recollect that the impossibility thesis à la von Hayek was based not on the limitation of computational capacity on the part of the Central Planning Board, but on the prohibitive difficulty of gathering dispersed and privately owned information for the purpose of central computation. Needless to say, no computer with whatever capacity can work without being provided with the relevant data. Interestingly enough, Abram Bergson [15, pp.663-664] also posed the possibility of avoiding trial and error procedure by solving pertinent equations by means of mathematical techniques: "[B]oth Lange and [Dickinson] wrote before the age of electronic computers. Given this technology, could not the [Central Planning Board], in performing its cardinal task of fixing prices, confute Hayek after all simply by using mathematical techniques?" However, Bergson was far more careful in answering this question than Lange: "[S]hould the Board seek to employ mathematical procedures in fixing prices comprehensively and in detail, its undertaking surely could become burdensome for managers of production units, who might be called on to predict and articulate in inordinately concrete detail the complex and ever changing constraints and opportunities that confront them, and on this basis to communicate to the Board such data on these matters as the Board would require; and for the Board itself, which promptly would have to digest such information and to communicate the results of its deliberations to the managers. The capacities of managers as well as of the Board to grapple with these tasks might often be enhanced by use of computers, but not always".

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[21]Herbert Scarf [114] constructed an explicit example where the competitive equilibrium is globally unstable. See also Takashi Negishi [88].

[22]As far as the relative performance of the competitive market economy and the Lange-Lerner scheme of market socialism is concerned, this objection is a double-edged sword; it applies not only to the Lange-Lerner scheme of market socialism, but also to the competitive market mechanism. But the basic fact remains that the Lange-Lerner scheme is not successful as a decentralized algorithm for computing a general equilibrium solution in a socialist state, as it was originally meant to be.

Secondly, there is no systemic device in the Lange-Lerner scheme of market socialism to confront the possibility of strategic behaviour by private agents. As Lange [70, p.81] rightly observed, "[o]n a competitive market the parametric function of prices results from the number of competing individuals being too large to enable any one to influence prices by his own action. In a socialist economy, production and ownership of the productive resource outside of labour being centralized, the managers certainly can and do influence prices by their decisions. Therefore, the parametric function of prices must be imposed on them by the Central Planning Board as an *accounting rule*. All accounting has to be done *as if* prices were independent of the decisions taken. For purposes of accounting, prices must be treated as constant, as they are treated by entrepreneurs on a competitive market". Since there is nothing in the Lange-Lerner scheme to make this accounting rule compatible with the private incentives of individual agents, we cannot but conclude that the Lange-Lerner scheme of market socialism lacks the important property of *incentive compatibility*.

Thirdly, the Lange-Lerner market socialism is designed for the single-minded purpose of enabling a socialist state to use its endowed scarce resources efficiently. As was aptly observed by Sweezy [152, p.233], "[p]erhaps the most striking feature of Lange's model is that the function of the Central Planning Board is virtually confined to providing a substitute for the market as the coordinator of the activities of the various plants and industries. The truth is that Lange's Board is not a *planning* agency at all but a *price-fixing* agency; in his model production decisions are left to a myriad of essentially independent units, just as they are under capitalism". It is true that achieving the efficient use of scarce resources is a task of no mean difficulty, but "[t]he common features of all collectivist systems may be described ... as the deliberate organisation of the labours of society for a definite social goal. That our present society lacks such 'conscious' direction towards a single aim, that its activities are guided by the whims and fancies of irresponsible individuals, has always been one of the main complaints of its socialist critics (von Hayek [159, p.42])". If we take this observation at all seriously, we must go beyond mere efficiency and proceed to optimality with reference to the single social goal in order to have a fully-fledged design of a rational collectivist society.

If we retain, as in the Lange-Lerner scheme of market socialism, the crucial value premise of consumers' sovereignty and want to orient a socialist state towards a definite social goal beyond the mere attainment of efficient allocation of scarce resources, we must find a process or rule to construct a conscious social goal on the basis of individual judgements on what constitutes social goods, since "[t]he effect of the people agreeing that there must be central planning, without agreeing on the ends, will be rather as if a group of people were to commit themselves to take a journey together without agreeing where they want to go (von Hayek [159, p.46])". This is precisely the same problem posed and settled in the negative by Arrow in a related but distinct context of collective choice and social welfare. Interestingly enough, von Hayek [159, p.44] observed that forming "a definite social goal" for its use in orienting central planning "would be impossible for any mind to comprehend the infinite variety of different needs of different people which compete for the available resources and to attach a definite weight to each". See also

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Leif Johansen [62], who examined the relevance of Arrow's impossibility theorem in the context of economic planning.

These negative observations notwithstanding, it should be emphasized that the "socialist planning" controversy, in which both Lange and von Hayek played major roles, was the first serious attempt at designing an alternative economic mechanism with the purpose of satisfying some concrete performance characteristics. In so doing, they became the modern forerunners in the theory of decentralized planning procedures and the theory of mechanism design.

4   Significance of the Subject and Main Lines of Research

Enough has been said so far about the historical background of social choice theory. It remains for us to emphasize the significance of the subject, and identify the major lines of research in this broad and interdisciplinary area.

Ever since the appearance of *Social Choice and Individual Values*, the growth of social choice theory along many distinct lines of research has been quite conspicuous, especially after the 1960s. By now, there is an extensive Social Choice Bibliography prepared and regularly updated by Jerry Kelly (http://www.maxwell.syr.edu/maxpages/faculty/jskelly /biblioho.htm), which is more than 300 pages in single-space printout. Even this extensive and invaluable Kelly Bibliography does not cover some of the issues treated in the *Handbook of Social Choice and Welfare* in full, whereas there are many other issues which are included in the Kelly Bibliography but not in the Handbook. The plan of the Handbook clearly reflects our perception of the special significance of the development along the three lines of research which we have identified in our account of the historical evolution of social choice theory: the methods of collective decision-making, the theoretical foundations of welfare economics, and the theory of incentive compatibility and mechanism design. To explain why we believe these issues to be of special significance, it is useful to go back to *Social Choice and Individual Values* once again.

To begin with, note that Arrow's theory connected social choice and a social preference ordering, which the Arrow social welfare function associates with each profile of individual preference orderings, through the assumption of *collective rationality*: Given any set of available social states, the society chooses that available social state which is at least as good as any other available social state, where the judgements of the goodness of social states are performed in terms of the social preference ordering. This crucial assumption has been one of the major targets for critics of the Arrovian framework of social choice theory. Most notable is the criticism by James Buchanan [22, p.116], according to whom "[t]he mere introduction of the idea of social rationality suggests the fundamental philosophical issues involved. Rationality or irrationality as an attribute of the social group implies the imputation to the group of an organic existence apart from that of its individual components. ... We may adopt the philosophical bases of individualism in which the individual is the only entity possessing ends or values. In this case no question

of social or collective rationality may be raised. A social value scale simply does not exist. Alternatively, we may adopt some variant of the organic philosophical assumption in which the collectivity is an independent entity possessing its own value ordering. It is legitimate to test the rationality or irrationality of this entity only against this value ordering".

Two avenues of research were explored in response to this early criticism, in order to check the robustness of the Arrovian impossibility theorems with respect to the assumption of collective rationality. The first avenue maintained the definition of social choice in terms of the optimization of the social preference relation, but weakened the required degree of collective rationality. Weakening Arrow's requirement of completeness as well as transitivity of social preference relation, one may want to discard the exacting requirement of transitivity of the indifference relation, and retain only the more defensible requirement of transitivity of the strict preference relation (to be called *quasi-transitivity*); one may also go one step further and weaken the requirement of quasi-transitivity, and settle with only the non-existence of any strict preference cycle (to be called *acyclicity*). The second avenue went further and discarded the assumption of collective rationality altogether; it focused directly on social choice which has no underlying social preference relation, and imposed some choice-consistency property, an important example thereof being *path-independence*: "the independence of the final choice from the path to it (Arrow [3, p.120])". These two avenues were pioneered and vigorously explored by Sen [117; 118, Chapter 4*; 124]; his leading attempts were followed by Andreu Mas-Colell and Hugo Sonnenschein [76], Charles Plott [97], Douglas Blair, Georges Bordes, Jerry Kelly, and Kotaro Suzumura [18], Suzumura [142, Chapter 3] and many others. Basically, however, these extensive researches confirmed the robustness of the Arrovian impossibility theorems. As Arrow [3, p.109] has observed in a related but distinct context, "[t]he paradox of social choice cannot be so easily exorcised".

The next crucial step in the search for an escape route from Arrow's impossibility theorem was to explore the use and usefulness of interpersonal comparisons of utilities, with or without cardinal measurability[23]. The context in which we can meaningfully talk about this potential escape route is one where an ethical observer forms his own subjective interpersonal comparisons of utilities, and makes use of this extended informational basis to define an essentially Arrovian social welfare function. A fruitful and systematic method of analysis was developed mainly in the 1970s by Sen [118; 120; 125], Peter Hammond [48], Claude d'Aspremont and Louis Gevers [29], and Eric Maskin [77], among many others, which brought about a neat axiomatization of the Rawlsian difference principle (in its welfaristic version) as well as of the Benthamite principle of utilitarianism. This is a legitimate way out from the Arrovian impossibility theorem in the context of forming

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[23]Note, in passing, that cardinality of individual utilities without interpersonal comparability does not provide us with any escape route from the Arrovian impossibility theorems. Indeed, it was shown by Sen [118, Theorem 8*2] that there exists no social welfare functional — which is "a mechanism that specifies one and only one social ordering given a set of individual welfare functions, one function for each individual (Sen [118, pp.123-124])" — satisfying the following conditions: unrestricted domain, independence of irrelevant alternatives, non-dictatorship, weak Pareto principle, cardinality, and non-comparability.

someone's social welfare judgements, but such an escape route is surely not available in the alternative context of collective decision-making. Even in the context of forming social welfare judgements, the phantom of Lionel Robbins cannot be exorcised so easily; if there are multiple ethical observers who form their respective subjective interpersonal comparisons of utilities, their social welfare judgements may well conflict with each other so much so that some variants of the Arrovian impossibility theorems may well come back strenuously, as was demonstrated by Kevin Roberts [104; 105; 106] and Suzumura [145].

In passing, one particular type of interpersonal utility comparison deserves special attention: "People seem prepared to make comparisons of the form: State x is better (or worse) for me than state y is for you ... . Interpersonal comparisons of the extended sympathy type can be put in operational form; the judgment takes the form: It is better (in my judgment) to be myself in state x than to be you in state y (Arrow [3, pp.114-115])"[24]. This is indeed the type of interpersonal utility comparison which formed the informational basis of, e.g., an analysis of economic inequality by Sen [120], as well as of an axiomatization of the Rawlsian difference principle by Hammond [48] and Sen [125]. This is also the informational basis which enables us to extend the celebrated fairness-as-no-envy approach in the theory of resource allocation — developed most notably by Duncan Foley [39], Serge-Christophe Kolm [68] and Hal Varian [155] — to the theory of social choice, which was initiated by Suzumura [140; 141].

Still centering around the original Arrow impossibility theorem itself, one may try to see how tight this remarkable theorem in fact is by carefully checking whether or not any one of the constituting axioms can be weakened without upsetting the validity of the theorem. One may also try to see the trade-off relationship which may hold between different axioms, keeping the essential validity of the theorem intact. These ideas have been pursued, e.g., by Julian Blau [20] and Robert Wilson [164], on the one hand, and by Donald Campbell and Jerry Kelly [23], on the other.

All the lines of research mentioned so far are, to a great extent, correctly describable as being the lineal descendants of Arrow's seminal work. There are some other lines of research which were mentioned, but not explored, in *Social Choice and Individual Values*. One salient example is the strategic aspects of collective decision-making, which we have briefly mentioned in the context of the Borda-Laplace rank-order method of collective decision-making. Arrow [2, p.7] was careful enough to point out that "once a machinery for making social choices from individual tastes is established, individuals will find it profitable, from a rational point of view, to misrepresent their tastes by their actions, either because such misrepresentation is somehow directly profitable or, more usually, because some other individual will be made so much better off by the first individual's misrepresentation that he could compensate the first individual in such a way that both are better off than if everyone really acted in direct accordance with his tastes". As a matter of fact, Samuelson [110, pp.388-389] pointed out the ubiquity of strategic misrepresentation of preferences in the specific context of the efficient provision

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[24]The interpersonal comparisons of the extended sympathy type was first formulated with rich applications by Patrick Suppes [135].

of public goods: "[I]t is in the selfish interest of each person to give *false* signals, to pretend to have less interest in a given collective consumption activity than he really has, etc." This *free-rider problem*, so-called, can be traced back much further to Knut Wicksell [163]: "If the individual is to spend his money for private and public uses so that his satisfaction is maximized, he will obviously pay nothing whatsoever for public purposes (at least if we disregard fees and similar charges). Whether he pays much or little will affect the scope of public service so slightly that, for all practical purposes, he himself will not notice it at all. Of course, if everyone were to do the same, the State would soon cease to function". In the context of social choice theory, however, the first general treatment of the strategic misrepresentation issue, of which Arrow was aware from the inception of social choice theory, but left unexplored, had to wait until 1970s when Allan Gibbard [43] and Mark Satterthwaite [113] came up with a general theorem on the manipulability of voting schemes[25]. Recollect that a voting scheme is a social choice mechanism which assigns a single outcome to each and every profile of voters' preference orderings over outcomes. As long as there are at least three alternative outcomes and at least two voters, there exists no non-dictatorial voting scheme which is free from strategic misrepresentation of preferences by individuals. It is worthwhile to point out that the Arrow theorem is closely related to the Gibbard-Satterthwaite theorem in the sense that the former theorem can provide the crucial step in proving the latter theorem. Given the validity of the basic Gibbard-Satterthwaite theorem on the ubiquity of strategic manipulation of voting schemes, it is natural that a huge literature was created in the search for either the escape route from the Gibbard-Satterthwaite impossibility theorem, or directions in which their theorem may be generalized.

Since the strategic misrepresentation of preferences is demonstrably ubiquitous, there is a further problem to be tackled: "Even in a case where it is possible to construct a procedure showing how to aggregate individual tastes into a consistent social preference pattern, there still remains the problem of devising rules of the game so that individuals will actually express their true tastes even when they are acting rationally (Arrow [2, p.7])". It was precisely in response to this plea that a fruitful area of research, to be called the *implementation theory*, or the *theory of mechanism design*, was created by Leonid Hurwicz [57; 58; 59], Partha Dasgupta, Peter Hammond and Eric Maskin [28] and Maskin [78; 79]. A mechanism is a game form, which is designed and managed by the helmsman of the economy, so that it can attain the social objective at the equilibrium of the game by assigning to each individual agent an appropriate set of admissible strategies and a payoff function. In view of the Gibbard-Satterthwaite theorem and Hurwicz's [58] theorem to the same effect in economic environments, the constructed game forms are such that the set of admissible strategies cannot be that of individual preference orderings, but that of much wider nature. Although the public objective, which the helmsman tries to optimize, is typically dependent on the private information, it need not be concordant with the private incentives of individual agents. It follows that the requirement that individual agents within the designed mechanism should be so induced as to act to bring about

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[25]See, however, an interesting earlier study on strategic behavior in voting by Robin Farquharson [38]. See also Pattanaik [92].

the social objective optimization at equilibrium cannot but impose a constraint on the mechanisms to be designed and on the public objectives to be implemented.

Another game-theoretic background of social choice theory deserves to be mentioned, which can be traced back all the way to the cooperative game theory of John von Neumann and Oscar Morgenstern [162]. Notable cooperative solution concepts to the axiomatic bargaining problem due to John Nash [87] such as the Nash bargaining solution, or the Kalai-Smorodinsky [63] solution, as well as to the games of characteristic function forms such as the Shapley value, the core, or the nucleolus, provide social choice theory with a rich class of reasonable (fair) compromises in the situation which mixes cooperation and competition among individual agents.

Not only Arrow's social choice theory, but also the Gibbard-Satterthwaite theorem on the non-manipulability of voting schemes, as well as the Hurwicz-Maskin theory on implementation, and the cooperative game-theoretic approach to fair compromises, all make extensive use of axiomatic methods. Many of the strengths and weaknesses of these theories hinge squarely on this common analytical character. As was observed by Arrow [2, p.87], "[o]ne of the great advantages of abstract postulational methods is the fact that the same system may be given several different interpretations". In exchange for this great merit of interpretational versatility, however, the axiomatic methods tend to be plagued with the potential weakness of a formal neglect of substantial issues. A case in point is a warning by Leif Johansen [62] to the effect that the theoretically undeniable ubiquity of "playing down one's preferences for a public good in order to get a lower share in the costs of providing the good" does not seem "likely to succeed in an open political decision-making process involving elected representatives". According to Johansen, "the two-tier system of electors and representatives tends to diminish the significance and relevance of the theoretical problem of unwillingness to reveal preferences for public goods". This warning seems to urge us to examine in concrete detail the institutional structures of the society, political as well as economic, in search of the empirical relevance of purely theoretical results obtained in a general axiomatic framework. This is an interesting step to take if one wants to verify that the paradox of voting is not just a theoretical curiosity, but a phenomenon of substantial empirical relevance; it also motivates us to analyse the logical performance of representative democracy vis-à-vis direct democracy. Furthermore, instead of merging "voting, typically used to make 'politial' decisions, and the market mechanism, typically used to make 'economic' decisions (Arrow [2, p.1])" into one and the same axiomatic system, it may prove useful to develop an idiosyncratic model of social choice in economic environments, along with developing a separate model of political decision-making. All these steps have been taken vigorously in the social choice literature with rich ramifications of specific results.

There is yet another crucial point of departure from Arrow's original formulation of social choice theory. Not only the traditional welfare economics, "old" as well as "new", but also the Arrovian social choice theory itself, are deeply rooted in the philosophical approach of *welfarist-consequentialism* in that they are based on the assessment of the goodness of states of affairs in terms of individual utilities obtained from these states of affairs. It was Sen's [118, Chapter 6*; 119; 121; 128] *impossibility of a Paretian liberal*

which casted a serious doubt on this long tradition by establishing an impossibility theorem to the effect that the weak welfaristic requirement of the Pareto principle cannot but conflict with the non-welfaristic requirement of the respect for minimal individual liberty. Sen's seminal analysis can be traced back to the problem which John Stuart Mill [83; 84] had to face in his simultaneous belief in the utilitarian outcome morality, on the one hand, and in the sanctity of individuallibertarian rights, on the other. In view of the remarkable pervasiveness of welfarist-consequentialism in the whole spectrum of normative economics, it is natural to find many attempts in the literature to try to find an escape route from Sen's impossibility theorem, e.g. Gibbard [44], Blau [19], Sen [121, Sections III-XI], and Suzumura [137; 138]; to gauge the robustness of Sen's liberal paradox, so-called, e.g. David Kelsey [65; 66], and Sen [121, Section II and Appendix A2]; and to examine critically Sen's original articulation of individual liberty, e.g. Peter Gärdenfors [42], Robert Sugden [134], Peter Hammond [49], Wulf Gaertner, Prasanta Pattanaik and Kotaro Suzumura [40], and Pattanaik and Suzumura [93; 94]. The implications and relevance of these works on the impossibility of a Paretian liberal are critically evaluated by Suzumura [144] who distinguished the three related but distinct issues in the social choice-theoretic analysis of welfare and rights: the issue of the analytical articulation of rights, the issue of the realization of rights, and the issue of the initial conferment of rights. There are also many criticisms of welfarist-consequentialism in terms of the counter-intuitive implications of this informational constraint in some paradigmatic cases, e.g. Ronald Dworkin [34], Amartya Sen and Bernard Williams [133], Jon Elster [37], Amartya Sen [127], and many others.

Once Pandora's box is opened, and we are given a glimpse of the possibilities which lie beyond the narrow confines of welfarist-consequentialism, nothing prevents us from asking questions which can be properly posed only when we are ready to go beyond the traditional informational basis of welfarist-consequentialism. In the analysis of individual well-being, for example, we need not necessarily analyse it only through the looking glass of individual welfares. Alternative articulations of individual advantages have been proposed, which have opened new possibilities in welfare economics in general, and social choice theory in particular. Representative proposals to this effect include *social primary goods* in Rawls' [100] theory of justice, *resources* in Dworkin's [35; 36] theory of equality, and *capabilities* in Sen's [127; 130] theory of well-being. The new vistas thereby opened have far-reaching implications with innovative perspectives on the theory and policy of economic development, as expounded in Sen [130]. We may even proceed beyond consequentialism as such, and pose some questions such as the intrinsic value of opportunities to choose and/or the intrinsic value of procedures for choice, along with their instrumental values. Indeed, it is only with these new developments in clear perspective that we can gauge the true usefulness and limitations of the traditional informational basis of welfarist-consequentialism. Some of these new vistas opened in this direction are expounded in Sen [131], Suzumura [146; 148; 149], Kotaro Suzumura and Yongsheng Xu [150; 151] and Reiko Gotoh and Kotaro Suzumura [46].

Overlapping partly with this trend to go beyond welfarist-consequentialism as the informational basis of social welfare analysis, there were conspicuous developments in

the theory of how to measure economic well-being. It was Serge-Chritsophe Kolm [67] and Anthony Atkinson [8] who kicked off the modern resurgence of interest in the measurement of income inequality. Soon afterwards, Sen [122] axiomatized a new measure of income poverty, which went substantially beyond the crude traditional measure such as the head count ratio, and incorporated a new distributional dimension into the measurement of poverty. More recently, Prasanta Pattanaik and Yongsheng Xu [95] started a new area of research concerning how to measure freedom of choice. Each one of these seminal works generated substantial follow-up works of their own, which are enriching our theoretical tool box for the measurement of well-being.

The *Handbook of Social Choice and Welfare* is a systematic attempt to provide, in two volumes, an up-to-date overview of the current state of the art in social choice theory and welfare economics, encompassing all these issues we have so far identified and even more[26]. Plenty of dishes are on the table. It is our sincere hope that the readers will enjoy them and be motivated to participate in the vigorous research activities which are currently taking place.

5   A Disclaimer

It has been said that social choice theory is "a science of the impossible." This statement contains an element of the truth only to the limited extent that the development of modern social choice theory received strong momentum from many impossibility theorems. Arrow's monumental theorem on the impossibility of democratic and informationally efficient preference aggregation procedures, Sen's theorem on the impossibility of a Paretian liberal, and the Gibbard-Satterthwaite theorem on the impossibility of non-manipulable and non-dictatorial voting schemes, to cite only a few most salient examples, have served us positively by sending an unambiguous signal that there are logical problems which await our careful scrutiny and serious attempt for resolution. In the process of understanding these impossibility theorems, we are brought to the far deeper perception of what underlies social conflicts of important values than ever. Likewise, in the process of finding some meaningful escape routes from these logical impasses, we are brought to much richer understanding on what makes several social values mutually compatible than otherwise. In this sense, there is nothing intrinsically negative about social choice theory in general, and impossibility theorems in particular.

It has also been said that welfare economics is plagued with elegance nihilism. In this context, it is worthwhile to recollect that Pigou's "old" welfare economics started with the following manifest: "The complicated analyses which economists endeavour to carry through are not mere gymnastic. They are instruments for the bettering of human life. The misery and squalor that surround us, the dying fire of hope in many millions of European homes, the injurious luxury of some wealthy families, the terrible uncertainty overshadowing many families of the poor — these are evils too plain to be ignored. By the knowledge that our science seeks it is possible that they may be restrained (Pigou [96,

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[26]See also Arrow, Sen and Suzumura [7].

p.vii])". Forty years later, however, Edward Mishan [85, p.197] commenced his survey of welfare economics over the period 1939-1959 with the following remark: "While it continues to fascinate many, welfare economics does not appear at any time to have wholly engaged the labours of any one economist. It is a subject which, apparently, one dabbles in for a while, leaves and, perhaps, returns to later in response to troubled conscience ... ." Since Mishan's survey covered the period over which the "new" welfare economics was created so as to replace the crumbling "old" welfare economics only to receive harsh criticisms on their logical foundations even before the scaffolds of construction were removed from their construction sites, Mishan's cynicism may be understandable at least to some extent. But the cynicism persisted ever since, and Atkinson [9] felt it necessary to talk about "The Strange Disappearance of Welfare Economics" from the mainstream economics. However, as we have observed at the beginning of this Introduction, "as soon as any collective body designs and implements an economic mechanism and/or an economic policy, paying proper attention to the costs and benefits accruing to its constituent members, one or more social welfare judgements cannot be avoided". Since social choice theory is partly concerned with the logical foundations of welfare economics, we cannot but maintain that the study of social choice theory and welfare economics is indispensable as long as one is interested in the problem of any economic policy, be that macroeconomic or microeconomic in nature. Pigou thought that welfare economics was a potent instrument for the bettering of human life. The same can be said of social choice theory.

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Chapter 26
Welfare Economics Beyond
Welfarist-Consequentialism[*]

> *Natural rights* is simple nonsense: natural and imprescriptible rights,
> rhetorical nonsense — nonsense upon stilts.
>
> <div align="right">Jeremy Bentham, Anarchical Fallacies [6, p.501]</div>

> Each person possesses an inviolability founded on justice that even the
> welfare of society as a whole cannot override.
>
> <div align="right">John Rawls, A Theory of Justice [49, p.3]</div>

> Individuals have rights, and there are things no person or group may do
> to them (without violating their rights).
>
> <div align="right">Robert Nozick, Anarchy, State and Utopia [43, p.ix]</div>

1 Introduction

Welfare economics is a controversial subject, and its historical evolution is full of blind
alleys and red herrings. "[T]he hallowed antiquity of welfare economics" (Schumpeter
[64, p.1069]) is surely respectable, but the standard history of this discipline begins with
Arthur Pigou's monumental treatise, *The Economics of Welfare* [48], with a good reason.[1]

[1]According to Schumpeter [64, p.1069], "a large part of the work of Carafa and his successors as well as of the work of the scholastic doctors and *their* successors was welfare economics. We also know that the welfare point of view was much in evidence in the eighteenth century ... For Bentham and

Suffice it to observe that it was Pigou's path-breaking work that gave its name to this branch of economic analysis. Indeed, as Sir John Hicks [36, p.307] aptly observed, "[i]f it existed before Pigou, it must ... have been called something else." However, even the short history of welfare economics after Pigou is still characterized by many intricacies and perplexities.

It deserves recollection that, in the Preface to the first edition of *The Economics of Welfare*, Pigou inscribed an unforgettable manifesto to the following effect:

> The complicated analyses which economists endeavour to carry through are not mere gymnastic. They are instruments for the bettering of human life. The misery and squalor that surround us, the dying fire of hope in many millions of European homes, the injurious luxury of some wealthy families, the terrible uncertainty overshadowing many families of the poor — these are evils too plain to be ignored. By the knowledge that our science seeks it is possible that they may be restrained. Out of the darkness light! To search for it is the task, to find it, perhaps the prize, which the "dismal science of Political Economy" offers to those who face its discipline. (Pigou [48, p.vii])[2]

Those who are inspired by Pigou's passionate commitment to the bettering of human life may be embarrassed by the following cynical observation with which Edward Mishan [40, p.197] commenced his survey of welfare economics over the period 1939-59: "While it continues to fascinate many, welfare economics does not appear at any time to have wholly engaged the labours of any one economist. It is a subject which, apparently, one dabbles in for a while, leaves and, perhaps, returns to later in response to a troubled conscience ... ." A natural question suggests itself: Why did such an indifferent attitude towards welfare economics spread among economists? What went wrong with Pigou's research agenda in search of instruments for the bettering of human life?

The fate of the "welfare economics with red corpuscles" (Solow [81, p.986]) has not improved much since the appearance of Mishan's 1960 survey, which is in conspicuous contrast with the sophistication of the fundamental theorem of welfare economics in the 1950s and 1960s. One cannot but ask: What is the underlying factor that is responsible for the *poverty of welfare economics*?

In full awareness of these natural questions, and capitalizing on some recent theoretical work of my own and many others, most notably Amartya Sen, this chapter focuses on the logical foundations of the post-Pigovian welfare economics and social choice theory with a view to finding a conceptual framework which enables us to enrich welfare

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the English utilitarians generally this point of view was, of course, an essential element of their creed. Hence, the positive spirit of Ricardian economics notwithstanding, we find it also in the English 'classics,' particularly in J. S. Mill. So far as this goes, modern welfare economics merely revives the Benthamite tradition." Likewise, Samuelson [59, p.203] called our attention to the ancient origin of welfare economics: "Beginning as it did in the writings of philosophers, theologists, pamphleteers, special pleaders, and reformers, economics has always been concerned with problems of public policy and welfare." See also Samuelson [62, pp.225-227].

[2]This part of the Preface was kept intact with only a few minor changes throughout the later editions of *The Economics of Welfare*

economics. The structure of this chapter is as follows. Section 2 briefly summarizes the debate through which the Pigovian "old" welfare economics came to lose credibility and enthusiasm among economists, and the "new" welfare economics, so-called, evolved along several related avenues. Unfortunately, the "new" welfare economics also failed to provide an alternative conceptual framework on the basis of ordinal and interpersonally non-comparable welfare information alone. Section 3 examines the nature of the Arrovian social choice theory in this arena, and a crucial feature thereof, which also permeates through the "old" and "new" welfare economics, will be identified as *welfarist-consequentialism*. Section 4 expounds the reasons why welfarist-consequentialism is an inadequate informational basis of welfare economics with red corpuscles. Sections 5-7 attempt to enrich the informational basis of welfare economics and social choice theory, focusing, respectively, on the possibility of interpersonal comparisons of welfare, preference for opportunities, and the procedural fairness of social choice. Section 8 concludes the main text with several remarks. An appendix provides a simple and self-contained proof of Arrow's general possibility theorem, which occupies a unique niche in the history of welfare economics.

2   Welfare Economics, "Old" and "New"

Pigou was a utilitarian, and his "old" welfare economics was based on the utilitarian concept of economic welfare. According to his famous definition, the *economic welfare* of a society is "that part of *social welfare* which can be brought directly or indirectly, into relation with the measuring-rod of money (Pigou [48, p.11])," which "consists in the balance of satisfaction from the use of the national dividend ... over the dissatisfactions involved in the making of it (p.85)." This definition presupposes that the satisfaction or welfare of different individuals can be added to, or subtracted from, one another. It was against this epistemological basis of Pigou's welfare economics that a harsh ordinalist criticism raged in the 1930s, beginning with the famous *Essay on the Nature and Significance of Economic Science* by Lionel Robbins [51], who forcefully and justifiably negated the possibility of making *objective* interpersonal comparisons of welfare. However, a careful reading of Robbins [51, pp.138-140, 149-150; 52, pp.636-637; 53, p.5] reveals that he never negated the possibility of making *subjective* interpersonal comparisons of welfare; nor did he ever urge fellow economists to refrain from making subjective interpersonal comparisons of their own. His only assertion was that these subjective interpersonal comparisons cannot claim any interobserver validity.

By the end of the 1930s, if not earlier, it became widely accepted that "[e]ven if the satisfactions of a single individual were admitted to be measurable upon a cardinal scale ... it would still be true that we should have no means of bringing the units of these scales into relation with one another. The satisfactions of different individuals are accordingly incapable of being added (Hicks [36, p.308])." Several attempts were made to fill in the conspicuous gap left wide open by the demolition of the utilitarian basis of "old" welfare economics, and to salvage the wreckage of Pigou's research agenda by reformulating welfare economics on the informational basis of *ordinal* and *interpersonally*

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non-comparable welfare and nothing else. The salient concept of the Pareto principle that a change from a social state x to another social state y can be construed as socially good if at least one individual is made better off without making anyone else worse off came to the fore, and the characterization and implementation of the Pareto-efficient allocation of resources became the central concern of "new" welfare economics. However, since almost every economic policy favours some individuals at the cost of disfavouring others, there would be almost no situation of real significance where the Pareto principle could claim direct policy relevance. Something additional was clearly needed for the "new" welfare economics to contribute to the bettering of human life.

Two related but distinct avenues were explored to rectify this unsatisfactory state of "new" welfare economics. The first avenue explored was the introduction of the *hypothetical compensation criteria*. Nicholas Kaldor [37], John Hicks [34], Tibor Scitovsky [65], Paul Samuelson [60] and others tried to expand the applicability of the Pareto principle by introducing hypothetical compensatory payments between gainers and losers from a policy change. According to the neat summary evaluation by Jan van de Graaff [104, pp.84-85], "[t]he compensation tests all spring from a desire to see what can be said about social welfare ... without making interpersonal comparisons of well-being ... . They have a common origin in Pareto's definition of an increase in social welfare — that at least one man must be better off and no one worse off — but they are extended to situations in which some people are made worse off." The second avenue explored was the introduction of a *social welfare function* by Abram Bergson [7] and Paul Samuelson [59, Chapter 8], who were firmly convinced that the economic analysis of the logical consequences of any value judgements — irrespective of whose ethical beliefs they represent, whether or not they are widely held in the society or how they are generated in the first place — is a legitimate task of welfare economics. The social welfare function was proposed as the theoretical device for characterizing such ethical beliefs about relative merits of alternative states of affairs. A *Paretian* social welfare function is one that judges in concordance with the Pareto principle if the latter has direct relevance. Kenneth Arrow [3, p.108] crystallized the gist of this approach as follows: "[The] 'new welfare economics' says nothing about choices among Pareto-optimal alternatives. The purpose of the social welfare function was precisely to extend the unanimity quasi-ordering to a full social ordering."

van de Graaff's and Arrow's insightful observations on the nature and significance of the two schools of "new" welfare economics help us examine the logical performance of the post-Pigovian welfare economics within a unified analytical framework. Capitalizing on Suzumura [87; 98], let us reiterate our verdict in this arena.

Let X and $N := \{1, 2, \ldots, n\}$ be the set of all social states and the set of all individuals in the society, where $2 \leq n < +\infty$ and $3 \leq \#X$ A *social state* means a complete description of economic, social and all other features of the world that may possibly influence the welfare of individuals. For each $i \in N$, R_i denotes the individual i's weak preference relation on X, which is assumed to satisfy the axiom of *ordering* on X, where $(x, y) \in R_i$ holds if and only if i judges x to be at least as good as y.[3] In what follows,

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[3] A binary relation R on X is a *quasi-ordering* if it satisfies *reflexivity* (for all $x \in X : (x, x) \in R$) and

$(x, y) \in R_i$ may be equivalently written as xR_iy. $P(R_i)$ and $I(R_i)$ denote i's *strict preference relation* and *indifference relation*, respectively.[4] Given a profile of individual preference orderings $\boldsymbol{R}^N := (R_1, R_2, \ldots, R_n)$, the *Pareto quasi-ordering* $\rho(\boldsymbol{R}^N)$ is defined by[5]

$$\rho(\boldsymbol{R}^N) := \cap R_i \text{ over all } i \in N \tag{1}$$

Within this framework, the problem confronted by the "new" welfare economics may be neatly stated as follows. The compensation criteria were introduced so as to extend the applicability of the Pareto principle through the hypothetical compensatory payments between gainers and losers. Let Q denote the generic binary relation representing the partial welfare judgements thus defined. Then, the first task for this school of thought is to ensure that Q is an *extension* of $\rho(\boldsymbol{R}^N)$; i.e. $\rho(\boldsymbol{R}^N)$ satisfies the following properties: (i) $\rho(\boldsymbol{R}^N) \subset Q$, and (ii) $P(\rho(\boldsymbol{R}^N)) \subset P(Q)$. By definition, any Q satisfying (i) and (ii) preserves all the information that the Pareto quasi-ordering $\rho(\boldsymbol{R}^N)$ already contains, and goes possibly further. But this is only a half of the full mission of this school of thought. Since the compensation criteria provide only a preliminary step towards final social choice, which must be eventually rationalized by a Paretian Bergson-Samuelson social welfare ordering (BS-SWO), the mission will be left unaccomplished if this preliminary step logically precludes the possibility of final rational social choice. For the success of this school, therefore, it is necessary that Q is compatible with at least one Paretian BS-SWO R; i.e., Q must satisfy the following properties: (iii) $Q \subset R$, and (iv) $P(Q) \subset P(R)$.[6] Thus, the research programme of the "new" welfare economics may be construed to boil down to that of devising a principle of hypothetical compensation between gainers and losers so as to generate partial welfare judgements Q satisfying (i), (ii), (iii) and (iv) for some Paretian BS-SWO R.

In fact, Q must in fact satisfy $\rho(\boldsymbol{R}^N) \subset\subset Q$ and $Q \subset\subset R$. To see why, we have only to note that a Q such that $Q = \rho(\boldsymbol{R}^N)$ (resp. $Q = R$) does not go beyond $\rho(\boldsymbol{R}^N)$ at all (resp. is not a preliminary step towards R). With this observation in mind, let $\Theta(\boldsymbol{R}^N, R)$ be the set of all eligible partial welfare judgements Q satisfying (i*) $\rho(\boldsymbol{R}^N) \subset\subset Q$, (ii) $P(\rho(\boldsymbol{R}^N)) \subset P(Q)$, (iii*) $Q \subset\subset R$ and (iv) $P(Q) \subset P(R)$. Whether or not the hypothetical compensation principles due to Kaldor, Hicks, Scitovsky, Samuelson and others can serve us as a useful preliminary step towards final rational social choice may be checked by examining whether or not they can generate partial welfare judgements, to be called the *test relations*, which belong to the set $\Theta(\boldsymbol{R}^N, R)$.

It is in this context that the concept of consistency due to Suzumura [85; 91, p.8] proves useful. Recollect that a binary relation Q on X is *Suzumura-consistent* if and

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transitivity (for all $x, y, z \in X : (x, y) \in R$ & $(y, z) \in R \Rightarrow (x, z) \in R$). A binary relation R on X is an *ordering* if it is a quasi-ordering satisfying *completeness* (for all $x, y \in X : (x, y) \in R \vee (y, x) \in R$).

[4]For any binary relation R on X, $P(R)$ and $I(R)$ stand, respectively, for the *asymmetric part* of R and the *symmetric part* of R, respectively; i.e., $P(R) = \{(x, y) \in X \times X | (x, y) \in R$ & $(y, x) \notin R\}$ and $I(R) = \{(x, y) \in X \times X | (x, y) \in R$ & $(y, x) \in R\}$.

[5]Since each R_i is an ordering, it is clear that $\rho(\boldsymbol{R}^N)$ satisfies reflexivity and transitivity.

[6]The Bergson-Samuelson social welfare *function* is nothing other than a numerical representation u of the Bergson-Samuelson social welfare *ordering* R: for all $x, y \in X, u(x) \geq u(y)$ holds if and only if $(x, y) \in R$ holds.

only if there exists no integer $t, 3 \leq t < +\infty$ and a subset $\{x^1, x^2, \ldots, x^t\}$ of X such that $(x^1, x^2) \in P(Q), (x^\tau, x^{\tau+1}) \in Q$ for all $\tau \in \{2, \ldots, t-1\}$, and $(x^t, x^1) \in Q$. The importance of this concept lies in Suzumura's extension theorem (Suzumura, [85; 91, Theorem A(5)]) to the effect that *Q has an ordering extension R if and only if Q is Suzumura-consistent*. It follows that a necessary condition for a test relation to belong to the set $\Theta(\boldsymbol{R}^N, R)$ is that Q satisfies Suzumura consistency. It is this property that is enough to disqualify the Kaldor compensation principle, the Hicks compensation principle and the Scitovsky compensation principle from being useful preliminary tests for final rational social choice. To verify this fact unambiguously, we have only to look at Figure 1, which shows that these compensation principles can generate test relations that violate Suzumura consistency.
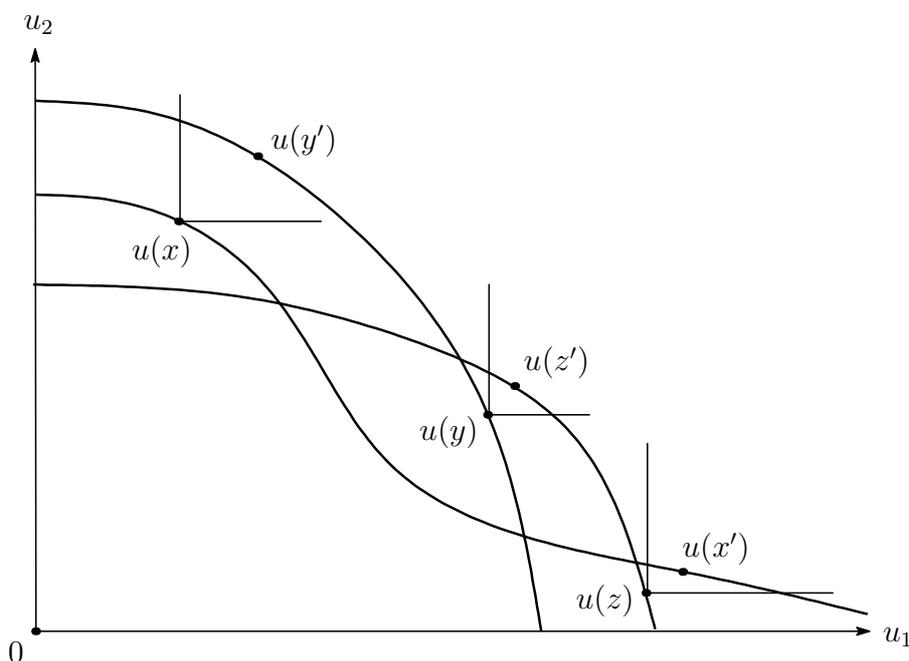
Figure 1. Inconsistency of the Kaldor, Hicks and Scitovsky compensation principles
Note: The curves depicted in this figure describe the utility possibility frontiers corresponding to various situations. Note that, according to each one of the Kaldor, Hicks and Scitovsky principles, y is better than x, z is better than y, but x is better than z.

The logical fate of the Samuelson compensation principle is different, but it fares no better in this arena. Although the Samuelson compensation principle can always generate transitive, hence Suzumura-consistent, test relations, it may fail to define test relations belonging to $\Theta(\boldsymbol{R}^N, R)$, which is because the Samuelson principle may fail to ensure that Q qualifies as an extension of the Pareto quasi-ordering. To verify this failure without ambiguity, we have only to look at Figure 2, which shows that the Samuelson

compensation principle fails to generate a Suzumura-consistent test relation Q that is also an extension of the Pareto quasi-ordering.

Putting all pieces together, we may now take stock and summarize our verdict on the fate of the "old" and "new" welfare economics. The "old" welfare economics of Pigou failed to elicit general support from economists because of its unwarranted — "unscientific" — informational basis, which is utilitarian in nature. The "new" welfare economics, which endeavoured to do without cardinality and interpersonal comparability of welfare, also failed to provide a consistent analytical framework. Indeed, the short history of "new" welfare economics is full of episodes in which the demolition activity took over immediately after the scaffold for proposed new foundations was removed. It seems to us that the widely held apathy and cynicism towards welfare economics in general, and the "new" welfare economics in particular, have much to do with this Sisyphean labour expended by the compensationist school of thought.
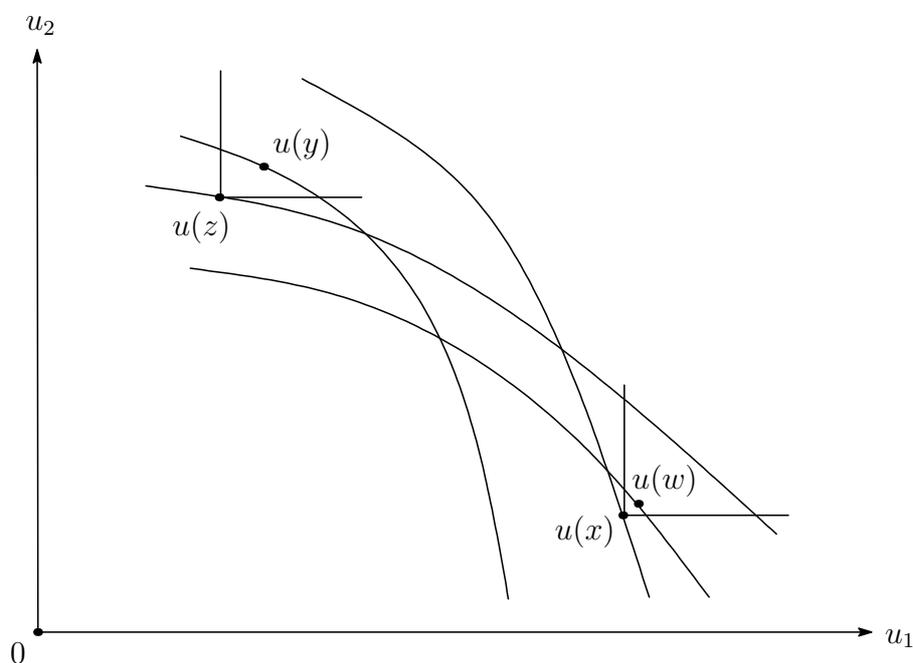
Figure 2. Incompatibility between the Pareto principle and the Samuelson compensation
                principle

Note: The curves depicted in this figure describe the utility possibility frontiers corresponding to various situations. If the Samuelson compensation principle is an extension of the Pareto principle, x is judged socially better than y, y is judged socially better than z, z is judged socially better than w, but w is judged socially better than x, a contradiction.

3 Arrovian Social Choice Theory and Welfarist-Consequentialism

The poverty of "new" welfare economics was further brought in bold relief by Kenneth Arrow [3; 5]. According to Arrow [3, p.103] Bergson's [7] formulation of the logic of welfare judgements is "a refined form of classical utilitarianism, but one which at least faces the problem of commensurating the utilities of different individuals." Let us briefly reiterate Bergson's formulation as crystallized by Arrow [3, pp.104-107] in the interests of facilitating our subsequent analysis.

It goes without saying that "[e]conomic or any other social policy has consequences for the many and diverse individuals who make up the society or economy. It has been taken for granted in virtually all economic policy discussions since the time of Adam Smith, if not before, that alternative policies should be judged on the basis of their consequences for individuals (Arrow [5, p.124])." It is assumed that each individual in the society has a method of evaluating these consequences from his own point of view, so that there are as many evaluations as there are individuals in the society. Bergson calls for a social evaluation of the consequences to all individuals based on the evaluations held by individuals. The BS-SWO is nothing other than the formal device for representing such a social evaluation. Up to this point, there is no disagreement between Bergson and Samuelson on the one hand and Arrow on the other, but an unbridgeable cleavage develops between them concerning the nature and origin of the BS-SWO. For Bergson and Samuelson, it lies outside the legitimate realm of economics to ask how these ethical beliefs came into existence in the first place.[7] For Arrow, in contrast, the aggregation process or rule through which a BS-SWO comes to be associated with the specified profie of individual preference orderings representing their respective evaluations should be a proper subject of economic analysis. Since Arrow's major result on the existence of a legitimate process or rule, known as the *Arrow impossibility theorem*, was devastatingly negative, many notable economists supporting the "new" welfare economics have strenuously denied the relevance of Arrow's theorem to welfare economics.[8] However, we are in full support of Arrow's [3, p.108] rebuttal to the effect that "one can hardly think of a less interesting question about [his] theorem than whether it falls on one side or another of an arbitrary boundary separating intellectual provinces."

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[7]This stance was most notably expressed by Samuelson [59, p.221]: "Without inquiring into its origins, we take as a starting point for our discussion a function of all the economic magnitudes of a system which is supposed to characterize some ethical belief — that of a benevolent despot, or a complete egoist, or 'all men of good will,' a misanthrope, the state, race, or group mind, God, etc. Any possible opinion is admissible, including my own ... . We only require that the belief be such as to admit of an unequivocal answer to whether one configuration of the economic system is 'better' or 'worse' than any other or 'indifferent,' and that these relationships are transitive ... ."

[8]To wit, Samuelson [61, p.42] asserted that "[t]he Arrow result is much more a contribution to the infant discipline of mathematical politics than to the traditional mathematical theory of welfare economics. I export Arrow from economics to politics because I do not believe that he has proved the impossibility of the traditional Bergson welfare function of economics." See also Samuelson [62, p.228] and Chipman [14, pp.172-175].

In analytically formulating the process or rule that, for each profile of individual preference orderings for alternative social states, specifies a corresponding BS-SWO, Arrow [3, p.9] started from the viewpoint that "interpersonal comparison of utilities has no meaning and, in fact, that there is no meaning relevant to welfare comparisons in the measurability of individual utility." It is worthwhile to confirm that the reason underlying Arrow's insistence on ordinal and interpersonally non-comparable utilities as the informational basis of the aggregation process or rule, the *Arrovian constitution*, is "the application of Leibniz's principle of the identity of indiscernibles," according to which "only observed difference can be used as a basis for explanation (Arrow [3, p.109])." In other words, it was because interpersonal comparisons of utilities were not based on any observable choice behaviour that the Arrovian constitution was made dependent only upon the interpersonally non-comparable individual preference orderings over the set of social states.

In addition to the requirement of an ordinal and interpersonally non-comparable informational basis, Arrow imposed (i) the condition of *unrestricted domain* on his constitution; (ii) a crucial condition which he called the *independence of irrelevant alternatives*;[9] (iii) the *Pareto principle* inherited from the "new" welfare economics and (iv) the uncontroversial condition of *non-dictatorship*. The culmination of his pioneering analysis was the justly famous *impossibility theorem*, which states that there exists no Arrovian constitution satisfying all four of his conditions of legitimacy. (Those who are interested in the technical details of this monumental theorem are referred to Arrow [3; 5], Campbell and Kelly [13], Roemer [58, Chapter 1], Sen [66; 70; 78] and Suzumura [91; 93]. The appendix to this chapter presents a self-contained exposition as well as a simple backward induction proof of Arrow's theorem so as to improve general accessibility of this major theorem in social choice theory.) Putting aside all technical details, we shall here focus on the restrictive nature of Arrow's informational basis.

Note that Arrow's social choice theory, which is the logical culmination of the "new" welfare economics, is a lineal descendant of the Benthamite-Pigovian utilitarian tradition *with ordinalist renovation* and *without interpersonal comparability of utilities*. Although Arrow dissociated himself from the utilitarian sum of individual utilities, his attention was still focused exclusively on the consequences of economic or any other social policy, and that the description of consequences was carried out solely in terms of the preference satisfactions of the people who enjoy or suffer from these consequences. This crucial feature of Arrow's social choice theory may be christened the *welfarist-consequentialism*. It boils down to the claim that the social judgements on right or wrong actions should be based on the assessment of their consequential states of affairs, where the assessment of consequences is exclusively in terms of people's welfare, their preference satisfaction,

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[9]This condition requires the following: if two profiles $\boldsymbol{R}^1$ and $\boldsymbol{R}^2$ coincide on a pair of social states $\{x, y\}$, then the social orderings R^1 and R^2 that correspond to $\boldsymbol{R}^1$ and $\boldsymbol{R}^2$, respectively, must also coincide on $\{x, y\}$. This can be construed as requiring the *informational efficiency* of the aggregation process or rule. Indeed, if the social aggregation process or rule fails to satisfy this requirement of informational efficiency, the society should gather information beyond individuals' opinions over the pair $\{x, y\}$ in determining whether x is socially better than y, or y is socially at least as good as x, with a result of inflating the gathering and processing cost of information far larger than otherwise.

or people receiving what they want. Not only is Arrow's theory based on welfarist-consequentialism in this sense, but also it permeates through almost the entire edifice of traditional welfare economics, "old" as well as "new," and the contemporary social choice theory. It is this informational basis which, we contend, is to be held mainly responsible for the poverty of welfare economics.

4   What is Wrong with Welfarist-Consequentialism

There are three distinct criticisms that one may raise against the use of the informational basis that is rooted in welfarist-consequentialism. The first capitalizes on the phenomenon called *sour grapes*, which Jon Elster [19] identified under the heading of *adaptive preference formation*. According to Elster [19, p.109], "[f]or the utilitarian, there would be no welfare loss if the fox were excluded from consumption of the grapes, since he thought them sour anyway. But of course the cause of his holding them to be sour was his conviction that he would be excluded from consuming them, and then it is difficult to justify the allocation by invoking his preferences." More generally, "the adjustment of wants to possibilities — not the deliberate adaptation favoured by character planners, but a causal process occurring non-consciously" — cannot but undermine the credibility of welfarist-consequentialism as the informational basis of evaluations of, and judgements on, social justice and social welfare in view of the fact that "[b]ehind this adaptation there is the drive to reduce the tension or frustration that one feels in having wants that one cannot possibly satisfy (Elster [19, p.25])." To bring this important point unambiguously home, let us turn to another passage from Amartya Sen which carries the same basic message:

> Considerations of "feasibility" and of "practical possibility" enter into what we dare to desire and what we are pained not to get. Our mental reactions to what we actually get and what we can sensibly expect to get may frequently involve compromises with a harsh reality. The destitute thrown into beggary, the vulnerable landless labourer precariously surviving at the edge of subsistence, the overworked domestic servant working round the clock, the subdued and subjugated housewife reconciled to her role and her fate, all tend to come to terms with their respective predicaments. The deprivations are suppressed and muffled in the scale of utilities (reflected by desire-fulfillment and happiness) by the necessity of endurance in uneventful survival (Sen [75, pp.21-22]).

The second criticism was raised by Ronald Dworkin in the context of the problem of distributional equality. According to Dworkin [18, p.207], "[t]he basic, immediate appeal of equality of welfare ... lies in the idea that welfare is what really matters to people, as distinct from money and goods, which matter to them only instrumentally, so far as these are useful in producing welfare. Equality of welfare proposes ... to make people equal in what is really and fundamentally important to them all." This immediate

appeal notwithstanding, the single-minded pursuit of equality of welfare brings us into an impasse, as Dworkin exposed in terms of a parable to the following effect:

> Suppose ... that a man of some wealth has several children, one of whom is blind, another a playboy with expensive tastes ... and so forth. How shall he draw his will? If he takes equality of welfare as his goal, then he will take these differences among his children into account, so that he will not leave them equal shares. ... [T]hose who are seriously physically or mentally handicapped do seem to have, in all fairness, a claim to more than others. The ideal of equality of welfare may seem a plausible explanation of why this is so. Because they are handicapped, the blind need more resources to achieve equal welfare. [However] ... most people would resist the conclusion that those who have expensive tastes are, for that reason, entitled to a larger share than others. Someone with champagne tastes ... also needs more resources to achieve welfare equal to those who prefer beer. But it does not seem fair that he should have more resources on that account (Dworkin [18, pp.186-187; 189]).

Although Dworkin's own use of this parable was to argue against the concept of equality of welfare *per se*, it may as well be of instrumental value in arguing against welfarist-consequentialism as the informational basis of welfare economics. Indeed, if we were forced to confine our informational basis to people's welfare, their preference satisfaction or their receiving what they want in judging about how we should treat them, we would have to give undue favouritism to someone with champagne tastes, *who should be held responsible for nourishing such expensive tastes*, at the cost of treating someone with serious physical and/or mental handicap, *who should not be held responsible for such a hardship*, unfairly.[10] In other words, if we believe that someone with champagne tastes should be held personally responsible for nourishing such expensive tastes so that he should not be entitled to receive compensation, and if we believe that someone with innate physical and/or mental handicap should not be held personally responsible for her disadvantage so that she should be entitled to receive compensation, we must go beyond welfarist-consequentialism.

The third criticism is totally different in nature. Instead of exemplifying the problematic nature of welfarist-consequentialism by identifying some concrete contexts wherein it brings about intuitively repugnant conclusions, this criticism reveals that a basic value, which is rooted in welfarist-consequentialism, cannot but conflict with another important value, which goes squarely against welfarist-consequentialism. Amartya Sen's [66, Chapter 6*; 67; 68; 76] justly famous *impossibility of a Paretian liberal* was presented as a criticism against welfarist-consequentialism in this spirit. To be precise, Sen exposed a serious logical conflict between the mild libertarian claim of individual rights, which is a

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[10]Dworkin [18] kicked off an extensive research on *responsibility and compensation*, which was given strong momentum by Arneson [2] and Cohen [15]. See also Bossert [9], Fleurbaey [20], Fleurbaey and Maniquet [21] and Roemer [57]. Suzumura and Gotoh [100] examined the relevance of this rapidly growing literature to the analysis of the concept and policies of the welfare state.

basic non-welfaristic value, and the welfaristic value of social efficiency in the form of the Pareto principle, by proving the non-existence of the social aggregation process or rule that simultaneously satisfies these two values. To the extent that Sen's libertarian claim of individual rights is found appealing as a basic non-welfaristic value to be respected, we are led to go against the unexceptional acceptance of the Pareto principle, which is arguably the most fundamental welfaristic value.[11] Although many critics casted doubts on the legitimacy of the way Sen articulated the libertarian rights, it seems fair to say that Sen's criticism against welfarist-consequentialism survives without losing its importance even if his articulation of libertarian rights is replaced by the allegedly more appropriate articulation in terms of *normal game forms*, as in Gaertner *et al.* [24] and Sugden [82], or *games in effectivity function forms*, as in Deb [16], Gärdenfors [25] and Peleg [47].[12]

Dissatisfaction with welfarist-consequentialism was forcefully voiced by John Rawls [49], Ronald Dworkin [18] and Amartya Sen [66; 67; 72; 74; 75; 77], who urged that we should purge welfarist-consequentialism from its traditional status of the informational basis of normative analysis and replace it with some objective measures of individual advantages. Among these proposed alternative measures, Rawls's *primary social goods* and Dworkin's *resources* met harsh criticism from Sen [72; 75] to the effect that they focus on the means, rather than the ends, to enhance an individual's well-being. As was forcefully argued by Sen, focusing on these means is tantamount to committing a materialist mistake.

To escape from the subjectivist mistake of welfarist-consequentialism,[13] as well as from the materialist mistake of Rawls and Dworkin, and to gear more directly with individual advantages *per se*, Sen [72; 74; 75; 77] proposed that we should focus on what he christened *functionings*: "[a] functioning is an achievement of a person: what he or she manages to do or to be. ... [It] is ... different both from (1) having goods (and the corresponding characteristics) to which it is posterior, and (2) having utility (in the

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[11]There is quite a substantial literature on Sen's impossibility of a Paretian liberal and related issues on welfare, rights and social choice procedures, which include, among many others, Deb *et al.* [17], Gärdenfors [25], Gaertner *et al.* [24] Pattanaik and Suzumura [44; 45], Peleg [47], Sugden [82] and Suzumura [86; 88; 91, Chapter 7; 94; 95; 99].

[12]Jeremy Bentham was strongly against the idea of natural rights as it goes squarely against the very foundations of utilitarianism. It is all the more interesting that Pigou [48, p.759] had made an early use of the non-welfarist notion of individual rights when he discussed people's claim rights to "a minimum standard of real income," which "must be conceived, not as a subjective minimum of satisfaction, but as an objective minimum of conditions." His characterization of "an objective minimum of conditions" is in fact close to what we now call the "basic needs," which consist of "some defined quantity and quality of house accommodation, of medical care, of education, of food, of leisure, of the apparatus of sanitary convenience and safety where work is carried on ... ." Pigou must have had a firm belief that such rights could be justified on utilitarian grounds in the Benthamite tradition of regarding rights as intrinsically non-important, but instrumentally crucial. Unfortunately, *The Economics of Welfare* is completely reticent about the utilitarian justification of these rights, so we cannot be sure how central was the consideration of individual rights in Pigou's "old" welfare economics. I owe this observation to Sen's remark in Gaertner and Pattanaik [23, p.74].

[13]Note that utilities are simply the subjective vindication of individual advantages, rather than the objective and interpersonally commensurable measure thereof. In this sense, to focus exclusively on individual utilities, as welfarist-consequentialism does, may well be to commit a subjectivist mistake.

form of happiness resulting from that functioning), to which it is ... prior (Sen [75, pp.10-11])." The *capability* of a person is defined as the set of functioning vectors from which the person is capable of choosing. Thus, Sen's concepts of functionings and capabilities provide us with a spectacle through which we can examine the performance of alternative economic systems from the viewpoint of individuals' opportunities to realize the life they value on deliberation.

Note, however, that Sen's space of normative analysis, i.e. the space of functionings, is no more than an alternative space of consequences. Indeed, the capability of a person is a measure of the consequential performance of an economic system in the form of an opportunity it enables him to pursue in the space of functionings. The fact that this measure is free from the subjectivist mistake of welfarist-consequentialism, as well as from the materialist mistake of Rawls and Dworkin, does not at all change the fact that Sen is still working within the boundary of consequentialism. Should we acquiesce in the consequentialist informational basis enriched by Sen's capability approach, or should we go even beyond consequentialism?

5   Interpersonal Comparability of Welfare

Before tackling this question, let us go back to where Arrow [3] started his examination of the foundations of "new" welfare economics. Recollect that his impossibility theorem was based on the view that "interpersonal comparison of utilities has no meaning and, in fact, that there is no meaning relevant to welfare comparisons in the measurability of individual utility (Arrow [3, p.9])." The reason behind Arrow's insistence on ordinal and interpersonally non-comparable utilities was that there did not seem to exist any observable choice behaviour on which interpersonal comparisons of utilities could be based. Capitalizing on the seminal work by Patrick Suppes [84] on the *grading principles of justice*, however, Arrow [3, 2nd ed., pp.114-115] later revised his view and endorsed a way of formulating interpersonal comparisons of utilities on the basis of observable choice behaviour within the enlarged space of alternatives.[14] This concept of interpersonal comparisons is known as the *extended sympathy*, which we may trace back all the way to Adam Smith's [80] *Theory of Moral Sentiments*.

Interpersonal comparisons of the extended sympathy type can be formulated in operational terms as follows. It is better in my judgement to be put in your position in social state x than to be put in somebody else's position in social state y. As Arrow [4, p.220] aptly observed in his subsequent analysis based on this concept, "[w]hatever one may think of interpersonal comparisons, at least these are ordinal and therefore may be interpreted as hypothetical choice." However Arrow [3, 2nd ed., p.115] also noted that "it is not easy to see how to construct a theory of social choice from this principle." Thus, it was left to Sen [66, Chapters 9 and 9*; 69] to lay the foundations of social choice theory with interpersonal comparisons of the extended sympathy type. Let us briefly

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[14]Before its later publication, Suppes [84] was circulated as Technical Report No.15, Office of Naval Research Contract No.225(17), Applied Mathematics and Statistics Laboratory, Stanford University, 1 November, 1957.

evaluate what was in fact accomplished and what was still left unaccomplished along this first line of informational expansion.

The extended individual preference ordering describing individual i's welfare judgements of the extended sympathy type is representable by an ordering Δ_i on the product space $X \times N$. For any $x, y \in X$ and any $j, k \in N$, $((x, j), (y, k)) \in \Delta_i$ holds if and only if i feels it would be at least as good to be in j's position when social state x prevails as to be put in k's position when social state y prevails. There seems to exist a wide agreement among economists as well as moral philosophers that people can and do make subjective welfare judgements of this extended type. Disagreement may develop, however, as to whether Δ_i deserves the name of *interpersonal* welfare comparisons in the first place. Indeed, being exclusively based on i's imaginary choice over hypothetical options such as (x, j) and (y, k), Δ_i may better be called i's *intra-personal* and *inter-situational* comparisons of welfare in the sense of Alchian [1]. To avoid a lengthy and clumsy circumlocution, however, we shall continue to use the expression of *subjective* interpersonal comparisons of welfare.

To crystallize a problem about subjective interpersonal welfare comparisons, consider a profile $\Delta^N := (\Delta_1, \Delta_2, \ldots, \Delta_n)$ of extended sympathy orderings, one ordering for each individual. For each pair $(i, j) \in N \times N$, let an ordering $R_j^i \subset X \times X$ be defined by

$$(x, y) \in R_j^i \quad \text{if and only if} \quad ((x, j), (y, j)) \in \Delta_i \tag{2}$$

for any $x, y \in X$. In particular, define $R_i \subset X \times X$ by $R_i := R_i^i$. By definition, $(x, y) \in R_i$ means that i regards x as at least as good for himself as y.

Since individual i's extended ordering Δ_i is his subjective interpersonal comparisons, there is no reason why we should not expect to have a situation where $(x, y) \in P(R_j^i)$ and $(y, x) \in P(R_j)$ hold simultaneously for some $i, j \in N$ and $x, y \in X$. In words, i judges x to be better for j than y, whereas j regards y to be better for himself than x. Opinions may differ as to whether or not we should accommodate such situations in our analysis. Those who are ready to subscribe to the viewpoint that "[p]lacing oneself in the position of the other should involve, not merely having the latter's objective circumstances, but also identifying oneself with the other in terms of his subjective features (Sen [66, p.150])" may be willing to accept only those profiles Δ^N of extended sympathy orderings that satisfy the following *axiom of identity* (Sen [66, p.150]): $R_j^i = R_j$ for all $i, j \in N$. Even though this axiom is appealing to many, there may still be some who are inspired by the following counter-argument. Suppose that x and y differ only in that j takes drugs in x, whereas he does not take drugs in y. Then it makes perfect sense that any $i, i \neq j$, judges (y, j) to be better than (x, j) even when the drug addict himself may prefer (x, j) to (y, j). Thus, the axiom of identity is a genuine restriction on the class of profiles of extended sympathy orderings to the effect of requiring non-paternalism. It is also worth noting that the extended sympathy orderings under the axiom of identity represent genuine *interpersonal* welfare comparisons of welfare.

Even under the axiom of identity, the interpersonal comparisons of the extended sympathy type are incapable of securing the *objective* interpersonal welfare comparisons with inter-observer validity. In other words, there is a serious gap between the axiom

of identity and another axiom called the *axiom of complete identity* (Sen [66, p.156]): $\Delta_i = \Delta_j$ for all $i, j \in N$. Is there a way of filling in this gap, and forming the objective interpersonal comparisons of welfare, even in principle? An affirmative answer to this question was forcefully put forward by John Harsanyi [30; 31; 32].[15] According to Harsanyi [32, p.58], although different individuals often express quite different extended preference orderings, "the possibility of meaningful interpersonal comparisons [with interobserver validity] will remain, as long as the different individuals' choice behavior and preferences are at least governed by the *same basic psychological laws*," which is because "each individual's preferences will [then] be determined by the same general causal variables." Hence, "the differences we can observe between different people's preferences can be predicted, at least in principle, from differences in their causal variables." He would like us to believe that, if only we are ready to accept these basic psychological laws, we are guaranteed of the possibility of objective interpersonal comparisons. However, this argument does not seem to stand on the safe ground.[16]

To substantiate this calim, let π_i and λ_i stand for i's *subjective characteristics* and a vector of *objective causal variables* needed to explain these characteristics, respectively. Let Π and Λ denote the set of all subjective characteristics and the set of all objective causal variables, which are assumed common for all individuals. Assume, for the sake of argument, that we accept Harsanyi's "basic psychological laws," and let $\zeta : \Lambda \to \Pi$ be a function embodying these laws. Thus, $\pi_i = \zeta(\lambda_i)$ holds for all $i \in N$. Let $\pi_i(1)$ and $\pi_i(2)$ denote the *choosable* and the *innate unchoosable* parts of π_i, respectively, so that we have $\pi_i = (\pi_i(1), \pi_i(2))$ for all $i \in N$.[17] Within this analytical framework, the description of individual situations can proceed as follows. Given a social state $x \in X$ and an individual $i \in N$ with subjective characteristics $\pi_i = (\pi_i(1), \pi_i(2)) \in \Pi$, i's *objective* situation in x is denoted by (x, i), whereas i's situation *including his subjective characteristics* is denoted by $((x, i), \pi_i)$. When individual k puts himself through imaginary exchange of circumstances into i's position, not simply replacing his objective circumstances with those of i's, but also identifying himself with i in terms of subjective features, k is placing himself in $((x_i, i), (\pi_i(1), \pi_k(2)))$. Thus, when k asserts that i's welfare in x to be higher than j's welfare in y, k is in effect expressing his strict preference for $((x, i), (\pi_i(1), \pi_k(2)))$ against $((y, j), (\pi_j(1), \pi_k(2)))$. Viewed in this way, there is no strong reason to expect that two observers, say h and k, where $h \neq k$, should coincide with each

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[15]See also Arrow [4, p.224] for closely related reasoning.

[16]The following examination of Harsanyi's argument is based on Broome [11], Kaneko [38] and Suzumura [96].

[17]According to Arrow [3, 2nd ed., p.115], "[an individual's] characteristics are put on a par with the items usually regarded as constituting an individual's wealth. The possession of tools would ordinarily be regarded as part of the social state: why not the possession of the skills to use the tools and the intelligence which lies behind those skills? Individuals, in appraising each other's states of well-being, consider not only material possessions but also find themselves 'desiring this man's scope and that man's art'." However, we cannot but feel that "reducing an individual to a specified list of qualities is denying his individuality in a deep sense. ... [T]he autonomy of individuals, an element of mutual incommensurability among people seems [thereby] denied (Arrow [4 p.225])." It is this feeling, which I share with Arrow, that motivated me to retain that innate part of an individual's subjective characteristics that is not susceptible to hypothetical individual choice.

other on the relative welfare of i in x *vis-à-vis* j in y. In other words, the possibility of objective interpersonal comparisons of welfare is not warranted even when we are ready to accept the "basic psychological laws" in Harsanyi's sense.[18] Harsanyi's persistent assertion notwithstanding, therefore, we cannot but conclude that there exist no objective interpersonal welfare comparisons of the extended sympathy type. We are then forced to live with subjective interpersonal comparisons with or without the axiom of identity. What can we say about the fate of Arrow's impossibility theorem in this arena?

Let us begin with the case of subjective interpersonal comparisons of welfare, with the axiom of identity. In this context where individuals express subjective interpersonal comparisons of their own subject to the non-paternalism constraint, we can formulate the counterpart of the Arrovian requirements of the independence of irrelevant alternatives and the Pareto principle. Under these conditions, and given any profile Δ^N of extended sympathy orderings satisfying the axiom of identity, Kevin Roberts [54] has shown that there exists an individual $d \in N$ and two positions, $j, k \in N$, which may depend on the profile Δ^N, such that d's preference for (x, j) against (y, k) is enough to ensure social preference for x against y. Thus, the opinions of all persons other than d are totally neglected in comparing x and y in terms of social welfare. Furthermore, at x as well as at y, only one position in the society is focused on, at the cost of neglecting all other positions. Both in the exclusive reliance on one person's view and in the exclusive focus on one position at each social state, this result is hardly recognizable as the resolution of Arrow's impossibility theorem.

Turn now to the case of subjective interpersonal comparisons without the axiom of identity. To crystallize our verdicts on the efficacy of the extended sympathy approach in this arena, let us introduce two further conditions to be satisfied by the social aggregation process or rule. The first is a strengthened version of the Pareto principle, which reads as follows.

Condition SP *(Strong Pareto Principle): For any pair of social states $x, y \in X$ and any profile of extended sympathy orderings $\Delta^N = (\Delta_1, \Delta_2, \ldots, \Delta_n)$, if $((x, i), (y, i)) \in \Delta_i$ for all $i \in N$, then $(x, y) \in R$; if additionally $((x, j), (y, j)) \in P(\Delta_j)$ for some $j \in N$, then $(x, y) \in P(R)$, where R is the social ordering corresponding to Δ^N.*

To formulate the second condition, let us follow Sen [66, Chapter 9] and define Suppes's [84] *grading principle of justice* $S(\Delta^N)$ for each profile Δ^N by $(x, y) \in S(\Delta^N)$ for

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[18]There are two special conditions under which this negative verdict on Harsanyi's assertion may be circumvented. In the first place, if all subjective characteristics are susceptible to hypothetical individual choice, the two hypothetical options $((x_i, i), (\pi_i(1), \pi_k(2)))$ and $((y, j), (\pi_j(1), \pi_k(2)))$ can be reduced to $((x, i), \pi_i)$ and $((y, j), \pi_j)$, respectively, which are independent of the observer's subjective characteristics. Second, the innate unchoosable part of the individual characteristics consists of a fixed vector, say $\pi^*(2)$, then the hypothetical options $((x, i), (\pi_i(1), \pi_k(2)))$ and $((y, j), (\pi_j(1), \pi_k(2)))$ are reduced to $((x, i), (\pi_i(1), \pi^*(2)))$ and $((y, j), (\pi_j(1), \pi^*(2)))$ respectively which are independent of the observer's subjective characteristics.

Unfortunately, both resolutions seem to be susceptible to serious problems of their own, and they fall far short of showing the possibility of objective interpersonal welfare comparisons of the extended sympathy type. See Kaneko [38] and Suzumura [96] for detailed vindication of these difficulties.

any pair $x, y \in X$ if and only if there exists a permutation ϵ_N defined on N such that $((x, i), (y, \epsilon_N(i))) \in \Delta_i$ for all $i \in N$, and $((x, j), (y, \epsilon_N(j))) \in P(\Delta_j)$ for some $j \in N$. Thus, $(x, y) \in S(\Delta^N)$ holds if and only if x dominates y in terms of the welfare of individuals when we neglect the ethically irrelevant individual identity. It is in this sense that the Suppes grading principle represents the basic idea of *impartiality*. According to Sen [66, p.151], "[the Suppes principle] is ... rich. While it does not yield a complete social ordering, it does squeeze as much juice as possible out of the use of 'dominance'."

Condition S *(Suppes Impartiality): For any pair of social states $x, y \in S$ and any profile of extended sympathy orderings $\Delta^N = (\Delta_1, \Delta_2, \ldots, \Delta_n)$, if $(x, y) \in S(\Delta^N)$, then $(x, y) \in P(R)$, where R is the social ordering corresponding to Δ^N.*

Capitalizing on Sen [66, Theorem 9*2], Suzumura [91, Theorem 1] proved that there exists no social aggregation process or rule that satisfies Condition SP and Condition S. It should be emphasized that this result does not invoke the Arrovian requirement of independence. If we are ready to require independence, however, a stronger version of Roberts's [54] theorem obtains, to the following effect: there exists an individual $d \in N$ such that d's preference for (x, d) against (y, d) is enough to ensure social preference for x against y. It is clear that the person d mentioned in this theorem is the precise counterpart of the Arrovian dictator in the present context. The escape route from the Arrovian impossibility does not seem open in this direction either.[19]

John Roemer [58, p.36] has asserted recently that "the 'impossibility of social choice' with the Arrovian postulates is due to the particularly impoverished information available to the social planner or the constitution framers. ... [T]he key to the existence of social choice rules is the admission of some kind of interpersonal comparisons of utility... ." This statement by Roemer may seem in sharp contrast with our negative verdicts. What can we make of Roemer's position, which is widely shared by social choice theorists? The answer is simple. Roemer and many others start off from a single interpersonal welfare comparison, which may or may not have any cardinal significance, without asking whose interpersonal welfare judgements it represents, and how these judgements came into existence in the first place; and they supplement the Arrow profile of individual preference orderings, which contains no interpersonal comparisons whatsoever, by making use of the additional information provided by a single interpersonal welfare comparison imposed from outside.

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[19]Can we dissipate the dark clouds over social choice theory by invoking interpersonally comparable *cardinal* information on individual welfare? If the problem we are concerned with is that of aggregating profiles of subjective interpersonal welfare comparisons with cardinal relevance into social welfare judgements, we are unable to escape from the Arrovian impasse even in this arena. Indeed, as was shown by Roberts [56], if individuals in a society have different subjective interpersonal welfare comparisons with cardinal relevance, one individual's opinions must dictate social welfare judgement, even in the most favourable circumstances of full comparability of individual welfares. In other words, social welfare judgements can be made on the basis of evaluations of gains and losses to different individuals, but they cannot but be based on one individual's opinions about these gains and losses, if we insist on requiring the Arrovian conditions including the Pareto principle and independence of irrelevant alternatives.

I do not want to belittle the importance of the huge progress attained along this line of research, but I am inclined to think that the original Arrow problem seems to be circumvented, not resolved, by this approach. As Arrow [3, 2nd ed., p.109] aptly observed in a different context, "[t]he paradox of social choice cannot be so easily exorcised."

6   Preference for Opportunities

Back, then, to the question posed at the end of Section 4, which may be rephrased as follows: *Is there any reason why we should go even beyond consequentialism as such?* As a matter of fact, there seem to be many reasons motivating us to explore this terrain. A particularly illuminating discussion by Sen is worth citing in some detail:

> A well-established tradition in economics suggests that the real value of a set of options lies in the best use that can be made of them, and ... the use that is *actually* made. The valuation of the opportunity, then, lies in the value of one element of it (to wit, the best option or the actually chosen option) ... . On the other hand ... the value of a set need not invariably be identified with the value of the best — or the chosen — element of it. Importance can also be attached to having opportunities that are *not* taken up. This is a natural direction to go in if the *process* through which outcomes are generated is of a significance of its own. Indeed, 'choosing' itself can be seen as a valuable functioning, and having an **x** when there is no alternative may be sensibly distinguished from choosing **x** when substantial alternatives exist (Sen [79, pp.201-202]).

A natural analytical device, which enables us to capture the *intrinsic value* of opportunity of choice rather than simply its *instrument value*, is to introduce the concept of extended preference ordering Ξ, defined over the Cartesian product of the set X of conventionally defined outcomes and the family K of non-empty subsets of X, where each $S \in K$ is meant to denote an opportunity set of choice: for any $(x, S), (y, T) \in X \times K, ((x, S), (y, T)) \in \Xi$, or equivalently $(x, S)\Xi(y, T)$, holds if and only if it is at least as good for the decision-maker that an outcome x is chosen from an opportunity set S as for another outcome y to be chosen from another opportunity set T. In particular, it stands to reason that the decision-maker recognizes the intrinsic value of the opportunity of choice if he prefers choosing x from S, where $x \in S$, to choosing x from the opportunity set $\{x\}$.[20] By making use of this extended framework, a concise defini-

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[20]Beginning with the seminal work by Sen [74; 75], there is a huge literature on the *measurement of opportunity*, which includes, among many others, Bossert *et al.* [10], Pattanaik and Xu [46] and Sugden [83]. However, to the best of my knowledge, the subject of *preference for opportunity* is left almost completely unexplored, Gravel [27; 28] being the sole exception. The analysis in this section capitalizes on Suzumura and Xu [101; 102] which is essentially different from Gravel [27; 28] who assumed that a person has two preference orderings, one over the set of outcomes and the other over the set of outcome-opportunity pairs, and analysed the possible conflict between them. As such, his analysis has nothing to do with consequentialism *vis-à-vis* non-consequentialism.

tion of consequentialism and non-consequentialism can be introduced and its far-reaching implications neatly characterized.

To facilitate our analysis, let $\Omega \subset X \times X$ be such that $x \in S$ holds for any $(x, S) \in \Omega$ and let Ξ_i be the individual preference ordering on Ω for any $i \in N$. We are now ready to identify two types of person $i \in N$ who has a reason to be called a *consequentialist*.[21]

Extreme Consequentialism: *An individual $i \in N$ is said to be an* extreme consequentialist *if, for all* $(x, S), (x, T) \in \Omega$, $(x, S)I(\Xi_i)(x, T)$.

Mild Consequentialism: *An individual $i \in N$ is said to be a* mild consequentialist *if, for all $(x, S), (y, T) \in \Omega$, we have*

(a) *if $(x, \{x\})I(\Xi_i)(y, \{y\})$, then $\#S \geq \#T$ if and only if $(x, S)\Xi_i(y, T)$, and*
(b) *if $(x, \{x\})P(\Xi_i)(y, \{y\})$, then $(x, S)P(\Xi_i)(y, T)$.*

Thus, an extreme consequentialist is one who ranks two extended alternatives (x, S) and (x, T) simply in terms of their consequence x, giving no relevance to the opportunity sets S and T from which x is chosen. In contrast, a mild consequentialist ranks two extended alternatives (x, S) and (y, T) in full accordance with their consequences x and y only if he has a strict preference between $(x, \{x\})$ and $(y, \{y\})$. If he happens to be indifferent between $(x, \{x\})$ and $(y, \{y\})$, his ranking of (x, S) *vis-à-vis* (y, T) is in accordance with the cardinality comparison between two opportunity sets S and T. It is to this limited extent that a mild consequentialist reveals his preference for opportunity.

What about non-consequentialism? This is a more subtle issue, and all we can do at present is to provide the first preliminary attempt towards formalizing this concept. The definition, which we introduced in Suzumura and Xu [101], reads as follows:

Extreme Non-consequentialism: *An individual $i \in N$ is said to be an* extreme non-consequentialist *if, for any $(x, S), (y, T) \in \Omega$ we have $(x, S)\Xi_i(y, T)$ if and only if $\#S \geq \#T$.*

Mild Non-consequentialism: *An individual $i \in N$ is said to be a* mild non-consequentialist *if, for any $(x, S), (y, T) \in \Omega$, we have*

(a) $\#S > \#T$ *implies $(x, S)P(\Xi_i)(y, T)$, and*
(b) $\#S = \#T$ *implies $[(x, S)\Xi_i(y, T)$, if and only if $(x, \{x\})\Xi_i(y, \{y\})]$.*

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[21]To make the exposition as simple as possible, I assume that K consists of all non-empty *finite* subsets of X. For any $S \in K$, $\#S$ denotes the number of elements contained in S, which is used to capture the richness of the opportunity set S. It may well be argued that measuring the richness of opportunity in terms of the cardinality of the opportunity set is naive, and that one should take such information as similarities and dissimilarities among outcomes into proper consideration. This can be done in various ways, including the use of the minimum of cardinalities of informationally equivalent classes rather than the cardinality of opportunity sets *per se*. It is for the purpose of making the present framework as simple as possible that in this chapter I continue to use the naive cardinality approach in measuring the richness of opportunities.

Thus, for an extreme non-consequentialist in our sense, consequences do not matter at all, and what is valued is the richness of opportunities involved in the choice situations. A mild non-consequentialist does not care about consequences either, as long as there is a clear ranking of two extended alternatives in terms of the cardinality of opportunity sets, but he does pay due attention to consequences if two opportunity sets contain the same number of options. In Suzumura and Xu [101], we have succeeded in providing the complete characterization of consequentialism and non-consequentialism, in both the extreme version and the mild version, in terms of the respective set of elementary axioms. However, it is admittedly true that these concepts and axiomatizations would be of little relevance unless the quantum jump beyond consequentialism could help us resolve, or at least cast a new light on, some perennial problems in welfare economics and social choice theory. With this desideratum in mind, let us exemplify the implications of our analysis in the arena of Arrovian social choice theory, capitalizing on Suzumura and Xu [102].

Let $\Re$ be the set of all logically possible orderings over Ω. A profile $\Xi^N := (\Xi_1, \Xi_2, \ldots, \Xi_n)$ of extended individual preference orderings defines an element of $\Re^n$. An *extended constitution* is a function f which maps each and every profile in some subset D_f of $\Re^n$ into $\Re$. When $\Xi = f(\Xi^N)$ holds for some $\Xi^N \in D_f$, $I(\Xi)$ and $P(\Xi)$ stand, respectively, for the corresponding social indifference relation and the social strict preference relation.

In order to make our problem analytically tractable, we assume that each individual's extended preference ordering Ξ_i $(i \in N)$, which defines an admissible profile $\Xi^N = (\Xi_1, \Xi_2, \ldots, \Xi_n) \in D_f$, satisfies the following conditions:

Independence (IND): *For any $(x, S), (y, T) \in \Omega$ and any $z \in X \setminus S \cup T, (x, S)\Xi_i(y, T)$ if and only if $(x, S \cup \{z\})\Xi_i(y, T \cup \{z\})$.*

Monotonicity (MON): *For any $(x, S), (x, T) \in \Omega$, $T \subset S$ implies $(x, S)\Xi_i(x, T)$.*

Simple Indifference (SI): *For any $x \in X$ and any $y, z \in X \setminus \{x\}$, $(x, \{x, y\})I(\Xi_i)(x, \{x, z\})$.*

IND corresponds to the standard independence axiom used by Pattanaik and Xu [46]. It requires that, for any opportunity sets $S, T \in K$, if $z \in X$ is not in both S and T, then the preference ranking over $(x, S \cup \{z\})$ and $(y, T \cup \{z\})$ mirrors precisely the preference ranking over (x, S) and (y, T). MON makes an explicit use of information about the opportunity aspect of the choice situations. It requires that choosing an outcome x from the opportunity set S is at least as good as choosing the same x from the opportunity set T that is a subset of S. SI requires that choosing x from the two simple cases consisting of two alternatives should be regarded as indifferent no matter what alternative is added to x. These axioms impose a mild restriction on each individual's extended preference ordering to the effect that *no individual is averse to richer opportunities; i.e., having a larger opportunity set does not harm anybody*. In the context where we neglect decision-making costs and other factors that may make a larger opportunity set a liability rather than a credit, this restriction seems to make a reasonable sense. In what follows, we assume that each profile $\Xi^N = (\Xi_1, \Xi_2, \ldots, \Xi_n) \in D_f$ is such that Ξ_i satisfies IND, MON

and SI for all $i \in N$. It is easy to check that an extreme as well as mild consequentialist's extended preference ordering must satisfy IND, MON and SI. Thus, for an extreme and mild consequentialist, imposing these conditions does not in fact restrict his preferences at all.

In addition to the domain restriction on D_f to the above effect, we introduce three conditions on f, which are straightforward translations of Arrow's [3] well-known conditions. It is for the sole purpose of bringing the role played by consequentialists *vis-à-vis* non-consequentialists into relief that these conditions are made deliberately parallel to the original Arrow conditions.

Strong Pareto Principle (SP): *For any $(x, S), (y, T) \in \Omega$ and any $\Xi^N = (\Xi_1, \Xi_2, \ldots, \Xi_n)$ $\in D_f$, if $(x, S) P(\Xi_i)(y, T)$ for all $i \in N$, then $(x, S) P(\Xi)(y, T)$, and if $(x, S) I(\Xi_i)(y, T)$ for all $i \in N$, then $(x, S) I(\Xi)(y, T)$, where $\Xi = f(\Xi^N)$.*

Independence of Irrelevant Alternatives (IIA): *For any $(x, S), (y, T) \in \Omega$ and any two profiles $\Xi^{N1} = (\Xi_1^1, \Xi_2^1, \ldots, \Xi_n^1), \Xi^{N2} = (\Xi_1^2, \Xi_2^2, \ldots, \Xi_n^2) \in D_f$, if $[(x, S) \Xi_i^1(y, T)$ if and only if $(x, S) \Xi_i^2(y, T)]$ hold for all $i \in N$, then $[(x, S) \Xi^1(y, T)$ if and only if $(x, S) \Xi^2(y, T)]$ holds, where $\Xi^1 = f(\Xi^{N1})$ and $\Xi^2 = f(\Xi^{N2})$.*

Non-Ditatorship (ND): *There exists no $i \in N$ such that $P(\Xi_i) = P(\Xi)$ holds for all $\Xi^N = (\Xi_1, \Xi_2, \ldots, \Xi_n) \in D_f$, where $\Xi = f(\Xi^N)$.*

We are now ready to state the following string of theorems that has been established by Suzumura and Xu [102].

(a) Suppose that all individuals are extreme consequentialists. Then there exists no extended constitution f that satisfies SP, IIA and ND.

(b) Suppose that there exist at least one extreme consequentialist and at least one mild consequentialist. Then there exists an extended constitution f that satisfies SP, IIA and ND.

(c) Suppose that all individuals are mild consequentialist. Then there exists no extended constitution f that satisfies SP, IIA and ND.

(d) Suppose that there exists at least one mild non-consequentialist. Then there exists an extended constitution f that satisfies SP, IIA and ND.

According to these theorems, the similarity of attitudes among individuals to the effect that either all individuals are extreme consequentialist, or all individuals are mild consequentialist cannot but bring strenuously back the Arrovian impossibility result even in this extended analytical framework. The impossibility result disappears, however, either if there simultaneously exist an extreme consequentialist and a mild consequentialist, or if there exists at least one mild non-consequentialist.

We have thus shown that (i) there is a reason, which is squarely rooted in individual's intrinsic preference for opportunity to choose, to go even beyond consequentialism as such; (ii) the extended analytical framework allows us to give precise definitions of, and concise axiomatization to, consequentialism *vis-à-vis* non-consequentialism; and (iii) the

possibility of the Arrovian constitution can be secured either if an extreme consequentialist and a mild consequentialist co-exist in the society, or if at least one person is a non-consequentialist in the society.

To conclude this section, let us observe that these results fall far short of dissipating the dark cloud hanging over welfare economics and social choice theory once and for all, yet I hope they are suggestive enough to signal a fruitful avenue to be explored in the future. One issue that would seem to be worth exploring is the re-examination of the concept of non-consequentialism *vis-à-vis deontology*. Our present terminology is not rich enough to capture the concept of *duty*, let alone that of deontology; further conceptual expansion is called for.

7 Consequences and Procedures

Another reason to maintain that the commitment to consequentialism, irrespective of how richly the consequences are described, is seriously lacking as the informational basis of welfare economics and social choice theory may be illustrated in terms of the following simple parable due to Suzumura:

> A father is to divide a homogeneous cake fairly among three daughters. Method I is that he himself divides this cake into three equal pieces, and tells the daughters to take a piece each, or leave it. Method II is that the children are offered the opportunity to discuss how this cake should be divided fairly among them, and cut it into three pieces in full accordance with the agreed conclusion. If they happen to agree that the egalitarian division is the fair outcome, and if we are informed only of the consequences of this cake division, we cannot but conclude that these methods of division are the same. It should be clear, however, that this identification is inappropriate. Indeed, in Method I, the children are not provided with any right to participate in the process through which their distributive shares are determined, whereas in Method II, they are given such an important right of autonomy. This crucial aspect will be left uncaptured if our analysis focuses only on consequences (Suzumura [95, p.31; 97, p.21]).

This parable, which is meant to emphasize that the importance of procedures lies not only in their instrumental value in promoting some other value, but also in their own intrinsic value, should be sufficient to suggest the crucial relevance of procedures along with consequences in search of the fully fledged concept of individual well-beings. Arrow [3, pp.89-91] was remarkably ahead of his time in this arena, and he clearly recognized the intrinsic value of social decision-making procedures when he wrote:[22]

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[22]Note also an even earlier observation on the intrinsic value of procedure due to Schumpeter [63, pp.190-191]: "[C]onvinced socialists will derive satisfaction from the mere fact of living in a socialist society. Socialist bread may well taste sweeter to them than capitalist bread simply because it is socialist bread, and it would do so even if they find mice in it." I owe this reference to Professor Masao Fukuoka.

[A]mong the variables which taken together define the social state, one is the very process by which the society makes its choice. This is especially important if the mechanism of choice itself has a value to the individuals in the society. For example, an individual may have a positive preference for achieving a given distribution through the free market mechanism over achieving the same distribution through rationing by the government. If the decision process is interpreted broadly to include the whole socio-psychological climate in which social decisions are made, the reality and importance of such preferences, as opposed to preferences about the distributions of goods, are obvious (Arrow [3, pp. 89-91]).

This is an ingenious argument, but it was not until Pattanaik and Suzumura [44; 45] attempted to explore this suggested avenue that the full implication of Arrow's argument was made crystal-clear.

To be precise, let X and Θ denote the set of conventionally defined social alternatives other than the decision-making procedures and the set of all decision-making procedures respectively. A pair $(x, \theta) \in X \times \Theta$ is called an *extended alternative*, which means that an outcome $x \in X$ is attained through a decision-making procedure $\theta \in \Theta$. A casual observer may well think that there is nothing essentially new in this conceptual extension, as the original Arrow analysis should be applicable to this extended framework through a simple refinement of basic terms. This is emphatically not the case, however, and it is important to understand why.

To bring the point clearly home, let us specify two types of decision-making procedure. Let R_i be i's preference ordering over X for all $i \in N$. For each pair $(\boldsymbol{R}^N, S)$ of the profile of individual preference orderings $\boldsymbol{R}^N := (R_1, R_2, \ldots, R_n)$ over X and the opportunity set $S \subset X$, a *social choice correspondence* σ maps $(\boldsymbol{R}^N, S)$ into a non-empty subset $\sigma(\boldsymbol{R}^N, S)$ of S. A *game form* is a pair $\gamma = (M, g)$, where $M := M_1 \times M_2 \times \ldots \times M_n$ and M_i is i's *strategy space* for all $i \in N$, and g is the *outcome function* that maps each pair $(\boldsymbol{m}, S)$ of the strategy profile $\boldsymbol{m} \in M$ and the opportunity set $S \subset X$ into a unique outcome $g(\boldsymbol{m}, S) \in S$. In each case, we introduce the concept of *feasibility* of an extended alternative $(x, \theta) \in X \times \Theta$ as follows. If $\theta = \sigma$, then for any pair $(\boldsymbol{R}^N, S), (x, \theta)$ is defined to be feasible if and only if $x \in \sigma(\boldsymbol{R}^N, S)$. If $\theta = \gamma$, then for any pair $(\boldsymbol{R}^N, S), (x, \theta)$ is defined to be feasible if and only if $x \in g(\mathscr{E}(\boldsymbol{R}^N, \gamma), S)$, where $\mathscr{E}(\boldsymbol{R}^N, \gamma)$ denotes the set of equilibrium strategies of the non-cooperative game $(\boldsymbol{R}^N, \gamma)$. In either case, this concept of feasibility is in sharp contrast with the corresponding concept in the original Arrow framework, where an alternative x is defined to be feasible *without any reference to individual preferences and equilibrium concept* if and only if x belongs to the opportunity set S. This simple contrast alone should suffice to show that the extended framework cannot be reduced to the original Arrow framework through a simple reinterpretation of the basic terms and nothing else. For the sake of facilitating later reference, let Σ and Γ stand, respectively, for the set of all social choice correspondences and the set of all game forms. In what follows, it is assumed that $\Theta := \Sigma \cup \Gamma$.

At this juncture, we need to recall the classical concept of *procedural fairness*. Recollect that there are two contrasting approaches to the concept of fairness. The first

presupposes an explicit *outcome morality*, which allows us to define fair outcomes in the space of consequential outcomes. The concept of fair decision-making procedures is a derivative from the concept of fair outcomes: a decision-making procedure is fair if it never fails to bring about fair outcomes defined in terms of the specified outcome morality. This approach represents the viewpoint of *perfect procedural justice* in Rawl's [49, p.85] terminology, which bestows on procedures only the instrumental value. It should be clear that this approach to fairness permeates the traditional welfare economics and social choice theory.[23] In contrast, the second approach to fairness reverses the sequence of inference altogether and construes a consequential outcome to be fair if it is brought about via the application of a fair decision-making procedure. This approach embodies the viewpoint of *pure procedural justice* in the terminology of Rawls [49, pp.85-86], which bestows on procedures an intrinsic value of their own. The fairness of decision-making procedures being given logical priority over the fairness of their consequences, the procedural fairness must be defined in this approach without direct reference to consequential outcomes.

Capitalizing on the recent work of Gotoh *et al.* [26], let us exemplify an explicit analysis of pure procedural fairness in a simple production economy. Our economy consists of a fixed number of individuals $N := \{1, 2, \ldots, n\}$ ($2 \leq n < +\infty$), and it produces a single output (consumption good) from single input (labour). All individuals own the same amount of time x^*, where $0 < x^* < +\infty$. If individual $i \in N$ contributes x_i as labour time to cooperative production, what is left, i.e. $l_i := x^* - x_i$, can be consumed as his leisure. An objective environment of the economy, to be denoted by $\boldsymbol{e}$, is characterized by a profile of individual *utilization functions* $\boldsymbol{h}^N := (h_1, h_2, \ldots, h_n)$, which transform the assigned resources of each individual into the functionings of his own choice, a profile of individual *production skills* $\boldsymbol{s}^N := (s_1, s_2, \ldots, s_n)$, and a *production function* f, which maps the aggregate labour input $\Sigma_{i \in N} s_i x_i$ into the aggregate output y to be distributed among individuals in accordance with the fair allocation rule. Given an objective environment $\boldsymbol{e} := (\boldsymbol{h}^N, \boldsymbol{e}^N, f)$, let $Z(\boldsymbol{e})$ be the set of all feasible allocations under $\boldsymbol{e}$, which is defined as follows:

$$Z(\boldsymbol{e}) = \{\boldsymbol{z} = (z_1, z_2, \ldots, z_n) | z_i = (x^* - x_i, y_i) \text{ for all } i \in N \ \& \ f(\Sigma_{i \in N} s_i x_i) \geq \Sigma_{i \in N} y_i\}. \tag{3}$$

The role of a fair allocation rule is to choose a feasible allocation $\boldsymbol{z} \in Z(\boldsymbol{e})$, paying fair attention to what individuals desire. In contrast to the environmental characteristics, which the society cannot but accept, the fair allocation rule is for the society to choose. The social choice of fair allocation rule should be conducted on the basis of agreement among individuals in the *primordial stage of rule selection*, where no one is favoured either by natural fortunes or by social contingencies, and everyone cannot but express his ethical judgements about social desirability of an allocation rule *vis-à-vis* another rule on equal and impartial foooting. This scenario can be made analytically precise in terms of the social aggregation process or rule ψ, to be chris-

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[23]The examples of outcome morality, which are widely used in welfare economics, include, among many others, the Pareto efficiency and the no-envy concept of fairness à la Foley [22], Kolm [39], Suzumura [89; 90], Thomson and Varian [103] and Varian [105; 106].

tened a *social decision procedure* in what follows, which maps each profile of *individual social welfare functions* $\boldsymbol{Q}^N := (Q_1, Q_2, \ldots, Q_n)$ into a social social welfare function $Q := \psi(\boldsymbol{Q}^N)$. A crucial feature of individual and social social welfare functions thus defined is that they are formulated as functions of the objective environment $\boldsymbol{e}$ and the profile $\boldsymbol{R}^N := (R_1, R_2, \ldots, R_n)$ of subjective individual preference orderings defined over the space of functioning vectors in Sen's sense. The intended interpretation of this formulation is that, for each pair $(\boldsymbol{e}, \boldsymbol{R}^N), Q_i(\boldsymbol{e}, \boldsymbol{R}^N)$ and $Q(\boldsymbol{e}, \boldsymbol{R}^N)$ denote, respectively, individual i's "ethical" judgements and the corresponding social judgements over the extended alternatives: $(\boldsymbol{z}^1, \theta^1)Q_i(\boldsymbol{e}, \boldsymbol{R}^N)(\boldsymbol{z}^2, \theta^2)$ for $\boldsymbol{z}^1, \boldsymbol{z}^2 \in Z(\boldsymbol{e})$ and $\theta^1, \theta^2 \in \Theta$ means that, when the objective environment $\boldsymbol{e}$ and the subjective preference profile $\boldsymbol{R}^N$ prevail in the society, having a feasible allocation $\boldsymbol{z}^2$ through an allocation rule θ^1 is at least as good as having a feasible allocation $\boldsymbol{z}^2$ through an allocation rule θ^2 according to i's "ethical" judgements. Behind this formulation lies an assumption that all individuals know the class of potential objective environments and subjective preference profiles, but no individual knows which particular objective environment and subjective preference profile will materialize after the veil of ignorance prevailing in the primordial stage of rule selection is lifted. Once the relevant information about objective economic environment and subjective preference profile is revealed, the social welfare function identifies the procedurally fair allocation rule, which will enable us to identify the procedurally fair consequential outcomes in the Sen space of functionings.

This is a distinctly Rawlsian framework, but there are some essential divergences from Rawls's [49] own framework of the original position. The first major divergence is that, to focus properly on the relationship between individuals and good things in their possession, Rawls's own focus on the *primary social goods* is discarded and Sen's *functionings and capabilities* are invoked instead. In the second place, I invoke the *dual preference structure*, i.e. the individual's "subjective" preferences and his/her "ethical" preferences, à la Arrow [3, p.18] and Harsanyi [30]. An individual's "subjective" preference ordering guides his choice of functioning vectors from the capability assigned by the allocation rule, whereas the "ethical" preference ordering embodies his impartial and social view on what the fair allocation rule should be like, which is to be expressed in the primordial stage of rule selection. In the third place, the Rawlsian veil of ignorance is thick and Rawls supposed that there would be unanimous agreement among individuals in the primordial stage of rule selection, whereas our veil of ignorance is relatively thin and the social decision procedure for choosing a fair allocation rule is formulated in terms of the Arrovian constitution, which aggregates each profile of individual social welfare functions into a social social welfare function.

For lack of the Rawlsian index of primary social goods, the assigned role of which is to identify the least favoured individual in the society, and for my clear unwillingness to smuggle an index of functionings through the back door, I formulated the Rawlsian *difference principle* in terms of what I call the *common capability*, to be defined below. Given an objective environment $\boldsymbol{e}$ and a feasible allocation $\boldsymbol{z} := (z_1, z_2, \ldots, z_n) \in Z(\boldsymbol{e})$, let the capability of $i \in N$ be denoted by $C_i(z_i, \boldsymbol{e})$, which is nothing more than the set of all functioning vectors achievable by various utilizations of z_i through h_i. We may then

define the crucial concept of common capability under $(\boldsymbol{z}, \boldsymbol{e})$, where $\boldsymbol{z} \in Z(\boldsymbol{e})$, by

$$CC(\boldsymbol{z}, \boldsymbol{e}) := \bigcap_{i \in N} C_i(z_i, \boldsymbol{e}). \tag{4}$$

The meaning of the common capability is simple, and it has an intuitive appeal to those who are interested in distributive fairness. Given an objective environment $\boldsymbol{e}$, and given a feasible allocation $\boldsymbol{z} \in Z(\boldsymbol{e})$, individuals are minimally warranted of functioning vectors in the common capability no matter how they differ in their utilization functions. In this sense, if we choose an allocation rule appropriately so as to make the common capability as large as possible, we are in effect making the least favoured individual best off without identifying who is in fact least favoured in the society.

Recollect that Rawls's difference principle was preceded by the *first principle of justice*, so-called, which requires that equal basic liberties should be warranted for each and every individual. As an auxiliary step in formulating this principle in our concrete context, let us define the *contribution mechanism*, which is a game form having the following two crucial properties: (a) the strategy space of each and every individual is the set of labour time chosen by himself; (b)the outcome of the game is a feasible allocation such that each individual is thereby awarded leisure time of his own choice. Since each and every individual participating in this mechanism can enjoy equal freedom in choosing his own labour time and the mechanism remunerates him/her with leisure as he/she sees fit, this mechanism seems to capture Rawls's first principle of justice in our concrete context.

We are now ready to introduce three axioms on the class of social welfare functions which seem to incarnate the essence of Rawls's theory of justice. The first and second axioms correspond, respectively, to the first and second principles of justice à la Rawls. Recollect that, given an objective environment $\boldsymbol{e}$ and a subjective preference profile $\boldsymbol{R}^N := (R_1, R_2, \ldots, R_n)$, an extended alternative $(\boldsymbol{z}, \theta) \in Z(\boldsymbol{e}) \times \Theta$ is feasible for $(\boldsymbol{e}, \boldsymbol{R}^N)$ if (a) $\theta = \sigma$ and $\boldsymbol{z} \in \sigma(\boldsymbol{R}^N, Z(\boldsymbol{e}))$, or (b) $\theta = \gamma$ and $\boldsymbol{z} \in g(\mathscr{E}(\boldsymbol{R}^N, \gamma), Z(\boldsymbol{e}))$.

Priority of Contribution Mechanism: *Suppose that θ^1 is a contribution mechanism and θ^2 is not. Then, for any objective environment $\boldsymbol{e}$ and any subjective preference profile $\boldsymbol{R}^N$, if either $(\boldsymbol{z}^1, \theta^1)$ is feasible for $(\boldsymbol{e}, \boldsymbol{R}^N)$, or $(\boldsymbol{z}^2, \theta^2)$ is not feasible for $(\boldsymbol{e}, \boldsymbol{R}^N)$, $(\boldsymbol{z}^1, \theta^1)P(Q(\boldsymbol{e}, \boldsymbol{R}^N))(\boldsymbol{z}^2, \theta^2)$ must hold.*

Consistency with Capability Maximin: *Suppose that θ^1 is a contribution mechanism, or θ^2 is not. Then, for any objective environment $\boldsymbol{e}$, any subjective preference profile $\boldsymbol{R}^N$, and any extended alternatives $(\boldsymbol{z}^1, \theta^1), (\boldsymbol{z}^2, \theta^2) \in Z(\boldsymbol{e}) \times \Theta$ such that $(\boldsymbol{z}^1, \theta^1)$ is feasible for $(\boldsymbol{e}, \boldsymbol{R}^N)$, or $(\boldsymbol{z}^2, \theta^2)$ is not feasible for $(\boldsymbol{e}, \boldsymbol{R}^N)$.*

(α) $CC(\boldsymbol{z}^1, \boldsymbol{e}) \supset CC(\boldsymbol{z}^2, \boldsymbol{e})$ implies $(\boldsymbol{z}^1, \theta^1)Q(\boldsymbol{e}, \boldsymbol{R}^N)(\boldsymbol{z}^2, \theta^2)$; and
(β) $CC(\boldsymbol{z}^1, \boldsymbol{e}) \supset\supset CC(\boldsymbol{z}^2, \boldsymbol{e})$ implies $(\boldsymbol{z}^1, \theta^1)P(Q(\boldsymbol{e}, \boldsymbol{R}^N))(\boldsymbol{z}^2, \theta^2)$.

The third axiom requires that an extended social alternative, however desirable it may seem, will never gain priority over another feasible alternative if it fails to be feasible:

Priority of Feasible Extended Alternatives: *For any objective environment $\boldsymbol{e}$, any subjective preference profile $\boldsymbol{R}^N$ and any extended alternatives $(\boldsymbol{z}^1, \theta^1), (\boldsymbol{z}^2, \theta^2) \in Z(\boldsymbol{e}) \times \Theta$, if $(\boldsymbol{z}^1, \theta^1)$ is feasible for $(\boldsymbol{e}, \boldsymbol{R}^N)$ and $(\boldsymbol{z}^2, \theta^2)$ is not, then $(\boldsymbol{z}^1, \theta^1) P(Q(\boldsymbol{e}, \boldsymbol{R}^N))(\boldsymbol{z}^2, \theta^2)$.*

In view of the distinctly Rawlsian flavour of these axioms, let us say that a social welfare function Q is *Rawlsian* if and only if it satisfies the Priority of Contribution Mechanisms, the Consistency with Capability Maximin and the Priority of Feasible Extended Alternatives. Furthermore, let us say that a social decision procedure ψ is *Rawlsian* if and only if, for any profile $\boldsymbol{Q}^N = (Q_1, Q_2, \ldots, Q_n)$ of individual social welfare functions, $Q = \psi(\boldsymbol{R}^N)$ is a Rawlsian social welfare function.

Within this framework, Gotoh *et al.* [26] identified a set of conditions under which there exists a Rawlsian social decision procedure satisfying the Pareto principle and the non-dictatorship condition. The conditions in question are that there should exist at least one individual who behaves as a *non-deontologist* in the sense that his social welfare function always satisfies the Priority of Feasible Extended Alternatives, at least one individual who behaves as a *liberal* in the sense that his social welfare function always satisfies the Priority of Contribution Mechanisms, and at least one individual who behaves as a *capability-maximiner* in the sense that his social welfare function always satisfies the Consistency with Capability Maximin. Thus, the possibility of minimally democratic social decision procedure can be secured not simply by the clever mechanism design as such, but also by the individual attitudes towards criteria of procedural fairness. In other words, the ultimate guarantee of the successful performance of social decision procedure lies in the nature of individuals who make use of the designed social decision procedure. On reflection, this may sound as a truism, but the purpose of our exercise was to bring this simple message clearly home.

Although the viewpoint of pure procedural fairness as well as its background concept of the primordial stage of rule selection behind the veil of ignorance is highly abstract, it is too facile to conclude that this procedural viewpoint is irrelevant in the down-to-earth context of economic policy design and implementation. The primordial stage of rule selection is admittedly a theoretical fiction which will never be realized in our daily life. Nevertheless, we should emphasize that the importance of the primordial stage lies not in its descriptive realism, but in its ability "to make vivid to ourselves the restrictions that it seems reasonable to impose on arguments for principles of justice, and therefore on these principles themselves (Rawls [49, p.18])."

It is my own firm belief that exploration of the avenue of procedural fairness will prove fruitful not only in the context of a fair choice of allocation rules, but also in the context of a fair conferment of individual rights, as well as in many other realistic contexts, with policy implications including taxation, competition and welfare state policies. *Hic Rhodes, hic salta.*

8 Concluding Remarks

Instead of summarizing this long and contentious discussion issue by issue, I shall recapitulate its central message in brief. I have tried to identify the main culprit of the poverty of welfare economics, and have suggested that the informational basis of the mainline welfare economics and social choice theory, i.e. welfarist-consequentialism, seems to be largely responsible for the present state of welfare economics, which is far removed from Pigou's manifesto to the effect that the task of welfare economics is to prepare instruments for the bettering of human life. Even if people happen to agree that it is the informational parsimony of welfarist-consequentialism that is to be blamed, however, they may well disagree as to whether we should remain within the narrow boundary of consequentialism if the description of consequences is substantially enriched beyond welfarism, or whether we should even go beyond consequentialism as such. I have contended that there seem to exist at least two reasons, one based on the intrinsic value of the opportunity to choose and the other on the intrinsic value of the procedure for social choice, which seem to motivate us to go not only beyond welfarist-consequentialism, but also beyond consequentialism as such. Analytical frameworks were developed with the purpose of exploring the prospect of going beyond consequentialism, and the use and usefulness of such analytical frameworks were briefly exemplified in terms of some concrete economic analyses. More explicitly, an analytical framework capturing the intrinsic value of the opportunity to choose may be of help in making the contrast between consequentialism and non-consequentialism crystal-clear in terms of the simple characterizing axioms, whereas an analytical framework capturing the intrinsic value of the procedure for social choice may be of help in formulating and analysing the Rawlsian concept of pure procedural fairness.

I would be the first to admit that the analyses I have pursued in this and background papers are nothing more than the first few steps towards a fully fledged analytical framework which goes beyond consequentialism, and much depends on what these suggested avenues bring us in the future, especially in the applied arena with strong policy relevance. The modest purpose of this chapter would be served if I were to be successful in calling readers' attention to this ongoing research programme in pursuit of instruments for the bettering of human life

Appendix: A Backward Induction Proof of Arrow's Theorem

In order to improve accessibility of the central theorem of social choice theory, i.e. Arrow's general impossibility theorem, a short exposition and self-contained proof will be given in accordance with the following scenario. It is shown that there should exist an Arrovian constitution for a society with $n - 1$ members, where $3 \leq n < +\infty$, if there exists an Arrovian constitution for a society with n members. By the repeated use of this property, it is assured that there exists an Arrovian constitution for a society with 2 members if

there exists an Arrovian constitution for a society with 3 members. It is then shown that there exists no Arrovian constitution for a society with 2 members; hence there exists no Arrovian constitution for any society with any finite number of members.[24]

To facilitate our proof, let $I(n) := \{1, 2, \ldots, n\}$ be the set of individuals in the n-person society, where $2 \leq n < +\infty$. As in the main text, X denotes the set of all social states, where $3 \leq \#X$. A profile of individual preference orderings is denoted by $a = (R_1^a, R_2^a, \ldots, R_n^a)$, $b = (R_1^b, R_2^b, \ldots, R_n^b)$ and so on, and the set of all logically possible profiles will be denoted by A_n. A constitution for an n-person society is simply a function f_n, which maps each and every profile $a \in A_n$ into a social preference ordering $R^a = f_n(a)$. A constitution is called *Arrovian* if it satisfies the following three axioms:

Pareto: *For every $a \in A_n$ and every $x, y \in X$, if $xP_i^a y$ for all $i \in I(n)$, then $xP^a y$ must hold, where P_i^a is the strict preference corresponding to R_i^a, and P^a is the strict preference corresponding to $R^a = f_n(a)$.*

Independence: *If two profiles $a, b \in A_n$ coincide on $\{x, y\} \subset X$, then $R^a = f_n(a)$ and $R^b = f_n(b)$ coincide on $\{x, y\}$.*

Non-dictatorship: *There is no dictator for f_n; i.e. there exists no $d \in I(n)$ such that, for all $a \in A_n$ and all $x, y \in X, xP_d^a y$ implies $xP^a y$, where $R^a = f_n(a)$.*

The following two lemmas are crucial for our proof of Arrow's theorem.

Dictator Lemma: *Let f_n be a constitution satisfying Pareto and Independence, where $2 \leq n < +\infty$. If there exists $i \in I(n)$, $x, y \in X$, and $a \in A_n$ such that $xP_i^a y, (\forall j \in I(n) \setminus \{i\} : yP_j^a x)$ and $xP^a y$, where $R^a = f_n(a)$, then i is a dictator for f_n.*

Proof: Let $\{z, w\}$ be a distinct pair of social states such that $\{x, y\} \cap \{z, w\} = \emptyset$. The case where $\{x, y\} \cap \{z, w\} \neq \emptyset$ can be treated similarly. Let $b \in A_n$ be such that $zP_i^b xP_i^b yP_i^b w$ and, for all $j \in I(n) \setminus \{i\}$, $zP_j^b x$, $yP_j^b x$ and $yP_j^b w$. There is no constraint on the ranking of z *vis-à-vis* w for each and every $j \in I(n) \setminus \{i\}$. Since a and b coincide on $\{x, y\}$ and $xP^a y$, we have $xP^b y$ by virtue of independence, where $R^b = f_n(b)$, whereas Parero implies that $zP^b x$ and $yP^b w$. In view of the transitivity of R^b, it follows that $zP^b w$ holds. Since i is the only person who prefers z to w at b and there is no restriction whatsoever on R_j^b for all $j \in I(n) \setminus \{i\}$ over $\{z, w\}$, we may invoke independence once again and conclude that i is a dictator for f_n. ∎

Reduction Lemma: *If an Arrovian constitution f_n exists, where $3 \leq n < +\infty$, then there exists an Arrovian constitution f_{n-1}.*

Proof: Let R^* be the universal indifference relation on X, i.e. $R^* := X \times X$, and define, for every $a \in A_{n-1}, f_{n-1}(a) := f_n(a, R^*)$. By definition, (a, R^*) is a profile for an n-person society in which each individual $i \in I(n-1)$ expresses R_i^a, whereas n expresses

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[24]The idea of this proof was originally explored in Suzumura [93]; however, the present version of the proof is slightly simpler.

R^*, i.e. indifference over all pairs of social states. We show that f_{n-1} is an Arrovian constitution. It is clear that f_{n-1} inherits Independence from f_n.

To show that f_{n-1} satisfies Non-dictatorship, suppose to the contrary that $d \in I(n-1)$ is the dictator for f_{n-1}. Let $x, y \in X$ and $a \in A_{n-1}$ be such that $xP_d^a y$ and $yP_j^a x$ for all $j \in I(n-1) \setminus \{d\}$. Since d is the dictator for f_{n-1}, $xP^a y$ holds, where $R^a = f_{n-1}(a) = f_n(a, R^*)$. Let $\{z, w\}$ be a disjoint pair of social states such that $\{x, y\} \cap \{z, w\} = \emptyset$. The case where $\{x, y\} \cap \{z, w\} \neq \emptyset$ can be treated similarly. Let $b \in A_n$ be such that $xP_d^b y P_d^b z P_d^b w$, $yP_j^b z P_j^b w P_j^b x$ for all $j \in I(n) \setminus \{d, n\}$ and $wP_n^b x I_n^b y P_n^b z$, where I_n^b denotes the indifference relation corresponding to R_n^b. By virtue of Independence, $xP^b y$ holds, whereas Pareto implies $yP^b z$, so that $xP^b z$ must hold by virtue of the transitivity of $R^b = f_n(b)$ R^b being complete, either $xP^b w$ or $wR^b x$ must be true. In the former case, the Dictator Lemma tells us that d is the dictator for f_n, whereas the latter case implies $wP^b z$, so that the Dictator Lemma tells us that n is the dictator for f_n. Thus, there can exist no dictator f_{n-1}.

To show that f_{n-1} satisfies Pareto, suppose that $x, y \in X$ and $a \in A_{n-1}$ are such that $xP_i^a y$ for all $i \in I(n-1)$ and $yR^a x$ holds, where $R^a = f_{n-1}(a) = f_n(a, R^*)$. Take any $z \in X \setminus \{x, y\}$ and let $b \in A_n$ be such that $xP_i^b z P_i^b y$ for all $i \in I(n-1)$ and $zP_n^b x I_n^b y$. By Independence, we have $yR^b x$, whereas Pareto on f_n, entails $zP^b y$, so that $zP^b x$ holds by transitivity of $R^b = f_n(b)$. Then the Dictator Lemma tells us that n is the dictator f_n, a contradiction. Thus f_{n-1} must in fact satisfy Pareto. ∎

Arrow's General Possibility Theorem: *There exists no Arrovian constitution f_n, where $2 \leq n < +\infty$.*

Proof. If there exists an Arrovian constitution f_n, *where* $n \geq 3$, we may invoke the Reduction Lemma repeatedly to conclude that there exists a sequence of Arrovian constitutions $f_n, f_{n-1}, \ldots, f_2$. Let $x, y \in X$ and $a \in A_2$ be such that $xP_1^a y$ and $yP_2^a x$. $R = f_2(a)$ being complete, either $xR^a y$ or $yP^a x$ holds. In the latter case, 2 is the dictator for f_2 by the Dictator Lemma. In the former case, let $z \in X \setminus \{x, y\}$ and $b \in A_2$ be such that $xP_1^b y P_1^b z$ and $yP_2^b z P_2^b x$. Then Independence and Pareto imply, respectively, that $xR^b y$ and $yP^b z$, which yield $xP^b z$ by virtue of the transitivity of $R^b = f_2(b)$, so that 1 is the dictator for f_2 by the Dictator Lemma. Therefore there exists no Arrovian constitutions f_2; hence there exist no Arrovian constitutions $f_3, \ldots, f_n$. ∎

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Chapter 27
An Interview with Paul Samuelson: Welfare Economics, "Old" and "New", and Social Choice Theory[*]

1 Introduction

Social Choice and Welfare has a tradition of interviewing pioneering contributors to welfare economics and social choice theory to keep their recollections on the formative stages of their seminal work, their current views on the past and present states of the art, and their perspectives on the agendas to be pursued in this branch of normative economics officially on record. Professor Paul Samuelson has been on the list of potential scholars to be interviewed for a long time in view of his enormously influential contributions to economics in general, and theoretical welfare economics in particular. Indeed, the purpose of these interviews would not be served unless and until we could interview a scholar "who before 1938 knew *all* the relevant literature on welfare economics and just could not make coherent sense of it," and is willing "to set the record straight as only a living witness and participant can [Samuelson (1981, p.223)]." In November-December 2000, this long overdue interview with Professor Samuelson finally took place in his office at MIT. It started from the list of preliminary questions I had submitted to him beforehand. Needless to say, he had much more to offer, which coloured and enriched this interview. To facilitate the readers' better appreciation of the rich information provided by Professor Samuelson, I added a few footnotes and provided an extensive list of references so as to link Professor Samuelson's recollections with what the readers could usefully learn by reading the existing literature. It is in similar vein that I inserted some relevant passages from Professor Samuelson's and others' past writings into my questions to him so as to place this interview in better perspective. It is hoped that this added material does not distract the readers' attention from the real and novel gems contained in this interview.

2 Interview

KS (Kotaro Suzumura): Thank you very much for giving me this opportunity to interview you on behalf of the Society for Social Choice and Welfare. In Chapter   of your *Foundations of Economic Analysis*, you have given a brief, yet fairly comprehensive overview of the whole area of welfare economics at the time of your writing. At the risk of a slight overlap with what you have already explained there, let me begin by asking you about Arthur Pigou and his "old" welfare economics, and the subsequent advent of the "new" welfare economics.

2.1 On Pigou's "Old" Welfare Economics

KS: Several people including your former teacher, Joseph Schumpeter, in his *History of Economic Analysis*, as well as yourself in Chapter   of the *Foundations of Economic Analysis* traced back the origin of welfare economics far beyond Arthur Pigou's *Economics of Welfare*. However, John Hicks was technically right, wasn't he, when he asserted that "[if welfare economics] existed before Pigou, it must ... have been called something else [Hicks (1975, p.307)]." What is your current view on the status of Pigou in welfare economics in general, and his "old" welfare economics, so-called, in particular?

PS (Paul Samuelson): Yes, but first, let me say this. Since you referred to Chapter   of the *Foundations of Economic Analysis*, you should be alerted to the fact that I prepared an enlarged edition of the *Foundations* in 1983. I did not change the text of the original edition, but I added the Introduction to the Enlarged Edition on the development since the original edition. Mostly, I do not consciously feel changed in my views on welfare economics after the 1938 clarification of the subject by Abram Bergson, but a reader who read Chapter   should perhaps also read the corresponding part of the Introduction to the Enlarged Edition, pp.xxi-xxiv, because I remark specifically there on the change in my thinking on welfare economics due to John Harsanyi's 1955 article published in the *Journal of Political Economy*.

Let me now answer your question. I understand why Hicks made that sentence, but I think it is not a very useful or accurate sentence. We take nothing away from Pigou when we remember that he was a culmination of a long tradition called "moral philosophy." It was this long tradition that Pigou first crystallized into the *Wealth and Welfare* in 1912, and then into the *Economics of Welfare* in 1920.

I had a great admiration for Pigou. I thought that, in many ways, he was not only a faithful follower of Alfred Marshall, but he was also a more fertile developer of the Marshallian tradition than Marshall himself. He was too faithful to Marshall in his language, and he never disagreed with Marshall. A great philosopher, Alfred North Whitehead, came to Harvard in 1924 after retiring from the University of London. This is long after Russell and Whitehead's *Principia Mathematica*. Whitehead said to me: "Don't you think that Pigou was an overrated economist? Wasn't Foxwell a better man?" Herbert Foxwell had been the candidate who was expected to succeed Marshall's chair when Marshall retired. But Marshall manipulated and contrived that the 30 year old Pigou receive the chair. Since I am an honest man, I said to Whitehead: "No, I think Pigou was a much more important economist than Foxwell."[1]

I think Pigou was a very fertile economist. A sign of this was his assigning Frank Ramsey the task of solving the 1927 problem of second-best optimal excise taxes. He of course worked

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[1] Those who are interested in Herbert Foxwell's life, work and his relationship with Alfred Marshall are referred to Foxwell (1939), Groenewegen (1995, pp.622-627 & pp.670-679) and Keynes (1936).

to a very old age, but I am much older than he was in his old age. I knew the *Economics of Welfare* well, including a fundamental mistake in it, which was not corrected until about the third or fourth edition. The mistake, which was common to Marshall and Pigou, was that Pigou believed that increasing cost industries should be taxed and the tax revenue collected should be used as a transfer subsidy to constant cost industries. He might have added: "... and to decreasing cost industries." However, decreasing cost industries were never handled properly by Marshall. Indeed, they are incompatible with laissez-faire competition and Marshall knew it. Thus, most of the thoughts which were worked out by my teachers' generation and by my own generation were in Marshall. He actually knew about it in 1890. John Neville Keynes, the logician and the father of John Maynard Keynes, was a friend of Marshall and a kind of an assistant, who warned Marshall: "Your consumers' surplus is wrong, and you will be picked on." But, instead of Marshall's going to work and going beyond his at best approximation under certain conditions, he never did do it properly.

I think Marshall was a great economist, but he was a potentially much greater economist than he actually was. It was not that he was lazy, but his health was not good, and he worked in miniature. Early on, in 1874, when Marshall deduced that alternative multiple equilibria of supply and demand could occur, he noted that this rebutted any notion that *laissez fare* markets could be relied on to achieve maximal interpersonal well being.

Pigou's mistake was pointed out by Allyn Young, then at Cornell, who was the teacher both of Edward Chamberlin and Frank Knight, in his Book Review of the *Wealth and Welfare* published in *Quarterly Journal of Economics*. He pointed out that, in modern language, it is Pareto optimal for rents to rise in an increasing cost industry, and that should be built into the price that is paid under laissez-faire, because that is the socially optimal way of organizing the allocation of resources. Pigou and Marshall got confused on this, because they brought in the externality argument. Now externality is very important — the whole theory of public goods, I guess, is a case of externalities proper. But, in the absence of any externalities, if you have the law of diminishing returns, let variable labor be applied to fixed land, and when there is expansion of the demand for good vineyard wine, that raises the rent. If the marginal cost is rising, that should be built into the laissez-faire price.

Somewhat redundantly, Frank Knight made essentially the same point in his important article, "Some Fallacies in the Interpretation of Social Costs," published in *Quarterly Journal of Economics*. Dennis Robertson, a good Cambridge economist, also made essentially the same point independently in 1924. Isn't it interesting that Pigou never had corrected it until maybe the 1932 edition? I looked for Allyn Young's name in the 1932 edition. It is there, but not in this connection, but in connection with the discussion of depreciation, which is irrelevant for our present purpose. Isn't it interesting that this important and world famous scholar did not say: "I made a mistake. I corrected it, but I owe thanks to Allyn Young, and perhaps to Frank Knight and to Dennis Robertson."

Pigou was a much better expositor of Marshall's welfare economics, which was implicit in Marshall, than Marshall himself ever was. Pigou had a mathematical structure in his mind, but following Marshall's instructions, he kept it concealed. Also, Pigou did not attempt to go deeply into solving the troublesome problems of fundamentals.

KS: Could you please give us an example?

PS: For example, he says as a recurring theme that if there are very poor people in a market society who do not have the basic necessities of life, then it is manifestly, obviously desirable

to make transfers from the more affluent people to the poor people. He has not, however, provided the kind of argument that Francis Edgeworth would have given. Like most classical economists, Edgeworth, a neo-classical economist, was an environmentalist who did not believe in the Darwinian superiority of certain people over others. John Stuart Mill, who had the highest IQ ever recorded, said in his autobiography: "If you had James Mill for your father-trainer, you would also have a high IQ." Thus, everybody has the same potentiality, and it is only the environment that makes them different. Likewise, Edgeworth would have shamelessly believed he could measure utility by the Benthamite procedure of measuring "minimum sensible" jolts of just-recognizable increments of pleasure. This is the theory of sensation like the Weber-Fechner Law. So, you draw the utility curve for each person, which is concave embodying the law of diminishing marginal utility. Thus, the extra dollar you get when you have 100,000 dollars of income is less important than the extra dollar you get when you have 10,000 dollars of income. I think that there is a layman's tendency to believe something like that. Most of the sharp solutions in classical welfare economics, or moral philosophy, are for special "Santa Claus" cases of symmetry among individuals. Take, for example, Kant's categorical imperative, or the golden rule in the New Testament: "Do unto others as you would have them do unto you." If you do not believe that human beings are the same, you may have to follow George Bernard Shaw and say that it is not right. Instead, you should say: "Don't do unto your neighbours what you would have them do unto you. Their tastes may be different from yours." The moment you do not have the same commensurable utility there is an end to the century-old welfare economics or moral philosophy. Thomas Nixon Carver as an over-age graduate student wrote around 1900 that: "You should equalize the marginal utility of the dollar between rich man and poor man by transfers through progressive taxation." Of course, he said: "I am abstracting from incentive distortions that would take place." Some background like this is, I think, implicit in Pigou. But he keeps it under the carpet rather than arguing it out.

2.2   On Robbins' Criticism of the "Old" Welfare Economics

KS: You have identified in your 1981 Bergson Festschrift article that there exist two distinct schools of the "new" welfare economics. One school is based on the *compensation principles* developed by Nicholas Kaldor, John Hicks, Tibor Scitovsky, Paul Samuelson and others[2], and the other school is based on the seminal concept of the *social welfare function* due to Abram Bergson and Paul Samuelson. The evolution of both schools was preceded by a harsh methodological criticism by Lionel Robbins against the epistemological basis of Pigou's "old" welfare economics. Would you please give us your personal recollection of the formative days of the "new" welfare economics?

PS: I think Lionel Robbins's essay in 1932 was not only important for my thinking, but was important for the whole profession. I cannot autobiographically relate the influence of Gunnar Myrdal's book, *The Political Element in the Development of Economic Theory*, which was originally published in Swedish in 1930. It was not available to us, but I think there were some quasi-nihilistic views in Myrdal about the conventional welfare economics, which were similar

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[2] [**Paul Samuelson's footnote**] Long before these writers, J. S. Mill had recognized that the winners from free trade had (transferable) gains larger than the losings of the losers. Implicit in what today we call "Pareto optimality" is a parallel theme, and two decades before Pareto Edgeworth's 1881 "contract curve" construction shows that he understood when deadweight loss did or did not negate the ability to "make compensation." Already prior to 1930, my teacher Jacob Viner had anticipated the Kaldor-Scitovsky notions.

to those in Robbins. These views were not just on Pigou's "old" welfare economics, but on moral philosophy which predated Pigou's 1912 work. Henry Sidgwick would be an important example, and, of course, Jeremy Bentham and John Stuart Mill. But to the lay person, it seems natural that the same loaf of bread is less significant when you already have a hundred loafs of bread than when you have ten loaves of bread. You see it in the Old Testament when King David or somebody has been discussed. One of the prophets gives a parable. There was a King who invited a poor shepherd to dinner. They killed a lamb and made the meat for the dinner. The poor shepherd had only one lamb, and the King had a superfluously large number of lambs. In the course of the dinner, the King said: "By the way, what we are eating is your lamb." The fact that the story could just be told in that way means that every reader could understand that it was a terrible thing to do. That is what I mean by the "old" welfare economics. It can be utilitarian; it can even be hedonistic; it can be additively utilitarian; but importantly interpersonal commensurability is somehow taken for granted. Robbins was not the first to be critical of this tradition, but he was very important as he wrote beautifully, and the book was short. This is the reason why, I believe, the good element of Robbins's book had a very significant influence.

KS: What precisely do you mean by the "good element of Robbins's book"?

PS: It is that you cannot deduce and test norms by means of science, by measurement of the elasticity of demand, by any other means of the objective observations and model buildings in empirical science. You must put in a normative axiom to get out a normative theorem. This position of Robbins really goes back at least to the philosopher, David Hume. I am separating in Robbins's book a bad element from this good element. A different "bad element" was first edition Robbins's "Austrian-like" belief in *a priori* "truths".

KS: Abram Bergson and yourself were in basic agreement with this good element of Robbins's book, weren't you?

PS: Yes. But, you see, most economists resisted Robbins, because they thought there was nothing left by way of policy prescription, although Robbins never quite said that. He said: "As a scientist, I cannot tell you this. But, as a voter, I can tell you which way *I* would go." This view can be traced back to David Hume, who was a great reductionist. I was ripe for that, because when I was an undergraduate student at the University of Chicago and studying sociology, I had to read William Sumner's *Folkways*. Sumner was a very conservative economist at Yale, but he was a great sociologist. He studied all cultures and showed how what was right in one culture was wrong in another and you could not prove by the methods of science which of them was correct.

KS: Could you please tell us about the "bad element of Robbins's book" in more detail?

PS: The bad element of Robbins's book was that it was more Austrian than Ludwig Mises and Friedrich Hayek. Like Carl Menger and especially Ludwig Mises, Robbins believed in a priori thinking; you could solve all problems of the world in economics by introspection; economics is a deductive science; the deductive laws are much more powerful than any empirical laws and they are independent of almost anything empirical. I was taught something like that Austrian view at the University of Chicago. I was a very young student, but I was a good student. Aaron

Director was my first teacher. He is the only man in the world who could truthfully speak of "my radical brother-in-law, Milton Friedman", because Milton's wife, Rose Director Friedman, is Aaron's young sister. Aaron believed that Hayek could reason out the business cycle in his 1931 book, *Prices and Production*, without any command of any important facts about the business cycle. The first edition of Robbins' essay is full of that view. It was modified a little bit later, but we should always attach importance to the first edition of anything, because in the history of ideas that is pragmatically the simplification which carries the greatest weight.

KS: In your 1981 Bergson Festschrift article, you described the initial thrust of Robbins's criticism as follows: "When Robbins sang out that the emperor had no clothes — that you could not prove or test by any empirical observations of objective science the normative validity of comparisons between different persons' utilities — suddenly all his generation of economists felt themselves to be naked in a cold world. Most of them had come into economics seeking the good. To learn in midlife that theirs was only the craft of a plumber, dentist, or cost accountant was a sad shock."

Could you please cite a few examples of economists who went through this period of turmoil ?

PS: Take, for example, Abba Lerner, who was not that mathematical, but a very clear thinker and really very new in economics. He was 30 years old, I think, when he went bankrupt in the hat business. He wanted to know why he went bankrupt, so he went to the London School of Economics, which was a kind of a nightschool at that time mostly. He was a student of John Hicks, and he wanted to learn about Marxism, because he thought he could learn the necessary lesson there. Hicks has told this in some autobiographical writing. Lerner was unconservative in political philosophy, definitely not a libertarian, but, of course, he was not a Marxist. He became very anti-Marxist as soon as he understood Marx. I predicted that he would end up in the arms of Hayek, which proved in a degree true. But, still, he had social sympathies. I don't think John Hicks had any particular social sympathies. He came from the above average class structure in Britain, but not from the elite aristocratic structure as, say, Ian Little did. But, he really talked, like Frank Knight, much more in terms of his own personal economics.

Another example is Simon Kuznets. Interestingly enough, when the Nobel prize was first granted, at MIT we developed an informal custom of having each Nobel prize winner come to lunch and speak personally about his early history, but we were unable to continue the custom. Of course, the first two prize winners were Europeans, who weren't available. After me came Simon Kuznets, who studied economics first in Russia before the revolution, because he was interested in the Jewish problem and he thought economics must have a fundamental answer to it. He thought Marxism might give the needed fundamental answer, which is why he went to a commercial university instead of a classical university. But later he changed his opinion. Kuznets, like his contemporary expatriate Wassily Leontief, when I first knew them, seemed burned out by early experiences and eschewed politics and policy diagnoses. Only in later life did they become more liberal in the American sense. Jacob Marschak, a similar Menshevik, by contrast was uniformly interested in altruistic "good causes."

Likewise, in those days, many scholars started their study of economics in search of the good. For them, Robbins's criticism brought about a sad shock.

2.3   On the Advent of the "New" Welfare Economics

KS: The first step in the attempt to reconstruct welfare economics on the basis of ordinal and interpersonally non-comparable utilities in active response to Robbins's criticism was to develop the concept of "Pareto optimality" and establish the so-called "fundamental theorems of welfare economics". Could you please explain how these crucial steps were taken in the first place?

PS: When I was a student at the University of Chicago, where I was a direct student of Jacob Viner in the classroom, and an indirect student of Frank Knight, I could not learn why price should equal marginal cost. Even when I got to Harvard in 1935, I went around asking everybody: "What is the proof that this is so?" Of course, I did not know the 1892-1893 work of Vilfredo Pareto in which he essentially shows that a perfectly competitive equation system gives you the necessary and sufficient condition, not for ethical optimality — he was always a little slippery on that problem — but for what came to be called Pareto optimality so that there is no avoidable deadweight loss. I think I had most to learn from Abba Lerner, although I, of course, worked it out for myself. If I had had perfect teachers, they would have known the Pareto work; they would have known Enrico Barone and what you might call the fundamental theorems of welfare economics that the conditions for Pareto optimality would be exactly realized by competitive arbitrage. Before Bergson, Lerner-Hicks-Hotelling-Kaldor-Scitovsky insufficiently understood that the full set of Pareto optimality conditions constituted an *incomplete* set of conditions for ethical maximization. You must ask the right questions and make the right distinctions. All of my teachers believed there was something to Adam Smith's invisible hand — that each person pursuing their self interest would, by some miraculous action of the invisible hand, be led to contrive in some vague sense the best interest of all. However, none of them could explain properly what the truth and falsity was in that position. I would say that if I had been a bright student in 1894 and read Pareto's Italian journal article, I would have understood what I now understand to be the germ of truth in the invisible hand argument. All it refers to is the avoidance of deadweight loss. Here is where my association with Abram Bergson becomes relevant.

KS: How did you come to know Bergson to begin with, and how did you collaborate with him in developing the "new" welfare economics and the concept of social welfare functions?

PS: Bergson was my contemporary in the Harvard Graduate School. He was two years ahead of me. We were both puzzled by Pareto's writings. Bergson would read to me a passage from Pareto and ask: "What do you think is being said there?" What really puzzled us was that he seems to use a singular form for what is generally an infinitely broad class. Indeed, there isn't a Pareto optimal point; there is a whole continuum of uncountable infinity of Pareto optimal points which is what makes it a necessary condition and not a complete sufficient condition.

I was not an independent co-author of Abram Bergson's 1938 paper published under his birth name, Abram Burk, which caused some confusion in the literature. I was a helpful midwife in helping to pull the baby out. I felt once the baby was pulled out, I had reached perfect clarification of the so-called "new" welfare economics.

KS: Who, in your opinion, were the most instrumental scholars in the evolution of the "new" welfare economics?

PS: The process of publishing the "new" welfare economics was not a well-organized, logical, and systematic thing at all. The names of the people who, at the minimum, would be involved include the following: Abba Lerner who, I think, is most important, John Hicks, Nicholas Kaldor, Tibor Scitovsky, Harold Hotelling, Ragnar Frisch, ... Lerner never claimed that he was discovering a new principle, but Kaldor, Hicks and others did. We should expand our list by counting in Ian Little. There was also a pupil of Hicks at Manchester, Alexander Henderson, who perceived the following question: "Suppose that there are three necessary conditions for Pareto optimality. Is it true that satisfying two out of these three conditions and not satisfying the third is always better than satisfying one of them and not satisfying the other two?" Now, if you count three apples, they are greater than two apples, and two apples are greater than one apple. It is also true that, in some sense, all of the three necessary conditions being satisfied is better than only two necessary conditions being satisfied. Yet it is *not* true in general that the more necessary conditions you satisfy, the better you always are.

KS: That is one of your concluding observations in Chapter   of the *Foundations of Economic Analysis*.

PS: Could have been, and Ian Little had that also.

KS: To identify the conditions for Pareto optimality is one thing, and to go beyond Pareto optimality by introducing the possibility of hypothetical compensation payments between gainers and losers, thereby expanding the reach of the Pareto principle to the situations involving interpersonal conflicts, is a different matter altogether. On reflection, what is your current verdict on the "new" welfare economics of the compensationist school?

PS: I think on the whole the "new" welfare economics of Kaldor, Hicks, Lerner and Scitovsky was overrated. In the first place, you know already you can find it in John Stuart Mill who discusses something like free trade. He in effect says that free trade may help some people, and hurt some other people, but the gainers would be able to compensate the losers. Thus, the "new" welfare economics of the compensationist school is not really that new. In the second place, there is a great ambiguity as to whether the fact that gainers would be capable of compensating the losers, yet do not actually pay compensations, has any significance.

I will give you an example. In 1959, my late wife and I made a trip to Japan at the invitation of the *Japan Economic Newspaper* (*Nihon Keizai Shimbun*). It was a wonderful trip — unbelievable. The head of the newspaper, Mr. Jiro Enjoji, took three weeks out of his busy life to travel all over Japan with us. Shigeto Tsuru and his wife were also with us. Shigeto was the tandem translator of my lectures which I gave in Tokyo, Nagoya, Osaka and Fukuoka.

KS: Shigeto Tsuru is your old friend from your Harvard days.

PS: That is right. During the war, Shigeto was evacuated to Japan. When he had to dispose of his books, I was the lucky recipient of his copy of the 1932 edition of Pigou's *Economics of Welfare*, which I read carefully.

At the time of our travel, Carl Christ, who was a Visiting Professor at the University of Tokyo for a year, told me that he was shocked by the rent controls in Japan. His advice was that they should be abolished. People said: "Well, yes, but it is not appropriate. There are a lot of poor people that will be very much hurt. A lot of old people will be very much hurt too."

Christ said: "No problem. Just compensate them." Now, there was no chance in the world that any Japanese Diet, or any post-MacArthur occupation, would have the ability to compensate, or would have the effective political desire ever to do it. So, you could not pin people down as if there was something important that could be done. But nobody took seriously what could be done. Lerner always taught us about ideal lump-sum taxes. However, there were very grave game-theoretical difficulties with lump-sum taxes, because the reason you ought to give people a lump-sum transfer is that they are poor, but as soon as the poor realize you are giving it to them because they are poor, they incur a blunting in their desire to work. This is a moral hazard problem. If, on the other hand, the potential compensation of the losers by the gainers remains a purely theoretical possibility, those who suffered losses remain unsalvaged. Thus, to say that lump-sum taxes could in principle solve the problem is not to say that they would actually solve it.

KS: Before turning to the core concept of the Bergson-Samuelson social welfare function and the "new" welfare economics based on it, I would like to ask you to clarify one specific point on the concept and nomenclature of Pareto optimality. From what you have described so far, I understand that Bergson and yourself had a crystal-clear idea about what came to be known as Pareto optimality. However, neither the 1938 Bergson article, nor the 1947 *Foundations of Economic Analysis*, made any explicit mention of the name of Pareto optimality. As a matter of fact, in your 1981 Bergson Festschrift article, you have written that "[t]he *necessary condition(s)* for an optimum, that such a *universal* improvement *not* be possible, Ian Little came in 1950 to call 'Pareto optimality,' a felicitous and useful coinage." May I take it that the concept of Pareto optimality was clearly grasped by Abram Bergson and Paul Samuelson, and maybe more vaguely by Abba Lerner and John Hicks, but the nomenclature of Pareto optimality was first introduced by Ian Little?

PS: I'd guess that the person who put the word in print is indeed Ian Little. Somebody told me that he made a study and could not find the word, Pareto optimality, in the literature. I was very surprised, because from the beginning that is the way Bergson and myself talked about it.

2.4 On the Concept of the Bergson-Samuelson Social Welfare Function

KS: Let us proceed to the crucial concept of the Bergson-Samuelson social welfare function. It is presumably to go beyond Pareto optimality, and spell out the exact necessary and sufficient conditions for ethical optimality that Bergson and Samuelson introduced the extraneous ethical norm in the form of a social welfare function. Could you please clarify the motivation behind the introduction of a social welfare function? Would you also explain how this concept was conceived in the first place?

PS: You cannot obtain an ethical result without already putting an ethical premise in the proposition from outside. This is already what 1950 Arrow would call an "imposition." Bergson laid out how the different forms of ethical premises could be implemented through the concept of social welfare functions, and how these different norms could reflect themselves in the results you would obtain. Of course, you could immediately understand how Pareto optimality would fit into the Individualistic Bergson Social Welfare Functions because, if you took the necessary conditions that would survive no matter how you changed the interpersonal weightings, what you would have left would be nothing other than the necessary conditions for Pareto optimality,

which by themselves do fall short of achieving any ethical maximum. That is still true only under certain circumstances; you need to rule out altruism and envy or sadism or masochism. Bergson's Individualistic Social Welfare Function, by definition, must have the mathematical property of "weak separability." Without this, there may indeed exist no meaningful Pareto optimal conditions. Let me give some partial examples. Start with Crusoe and Friday. Let neither have transitive preferences that satisfy any integrability conditions. Then never can you assert that letting them trade freely and spontaneously will "end both of them better off." "Better off-ness" is undefined and undefinable even for a one-individual universe! Add the further complication that corn and cloth both can change over from being "good goods" to being "bad goods." Then most of Lerner-like production-efficiency conditions cease to be capable of meaningful applications. All the 1954 alleged Pareto-optimal conditions that I derived for the "Wicksell-Lindahl public-good problem" evaporate into thin air. Buddha or Saint Francis or Aristotle or Bergson can still *impose* on every state of the world an ethical transitive ordering. But of course theirs could be four *contradictory* ethical norming.

I recall that, at the NYU Sidney Hook conference on Philosophy and Economics, Kenneth Arrow startled the philosophers present (and me, too) when he declared something like: "Surely when all the individuals agree that situation A is better than situation B, any admissible ethical system must not second guess their desires." I don't recall Bergson as ever going to that extreme, even though to make sense of well known Pareto optimality conditions he did include in his admissible Social Welfare Functions the weakly-separable species in which those conditions did make sense. But never did he make the following common error: If situation α is Pareto optimal and β is not, then always society should prefer α to β. And when asked to also contemplate situation γ which like α is Pareto optimal, never did he pronounce on how one could *deduce* which of α and γ was the better ethically.

KS: In the provocative 1976 article devoted to the Paretian heritage, John Chipman (1976, pp.66-67 and pp.109-110) claimed that Vilfredo Pareto had already "essentially developed the concept of a social welfare function" prior to its inception by Bergson and Samuelson. What do you think of this claim?

PS: I think that Chipman attributes the concept of a social welfare function to the 1913 article of Pareto. I also seem to remember that Kenneth Arrow may have had a similar viewpoint.

KS: Yes, Arrow is in fact of that belief, which I had an opportunity to confirm.

PS: I don't want to be definite in my reaction to that query. However, I should say that as a person with great but guarded admiration for Pareto, I think he was often, at least momentarily, confused, and he was simultaneously at different levels of his stages of thinking. You must remember that Pareto never had any students really. He lectured to lawyers. He had disciples, but he didn't have the advantage of people like us today, where you try out your ideas on twenty different equals. He had no equals; that made him uneven and a little eccentric. But, just like Joseph Schumpeter, Pareto professed great self-confidence, sureness, and disconcernment towards everybody else's ideas. Chipman argues that when Pareto introduced the word, *ophelimity*, he did it partly to get rid of various hedonistic and other connotations. But, Chipman believes when all is said and done, he did have a notion of *preferred* cardinal utility and believed that everybody had that. Well, if that is so, it is a kind of confusion, because he gives no rational grounds for preferring one cardinal-numbering over another. Pareto's discussion on

complementarity was uneven. Mathematicians must be very exact, but late in the day he was using the sign of the cross derivatives of cardinal utility. You know, the moment you transform cardinal utility, you can change the sign of the cross derivatives.

Let me connect this up with the social welfare function. I had to read Pareto in the Italian original, and my command of Italian was very poor. Nevertheless, I had a feeling when I read the 1913 article — I say this with diffidence — that he may momentarily have had the notion of an imposed-from-outside social welfare function which itself would not be different from Bergson's one. I don't think that subtracts anything from Bergson's originality. But I thought I detected in it also a positivistic real *political* function of certain elites in any society. Each one of these elites has different power, like the powers of father and mother, oldest son, younger sons in a family. If you try to get a demand function for the family, you must combine these different influences. Generally speaking, when you do that, you don't get an integrable function. To me, that was what Pareto was talking about in the 1913 article.

The same puzzle comes about in my 1956 *Quarterly Journal of Economics* article on social indifference curves. A key concept in this article is that of the "just" society. It is the society in which, somehow in the background, lump-sum payments have been made so as to keep maximizing a collective (Bergson) social welfare function that is not too distinct from weak separability. Of course, it is just a thought experiment. It would be extremely hard in any experimental situation to get information and to do it. When Gary Becker tried to write on the economics of families, he kind of took over that notion. He somehow thought that there really exists conceptually such an archetypical family of social indifference curves. I think it is extremely unrealistic; I am not sure that Pareto, who by 1913 was deeply in sociology, would have agreed with Becker. He regarded sociology as everything that included more than economics, including very contradictory items and with emphasis on irrationalities and non integrable preferences.

Thus, it could be that I could see places in which Pareto had a concept very much like the Bergson social welfare function. But I think there are other logically distinguishable notions in his discussion. The problems have been made more complicated by the fact that Pareto liked to use little deltas and equate them, which I never liked. You can't be sure what Pareto meant by his infinitesimals. I don't believe that he was above reproach with respect to confusing and even being himself confused as if he knew what he was saying.

That is all I can say on the problem which you posed.[3]

2.5   On the Concept of the Arrow Social Welfare Function

KS: Soon after the publication of Kenneth Arrow's *Social Choice and Individual Values*, Ian Little, James Buchanan, and Abram Bergson, respectively, published a harsh conceptual and substantive criticism against Arrow's use of the concept of a social welfare function and his general impossibility theorem. To the best of my knowledge, your own published criticism on Arrow's social welfare function and general impossibility theorem appeared in the 1967 article

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[3] In an early response to Chipman (1976), Samuelson (1977b, p.177) made an almost sarcastic remark on Chipman's assertion to the following effect: "This, I believe, involves an act of sympathetic charity since Pareto's many writings are often obscure on what we now call Pareto optimality, and since expressions such as $\theta_1(\delta U^1) + \theta_2(\delta U^2) + \cdots$ are sometimes used by Pareto as positivistic-politics constructs and sometimes as vague Lagrange multiplier expressions relevant to the first-order conditions for being on the ("Pareto-optimal" points of the) utility-possibility frontier". Subsequently, Bergson (1983, p.44) basically concurred with this verdict when he concluded that "it still seems difficult to quarrel with Samuelson's $\cdots$ assessment of Chipman's perception."

entitled "Arrow's Mathematical Politics." In this article, you exported Arrow from economics to politics with a remark that Arrow's general impossibility theorem is a seminal contribution to the infant discipline of mathematical politics, but it has nothing to do with welfare economics.

Would you please recollect what was your first response to Arrow's social welfare function and his general impossibility theorem?

PS: From the beginning, I thought it unfortunate that Arrow used the terminology of welfare economics when he was in fact making a path-breaking contribution to the emerging discipline of mathematical politics. I read your interview with him with great interest. I am a great admirer of Kenneth Arrow. I consider him as one of the greatest economists of our time. I think that one of the biggest mistakes that Stockholm ever made was to give him a half of the Nobel Prize. There were two mistakes at the same time. They gave Hicks only a half of the prize and they should have given him a full prize. Maybe they should have given Arrow two prizes, one for his contributions to social choice theory, and another for his work in probability and information, which is quite different.

It is interesting to read Arrow's recollection of how he went about the problem of social choice, which agrees a little with my impressions, my imperfect memories. In the summer of 1948, Olaf Helmer, a logician at the Rand Corporation, was trying to develop game theory as a tool for the analysis of international relations and military conflict. He told Arrow that he was troubled by the foundations of economists' application of game theory. When applied to international relations, the players were countries, not individuals. In what sense, Helmer asked, could collectivities be said to have utility functions? Arrow immediately replied that this question had been answered by Bergson's notion of social welfare functions and he tried to give Helmer a brief exposition. It resulted in his discovery of the general impossibility theorem. Now, I think he went into mud, looking for a small pearl, and came out with a big diamond. It was a very important finding in political science as it showed that the failure of specific voting functions is not due to any lack of cleverness, but is a reflection of general impossibility. However, it had nothing to do with ethics and welfare economics. Arrow's use of "social welfare function" for his "voting function" was unfortunate. Arrow wanted to "impose" nothing, which in my book removed him already from the issue of ethics.

KS: Were you in general agreement with Ian Little and Abram Bergson in their criticisms?

PS: The moment Arrow's book came out, and maybe the moment his article came out in the *Journal of Political Economy* earlier, independently and at least in three different minds — Ian Little's mind, my mind, and Abram Bergson's mind —, there came a realization that Arrow was not talking about the same thing.

KS: By the "same thing" you mean the historic economists' social welfare function ... .

PS: That's right. Arrow's general impossibility theorem does not disprove the existence of the Bergsonian social welfare function, neither does it disprove the existence of the Benthamite hedonistic function. As I said, I am a great admirer of Kenneth Arrow, and there are only two things I have ever disagreed with in his writings. One, not very important, difference is that, in axiomatizing the von Neumann-Savage utility system for gambling, he believes that you ought to make utility bounded. This is to avoid the St. Petersburg paradox. I beg to differ, because I think that the St. Petersburg paradox is only a classroom paradox. It is a purely contrived

infinity. I don't think I have ever succeeded in pursuading Arrow on this. Another, this time important, difference is his usage of the concept of a social welfare function. When he brought out his new edition, he must have known the objection of Bergson; he must have known the objection of Little; and I think he certainly knew of the objection by me. As far as I know, however, he just paid no attention to them. I have never heard of Arrow saying that it was a linguistically unfortunate abuse of those three words — the same three words. I think he was sort of reaffirming his right to have done it.[4]

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[4] For the sake of setting the record straight, two lengthy remarks on the literature may be in order at this juncture.

In the first place, it seems fair to cite two of Arrow's actual writings on the concept of a social welfare function. On the one hand, in "Notes on the Theory of Social Choice, 1963", which Arrow appended to the second edition of *Social Choice and Individual Values*, he wrote as follows: "It would perhaps have been better for me to use a different term from 'social welfare function' for the process of determining a social ordering or choice function from individual orderings, although the difference between Bergson's definition and my own was pretty carefully spelled out ... . I will therefore now use the term 'constitution,' as suggested by Kemp and Asimakoplos. The difference, however, is largely terminological; to have a social welfare function in Bergson's sense, there must be a constitution [Arrow (1963, pp.104-105)]." On the other hand, in his contribution to the book edited in honour of Samuelson, *Paul Samuelson and Modern Economic Theory*, Arrow referred to a passage from Samuelson's 1981 Bergson Festschrift article, "Bergsonian Welfare Economics," and firmly asserted as follows: "[I]f there are 'rumors that Kenneth Arrow's Impossibility Theorem rendered Bergson's "social welfare function" somehow non-existent or self-contradictory,' they are indeed 'quite confused' [Arrow (1983, p.21)]." To substantiate this statement, Arrow observed that the Pareto quasi-ordering corresponding to each and every profile of individual preference orderings can be extended into a complete ordering by virtue of Szpilrajn's classical extension theorem. Thus, it seems fair to say that the conceptual difference and interrelationship between the Bergson social welfare function and the Arrow social welfare function are by now well recognized by Arrow and whole profession. It may also be asserted that a wide recognition exists by now that Arrow's general impossibility theorem does not disprove the existence of the Bergson social welfare function; it is a theorem on the non-existence of the Arrow social welfare function, or constitution, and not on the non-existence of the Bergson social welfare function. Let us add in passing that Fleurbaey and Monjin (2005) in this issue of *Social Choice and Welfare* has expressed a related but somewhat different view on the status of Bergson-Samuelson social welfare function within the ordinalist and interpersonally non-comparable informational framework.

In the second place, although Bergson and Samuelson are in complete agreement on the conceptual distinction between the Bergson-Samuelson social welfare function and the Arrow social welfare function, as well as on the irrelevance of the Arrow impossibility theorem to welfare economics, there are at least two junctures where they seem to have chosen somewhat different directions. On the one hand, there is no room for compromise whatsoever in Samuelson's purge of the Arrow impossibility theorem from the territory of welfare economics. In contrast, Bergson seems to have taken a somewhat more flexible stance in this arena. It is true that Bergson (1954, p.240) began his examination of "Arrow's Theorem in Relation to Welfare Economics" by declaring that "[i]n my opinion, Arrow's theorem is unrelated to welfare economics." However, he was careful enough to note that there is a conception of the concern of welfare economics which allows a different interpretation of the Arrow impossibility theorem: "According to this view, the problem is to counsel not citizens generally but public officials. Furthermore, the values to be taken as data are not those which might guide the official if he were a private citizen. The official is envisaged instead as more or less neutral ethically. His one aim in life is to implement the values of other citizens as given by some rule of collective decision-making. Arrow's theorem apparently contributes to this sort of welfare economics ... [Bergson (1954, p.242)]." It is worthwhile to point out that Arrow (1963, p.107) fully endorsed this view of welfare economics which Bergson aptly identified. On the other hand, Samuelson (1947, p.221) admits no reason whatsoever to be concerned with the origin and/or nature of the values captured by the social welfare function: "Without inquiring into its origins, we take as a starting point for our discussion a function of all the economic magnitudes of a system which is supposed to characterize some ethical belief — that of a benevolent despot, or a complete egoist, or 'all men of good will,' a misanthrope, the state, race, or group mind, God, etc. Any possible opinion is admissible, including my own, although it is best in the first instance, in view of human frailty where one's own beliefs are involved, to omit the latter. We only require that the belief be such as to admit of an unequivocal answer as to whether one configuration of the economic system is 'better' or 'worse' than any other or 'indifferent,' and that these relationships are transitive ... ." In contrast, Bergson (1976, p.186) is ready to be concerned with the nature of the values to be captured

KS: What did you think about Buchanan's criticism of Arrow to the effect that the Arrovian social welfare function, or constitution, which hinges squarely on the concept of *collective rationality*, is nothing other than a category mistake?

PS: Would you remind me of Buchanan's criticism of Arrow? If you spell it out simply, I will generate a reaction to it.

KS: Let me try. Arrow's general impossibility theorem depends on the assumption of collective rationality to the effect that the *social choice* is made in accordance with the maximization of an underlying *social preference ordering*, which is constructed on the basis of the profile of individual preference orderings through some process or rule, within the given social opportunity set. In his 1954 *Journal of Political Economy* article, James Buchanan criticised Arrow for his use of the assumption of collective rationality in the above sense by asserting that it was an illegitimate transplantation of a property of individuals only: "The mere introduction of the idea of social rationality suggests the fundamental philosophical issues involved. Rationality or irrationality as an attribute of the social group implies the imputation to the group of an organic existence apart from that of its individual components. ... We may adopt the philosophical bases of individualism in which the individual is the only entity possessing ends or values. In this case no question of social or collective rationality may be raised. A social value scale simply does not exist. Alternatively, we may adopt some variant of the organic philosophical assumption in which the collectivity is an independent entity possessing its own value ordering. It is legitimate to test the rationality or irrationality of this entity only against this value ordering."

PS: My own views about ethics are, generally speaking, against a narrow and special view. Hearing your summary of Buchanan's criticism, I don't at all agree with his position. It boils down to the claim that, if it is a social choice in an individualistic society that is being analysed, then you should not be interested in any degree of rationality, consistency, or transitivity at the social level. This would be like an answer from fallacy. It seems to be a Humpty-Dumptyism. Humpty-Dumpty says: "If I say a thing twice, then it is true." I see no reason to think that there is any cogent force in Buchanans argument. What he says boils down to the statement: I, Buchanan, have no interest in that." He gives no reason why other reasonable men should go along with him. I think those were blinders of his own creation. If readers recall why Harsanyi in 1955 converted me into accepting some role for strongly additive interpersonal BSWF's, then we'll recognize that I had respect for an Ethics Giver who wants to obey the Marschak-Savage Independence Axiom of Laplacian rationality. Buchanan is interested only in living human beings — sober or drunk, young or old, ... Dogs or chimps or Alzheimer sufferers need not apply.

KS: I understand that you firmly retain your previous verdict that Arrow's contribution to social choice theory is not relevant to ethics and welfare economics. What, then, is your current opinion on the scientific status of social choice theory in general, and Arrow's general impossibility theorem in particular?

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by the social welfare function: "The practitioner of welfare economics is in principle free to take any values as a point of departure, but the resulting counsel as to economic policy is not apt to be too relevant unless the values in question are held by, or can plausibly be imputed to, one or more officials concerned with the policies in question. Should the practitioner for any reason disapprove of those values, he may, of course, refrain from offering the officials any counsel at all."

PS: I regard social choice theory in the narrow sense as orthogonal to welfare economics. It can be a part of positivistic study of voting systems. I like the title of your journal, *Social Choice and Welfare*, but by connecting social choice theory with welfare economics, Arrow seems to have created much of the unfortunate confusions. Indeed, social welfare can be completely congruent with the pre-Arrow literature on welfare economics and moral philosophy. Arrow wanted to find out how an individualistic Bergson-Samuelson social welfare function could be generated democratically. But I should register a difference in opinion here.

Arrow has said more than once that any theory of ethics boils down to how the individuals involved feel about ethics. I strongly disagree. I think every one of us as individuals knows that our orderings are imperfect. They are inconsistent; they are changeable; they come back. We go out at night and we leave our wallet at home, because we don't trust ourselves, and we are right not to trust ourselves. We do things and say, "I am going to hate myself in the morning" and, in the morning, we do hate ourselves. There are no ideal individuals who, as adults, suddenly become these perfect individuals. People talk about paternalism as if we were bowing down to a dictator, but it is wrong in ethics to rule out imposition, and even dictatorship, because that is the essence of ethics. Take, for example, the simple axiom of unanimity and suppose that people are self destructive ethically. The notion that every ethical system will have to recognize a unanimous agreement by people is like encouraging bad children to be bad children. I am serious in my belief that difference between a child and an adult is only a difference of degree. In the old paintings, the children are little adults; in modern paintings, if you did them right, the adults are only badder or older children. We are all imperfect. This is not a doctrine of the original sin; it is a doctrine of the imperfectability of mankind. It is too presumptuous to suppose that individuals are consistent, transitive and meaningfully unchangeable in their views. By the way, Piero Sraffa never believed in modern demand theory at all and tried to do everything with cost and technology alone, because he believed people are changing all the time. In this he does not earn my blessing. Piero, like Margaret Fuller, "accept the universe!"

I would say that the ruling theme among economists since 1750 goes something like this. There is a vague notion, which could not be written up for a classroom examination, that there is something optimal about laissez-faire pricing. Among the most sophisticated lay people, it is realized that laissez-faire pricing systematically makes some people better off and some other people worse off, and this pattern quickly changes. There is a chivalrous rule of thumb: "Don't interfere with it." In the first place, if you do interfere with it, you probably do as much ethical harm as good because of imperfect government. But, more than that, there is the law of large numbers operating. One invention helps A, another invention helps B; by James Bernoulli's theorem of large numbers, it evens out. Perhaps. The trickle down theory from inequality is bred by the Schumpeterian dynamic process of innovation. The total pie is improved; on the whole and over time, it evenly lifts up everybody. The same tide raises all ships. That is dogmatic faith, but I think it is in the background of intelligent conservatives. John Hicks certainly. His implicit faith is that it will even out upward. In terms of economic history, there is a lot of truth in that faith. This is a kind of common sense ethics, and most people don't want to go into the complicated questions, I think. I don't know whether most people should.

KS: You have been consistently asserting that the informational basis of the Bergson-Samuelson social welfare function of the individualistic type is the profile of individual preference orderings which are ordinal and interpersonally non-comparable. However, if we require that the social welfare judgements are complete and quasi-transitive with unrestricted domain, and the Pareto principle and the anonymity principle should be respected together with the Arrovian axiom

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of independence of irrelevant alternatives, then the social welfare judgements should be such that all the Pareto non-comparable social alternatives are judged to be socially indifferent. This simple theorem is due to Amartya Sen, and it tells us that the exclusive reliance on the ordinal and interpersonally non-comparable preference information may be inappropriate, as it excludes distributional equity judgements in the situation of interpersonal conflict altogether. Could you please comment on this concern and clarify your stance once again?

PS: Here is a (singular) quintessential Bergson Individualistic SWF. Jane lacks altruism or envy. So does Tom. Each consumes *his* apples and *his* oranges; or *her* apples and *her* oranges. Present the Ethicist with a total of 100 apples and 100 oranges, which can be allocated 50-50, 10-90, 100-0, ... between them. Suppose Tom's and Jane's choices could be described by any one of the infinity of following cardinal utility functions:

Tom: $\Phi = \log(\text{apples}^{\text{T}}) + \log(\text{oranges}^{\text{T}})$ or $\text{F}\{\Phi\}$ with $F' > 0 \geq F''$

Jane: $\phi = (\text{apples}^{\text{J}})^2(\text{oranges}^{\text{J}})$ or $\text{f}\{\phi\}$ with $f' > 0 \geq f''$.

Then Pareto optimality conditions would have the same content whatever was the IBSWF of the form

$$\Theta(\Phi, \phi), \partial\Theta/\partial\Phi > 0, \partial\Theta/\partial\phi > 0.$$

But let Jane and Tom each have *algebraic* sympathy. And perhaps introduce a public good that both consume at once. Then the general BSWF might be of the form

$$\Psi(\text{oranges}^{\text{T}}, \text{oranges}^{\text{J}}, \text{apples}^{\text{T}}, \text{apples}^{\text{J}}, \text{public good})$$

or

$$\text{G}\{\Psi(\ )\}, G' > 0 \lesseqgtr G''.$$

Given Σ oranges $= 100 = \Sigma$ apples & public good $= 1$, what Pareto efficiency condition(s) could you ever deduce? Often none.

As bad is when 100 chocolates are to be divided between atom Tom and atom Jane. Every allocation is (emptily?) Pareto optimal. Room is left for any imposed ethics. I hope a Sen would not say that no non-trivial BSWF's exist. Room is left for indefinitely many.

The most general B-S SWF can make judgments like: "Five biscuits to Tom, other things equal, is better than four biscuits to Jane" without having to mean that some utility of Tom is being compared to some utility of Jane. Maybe Tom has no transitive ordinal ordering that the ethicist must "respect." And what Tom chooses could be deemed to be ethically wrong and ignorable.

2.6   On the Single Profile Impossibility Theorems

KS: Ian Little and yourself emphasized that the Bergson-Samuelson social welfare function is defined for any fixed profile of individual preference orderings characterizing the given society. In contrast, Arrow's social welfare function, or constitution, is a "process or rule" assigning a social welfare ordering to each and every logically possible profile of individual preference orderings.

Your 1967 article on "Arrow's Mathematical Politics" has identified this sharp contrast between the Bergson-Samuelson single-profile framework and the Arrow multiple profile framework to be the primary logical culprit for the Arrow impossibility theorem. As a response to your charge against the multiple profile framework of the Arrovian social choice theory, many single profile counterparts of the Arrow impossibility theorem have been presented by Murray Kemp and Yew-Kwang Ng (1976), Robert Parks (1976), Robert Pollak (1979), Kevin Roberts (1980), Amartya Sen (1993), and many others. Would you please recapitulate your verdicts on the status of Arrovian impossibility theorems in view of these single profile general impossibility theorems?

PS: There are 999 such single profile impossibility theorems but none that I know of cogently exclude interesting possible single profiles. I don't know of any important single-profile impossibility theorem. I can generate lots of Kemp-Ng theorems, none of which are cogently relevant. Ian Little has recently published his collected papers, *Collections and Recollections*, in which he commented on his famous criticism of Arrow published in the 1952 *Journal of Political Economy* as follows: "[O]ne of the main points made was that Arrow's famous book ... had no bearing on traditional welfare economics. One of the reasons given was that the conditions required of a satisfactory 'social welfare function' (SWF) were stated in terms of changes in individual ordering, whereas the *locus classicus* of a SWF [viz., Bergson (1938)] stated it for a given set of orderings. It seems that too much was made of this, in that it has been subsequently shown [in Kemp and Ng (1976)] that a very similar impossibility theorem can be proved for a given set of orderings [Little (1999, pp.17-18)]." I wrote to Little and said: "You weren't wrong earlier, but maybe just confused."[5]

Take, for example, a single-profile impossibility theorem à la Kemp and Ng (1976), which hinges squarely on their Axiom 3. I wrote in my published response to them: "I must regard Axiom 3 of Kemp-Ng as anything but 'reasonable' to impose on a Bergson-Samuelson Individualistic Social Welfare Function ... . As Oscar Wilde might put it, "For any ethical observer to understand Axiom 3 is to reject it [Samuelson (1977a, p.81)]."[6]

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[5] When I had corresponded with Professor Ian Little about this interview, he kindly made the relevant passages of Professor Samuelson's letter available to me. Since it is of some interest, I am hereby citing it after receiving permission to do so from Professors Samuelson and Little:

Little to Suzumura: 29 March 2005

Dear Suzumura. The relevant part of Paul Samuelson's letter of 3 November 1999 is as follows:

'Belatedly I have learned about the existence of your *Collection and Recollections*. Now that I have got as far as page 18, I wish to present you with a gift. On page 18, in your first complete sentence you seem to be lowering your flag—which is also my flag. This is because of the Kemp and Ng 1976 *Economica* paper.

I suggest you rewrite that sentence in all the subsequent editions of your Memoirs to read as follows: "I was quite right in my original position, even though Kemp and Ng in a 1976 *Economica* article purposed to prove the opposite. Professor Samuelson in a pre-humous letter has supplied me with a reprint of his cogent 1977 *Economica* refutation of the Kemp-Ng contention, which serves as a confirmation of my critique of Arrow."

Take care of yourself. They are not making many of our kind any more.'

I had regrettably not read Samuelson's 1977 *Economica* article. If I had I would not have 'lowered our flag'. I promised him I would include his amendment in any future edition of *Collection and Recollections*. But I fear that the probability of there being another edition is extremely close to zero. Do with this what you like. I am very happy to know that Paul is still pre-humous. With best wishes. Yours sincerely, Ian Little.

[6] Let us recapitulate Samuelson's criticism on Axiom 3 of Kemp and Ng more in detail.

KS: What about Amartya Sen's *Impossibility of a Paretian Liberal*, which is another example of a single-profile impossibility theorem without taking any recourse to the Kemp-Ng Axiom 3, or anything like that?

PS: Earlier on, I discussed when Pareto optimality conditions might evaporate away. If Sen agrees with that, well and good. You might want to clarify to me how interesting and important is Sen's case against a Paretian liberal.

KS: Let me try. One of the axioms in Arrovian social choice theory, which has been left almost unchallenged in the literature, is the Pareto principle to the effect that unanimous preferences among individuals for a social state **x** against another social state **y** is to be faithfully embodied in the social preference for **x** against **y**. Sen posed a serious criticism against this ubiquitous acceptance of the Pareto principle. He did this in terms of an intuitive example involving an individual's libertarian right to read a book in his/her private room or not without outside interference, which Sen elaborated into a simple yet powerful impossibility theorem on the Paretian liberal.[7] In conspicuous contrast with Arrovian impossibility theorems, which hinge squarely on the multiple-profile framework à la Arrow, Sen's impossibility theorem invoked only a single profile of individual preference orderings. Another contrast to be noticed is that Sen's impossibility theorem depend neither on the axiom of collective rationality, nor on the axiom of independence of irrelevant alternatives, which is another important constituent of Arrow's impossibility theorem.

PS: Protestant ministers objected around 1600 to bear baiting, not because bears should not be made to suffer but rather because spectators should not be allowed this obscene pleasure. If that's the kind of thing Sen has in mind, I or Bergson might say: "Who are we to tell those ethical prescribers that they are being silly or acting inadmissively?"

> Suppose society has a fixed total number of chocolates that could be partitioned between two specified selfish hedonists: say, 80 and 20, 50 and 50, 20 and 80, or more generally as any of two non-negative real variables (X chocolates to Person 1 or x chocolates to Person 2), where $X + x = 100$ and neither is negative. ... What is the meaning of the new Axiom 3 in this context? It says, "If it is ethically better to take something (say 1 chocolate or, alternatively, say 50 chocolates) from Person 1 who had *all* the chocolates in order to give to Person 2 who had none, then it *must* be ethically preferable to give *all* the chocolates to Person 2." One need not be a doctrinaire egalitarian to be speechless at this requirement. Is it "reasonable" to put on an ethical system such a straightjacket? Few will agree that it is [Samuelson (1977a, p.83)].

It seems to me that the forcefulness of this criticism originates in the fact that we are informed of the material background of the following preference orderings of Person 1 and Person 2:

> Person 1: (100, 0), (100 - ϵ, ϵ), (0, 100)
> Person 2: (0, 100), (100 - ϵ, ϵ), (100, 0),

where ϵ is a small positive number. If the informational basis of social welfare judgements is limited only to the profile of (ordinal) individual utilities and we are deprived of whatever non-welfare information about the social alternatives, the Kemp-Ng Axiom 3 may not be that easy to shoot down. It is in this sense that the Kemp-Ng Axiom 3 is said to be a counterpart in their single-profile framework of Arrow's Axiom of "Independence of Irrelevant Alternatives" in his multiple-profile framework. Therefore, what is to blame may not be the Kemp-Ng Axiom 3 *per se*, but the narrow informational basis of ordinal welfarism.

[7] There is a debate in the literature concerning the legitimate articulation of individual rights in the conceptual framework of social choice theory. As this debate has very little to do with the present issue of the ubiquitous applicability of the Pareto principle, we have only to refer those who are interested in this debate to Gaertner, Pattanaik and Suzumura (1992), Gärdenfors (1981), Sen (1992), Sugden (1985) and Suzumura (1996; 2005).

2.7 On Consequentialism and Welfarism

KS: Our discussion on Sen's impossibility theorem is a convenient step towards further examination of the informational basis of social choice theory and welfare economics. As Arrow (1987, p.124) has aptly observed, "[i]t has been taken for granted in virtually all economic policy discussions since the time of Adam Smith, if not before, that alternative policies should be judged on the basis of their consequences for individuals." As a matter of fact, most of the contemporary welfare economics is based not just on *consequentialism* in this sense; it is based on *welfarist-consequentialism*, or *welfarism* for short, in the sense that consequences are evaluated solely on the basis of utilities entertained by individuals from these consequences.[8] To the best of my knowledge, it was John Hicks (1959) who first declared in "Preface — and a Manifest" in his *Essays in World Economics* that welfarism is too narrow as the informational basis of welfare economics for it to serve the enhancement of human well-being. It was in his farewell to the traditional informational basis of welfare economics that he coined the term, *economic welfarism*:

> The view which, now, I do *not* hold I propose (with every apology) to call 'Economic Welfarism': for it is one of the tendencies which has taken its origin from that great and immensely influential work, the *Economics of Welfare* of Pigou. ... The line between Economic Welfarism and its opposite is not concerned with what economists call utilities; it is concerned with the transition from Utility to the more general good, Welfare (if we like) itself [Hicks (1959, pp.viii-ix)].

Hicks was led to dissociate himself from Economic Welfarism, because he came to believe that "[i]t is impossible to make 'economic' proposals that do not have 'non-economic aspects', as the Welfarist would call them; when the economist makes a recommendation, he is responsible for it in the round; all aspects of that recommendation, whether he chooses to label them economic or not, are his concern [Hicks (1959, pp.x-xi)]." However, Hicks was surely not ready to jump to the other polar extreme:

> I have ... no intention, in abandoning Economic Welfarism, of falling into the 'fiat libertas, ruat caelum' which some later-day liberals seem to see as the only alternative. What I do maintain is that the liberal goods are goods; that they are values which, however, must be weighed up against other values. The freedom and the justice that are possible of attainment are not the same in all societies, at all times, and in all places; they are themselves conditioned by external environment, and (in the short period at least) by what has occured in the past. Yet we can recognize these limitations, and still feel that these ends are worthier ends than those which are represented in a production index. It is better to think of economic activity as means to these ends, than as means to different ends, which are entirely its own [Hicks (1959, p.xiv)].

What is your current response to Hicks's manifest against economic welfarism? Do you feel sympathetic to his conversion?

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[8] According to Sen (1979, p.538), welfarism just represents an informational constraint to the following effect: "Social welfare is a function of personal utility levels, so that any two social states must be ranked entirely on the basis of personal utilities in the respective states (irrespective of the non-utility features of the states)."

PS: As a reporter on the philosophy of ethics, how would I want to react to J. S. Mill's disagreement with Bentham's dictim: The pleasure of the game push-pin is as important as Shakespeare's poetry? Understanding Mill's reaction I would still have to say: "Each has a right to his opinion. After all it is his (Bentham's) opinion." If Hicks is newly converted to being able to admit judgments like this I see nothing revolutionary in that. Why is it a rejection of something called "welfarism?" I call it a welfarism that differs from regarding each individual as an atom who values algebraically only his vector of his goods and who is put in a strongly separable normative function that insists on the equality of

$$(\partial \text{ Tom's apples} / \partial \text{ Tom's oranges})_{\text{Tom}}$$

to

$$(\partial \text{ Tom's apples} / \partial \text{ Tom's oranges})_{\text{Bergson ethicist}}.$$

Maybe, like a character in a Moliere play, J. R. H. was becoming in 1959 more Bergsonianly eclectic without realizing it.

KS: Both Abram Bergson and yourself were careful enough to avoid premature commitment to welfarism in your initial exposition of the concept of a social welfare function. However, your famous Chapter   in the *Foundations of Economic Analysis* on welfare economics has a passage where an explicitly welfaristic formulation of social welfare function is presented. To be more specific, in p.228 of the *Foundations*, we encounter the expression for social welfare W as a function of the profile of individual utilities: $W = F(U^1, U^2, \dots)$. It is this formulation which is often cited, e.g., by Sen (1979), as a sure-fire proof that a social welfare function à la Bergson and Samuelson is unambiguously welfaristic in nature.[9] Would you please tell me whether you regard yourself as a welfarist in your own social welfare function?

PS: I named as an extreme atomistic type the case where each person cares *only* for his goods and bads and where the ethical prescriber gives some measurable weight to each of their own private rankings. To declare that elements of envy and sympathy and sadism and altruism bring us into or out of "welfarism" is mere prattle. My view would be as wide as possible. In the sense that Hicks and Sen used the term, I am *not* exclusively a welfarist; the expression cited by Sen is just an example of the possible class of social welfare functions, which happens to be welfaristic. Consistent with Hicks's manifest, my own social welfare function will have a

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[9] Likewise, we find a passage in Bergson (1948, p.418), which reads as follows:

> If the decision is in favour of consumers' sovereignty, the welfare function may be expressed in the form,
>
> (1) $W = F(U^1, U^2, U^3, \dots)$.
>
> Here U^1, U^2, U^3, etc., represent the utilities of the individual households as they see them and W, the welfare of the community, is understood to be an increasing function of these utilities. The welfare of the community, then, is constant, increases or decreases, according to whether the utilities of the individual households are constant, increase or decrease.
>
> If U^1 has arguments about corn² in it, the weak separability is spurious [Added by P. Samuelson].

large room to accommodate freedom, liberty and rights. My own ethical value must not dictate my analyses of ethics.

By the way, Milton Friedman is not a consequentialist, who neither wants there to be more bread, nor particularly cares whether that bread is equally distributed among people. He wants there to be liberty. He would be disappointed if, by non-liberty, a rational collective state could create prosperity. He does not believe it would be possible, but he would be disappointed if it should happen to be the case. I am not that extreme non-consequentialist; if people do want liberty, I would ask how much they are willing to pay in terms of sacrifice with bread. Milton Friedman thinks that liberty is something that belongs to him, and somebody else is taking it away from him. He thinks that liberty is something that can be treated algebraically, and scaled to get more quantities. You can get more of that good stuff. I am a more cautious libertarian. There is an old saying. A man is walking down St. James Street in London, swinging a cane in a wide curve. An old passerby speaks to him: "Hey, white bear, you are swinging your cane." The guy replies: "It's a free country, isn't it?" The old passerby retorts: "Your freedom ends where my nose begins." But the old man is wrong; the white bear's freedom ends long before his neighbor's nose begins. One man's right to privacy is another man's condemnation to loneliness. I don't say that in order to make ethics of liberty simple; I say that in order to make it realistic, because it is not simple.

Let me also tell you my personal experiment at the University of Chicago as a little hobby. I was curious. Are economic libertarians, who are against exchange controls, against price controls, and against rationing, also zealous Voltairean believers in freedom of opinion, free expression of opinion like John Stuart Mill's irreducible civil liberties? Therefore, I observed (covertly) the behavior of my friends who might be thought to be strong economic libertarians to see whether they were also strong political libertarians. Quite to the contrary. I asked Milton Friedman, in a quiet non-confrontational way so that he had not known I was studying his behavior. The question was about Paul Sweezy, who was invited by a leftist philosophy teacher to the University of New Hampshire to talk to his class back in the Joe McCarthy witch-hunt days. He was subsequently brought up before the New Hampshire legislature to testify on what he had talked about. He refused to do both. I asked Milton Friedman: "Do you think he should have been required to do that?" Friedman replied: "Of course! Public money is running the University." I asked further: "You mean, it would be different if it was Dartmouth College, a private school?" He said: "Well, a wise and honest man should be willing to admit what he said." I said: "You don't understand. Everybody knows what he said. The meaning of this is not to learn new information. It is to bring out the despicable fact that he spoke, let us say, in favor of the Soviet Union." Milton Friedman had no sympathy for Paul Sweezy. The only exception I found in my wide sample was Fritz Machlup. I mentioned this to my late colleague, Evsey Domar, who was a colleague of Fritz Machlup at Johns Hopkins University. He said: "Oh, that is nothing. He is in love with professors." I said: "I don't care. I just want to get at the barebone fact by whatever reasons."

I think those who were the most derogatory in what they think of the narrow welfarism exaggerate what most people feel. If you want to find out who are the happiest people in the world, it is very difficult to do because of the way you ask the question, and the way your question is answered. I heard at a private dining club the philosopher, Sissela Bok, who is the daughter of Gunnar Myrdal but has a very different personality from her father. She was making a study of what people say about their own happiness. It turns out that it is people in Finland, Sweden and Holland, not people in Africa, not people in Indonesia or France or

the U.S. who report most happiness. We used to think of those Northern countries as having a lot of suicide; they kept more honest records than Catholic countries. Why are they happy? They are happy because they have three good meals and a good medical care. They are falling behind us a little bit in the sweepstakes of growth from 1970 to the present time, but for a hundred years they evolved up from a very slow, very cold and unproductive society mostly through education. I think the lip services people give to the non-economic objectives turn out to mean very little to them when they cost a lot in economic terms. Along with liberty come the unintended consequences of liberty. Spain after Franco's day is a very nice free country, but I was told by an accompanying government official that "in Franco's day, we could take the subway to the office where we are going, but I really don't advise two middle class people in the middle of the day to use the Madrid subway." The Soviet Union freed from Stalin's tyranny has a lot of chaos including mafia chaos.

2.8   On the Resurgence of Consumers' Surplus

KS: In a famous section, "Why Consumer's Surplus is Superfluous," in the *Foundations of Economic Analysis*, you raised a famous and devastating criticism against the Marshallian concept of consumer's surplus, which started as follows [Samuelson (1947, p.195)]: "[A]ny judgment as to the usefulness or lack of usefulness of consumer's surplus has nothing to do with the problem of the admissibility of welfare economics as a significant part of economic theory since nobody has ever argued that the latter subject presupposes the validity of consumer's surplus. Can it then be said that consumer's surplus if not necessary, is nevertheless a useful construct?" Answering this question of your own strongly in the negative, you concluded as follows: "It is for these reasons that my ideal *Principles* would not include consumer's surplus in the chapter on welfare economics except possibly in a footnote, although in my perfect *Primer* the concept might have a limited place, provided its antidote and alternatives were included close at hand [Samuelson (1947, p.195)]." Not many economists were bold enough to challenge your sweeping and definitive criticism, yet we may find in Max Corden's *Theory of Protection* the following passage:

> [T]he reader might recall the story of consumers' surplus. Here was a simple intuitively appealing idea, discovered by Dupuit, rediscovered and developed by Marshall, revived by Hicks, and obviously useful. Upon careful examination it turned out to require many assumptions for its validity, and to have several possible meanings. The purists convinced themselves it was unnecessary for dealing with any relevant problem. It was a 'totally useless theoretical toy'. Officially, one might say, it died. And yet it would not stay in the grave. It has such a strong intuitive appeal, and there is nothing better available, so people keep on measuring it. ... One suspects that the perfectionist theorists gave up too quickly [Corden (1971, pp.242-243)].

We should also mention the frequent use made in recent years of the concept of consumer's surplus in the theory of international trade as well as theoretical industrial organization. Would you please comment on these rebuttals, and elaborate your verdict on the use and usefulness of the concept of consumer's surplus?

PS: My thought is very nuanced. In the 2004 debates about protectionism, I've published Ricardo-Mill models where a uniform money-metric utility gives better measures of gains and

losses than concave surplus triangles. But I'd never use uniform homothetic axioms to redistribute incomes ethically. Even if the rich and poor did partition their incomes identically — and they don't — I'd be the last one to maximize any sum of "money-metric utility." Corden-Harberg consumer surplus triangles are a very treacherous concept. The correct thing is to look at the indifference curves. It is much clearer in the indifference curve space, and it is even clearer when you do it for Peter alone than when you do it for Peter and Paul together. When you merge Peter and Paul in an aggregate demand curve, and you start taking areas under the aggregate demand curve, in the first place, it is technically wrong — these triangles do not measure anything you want to measure when the marginal utility of money is an endogenous variable. From the very beginning, this was the criticism of Marshall by many different people. There was a 1889 letter from John Neville Keynes to Marshall, in which he wrote: "You are going to be in a trouble on this and you know it is not right. What you pay for the first unit if you are buying only one unit is different from what happens if you are buying others." John Hicks wrote articles on the compensated demand curve and Milton Friedman argued, in a particularly silly article published in the *Journal of Political Economy*, that Marshall's *dd* curve was a *compensated* demand curve. He just did not understand the language which had been used in those days. Arnold Harberger, Chicago's leading applied economist during his time, tried to measure the consumers' surplus triangle. His dogma was that a square inch of area is a square inch of area; you don't have to worry about poor people or rich people; you can aggregate the jelly of Peter with the jelly of Paul, and you have got jelly. Now, what Marshall says is something a little more careful. He says: "Most things affect all classes equally." In other words, they all even out. That goes back to what I said is the underlying principle of most economists of all ages. If you do the thing that increases the size of the pie, it will trickle down, which is a vague law of large numbers. One time it will hurt one group, and another time it will hurt another group. I am sure that Joseph Schumpeter believed in something like that, and the widespread use of the Marshallian consumers' surplus hinges squarely on such a belief to be widely shared.[10] Ricardo famously recanted on his earlier belief that every invention must raise the real wage. Wicksell, Kaldor, Schumpeter and Stigler all believed that he goofed — until I proved that he had not. I did wonder why Ricardo never favored slowing down such inventions. My best guess was that he too relied on the guess that in the long run chance would favor wage growth. A comfortable wishful guess.

2.9 Welfare Economics and Economic Policy

KS: In your 1981 Bergson Festschrift article, you wrote on the role of competition as follows: "[The] Pareto-optimality property of competitive equilibrium is no theoretical argument for laissez-faire, and is in many situations no cogent practical argument for favouring the use of competition." This interesting observation leads us to a series of questions. In the first place, what, in your opinion, is the main message of the basic theorems of welfare economics? In the second place, what, in your opinion, is the theoretical basis for favouring the use of competition in the allocation of resources? To put it slightly differently, what, in your opinion, is the theoretical foundations of competition policy?

PS: All of the glories of competition are only appropriate when you have constant returns to

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[10] Among many post-Marshallian literature on the concept of consumer's surplus, those who are interested should start their reading with Willig (1976) and Hausman (1981), which present rather contrasting messages with each other.

scale, or when you have replicability so that the lumpiness involving fixed cost gets replicated innumerable times and you have what I wrote in the Chamberlin Festschrift article [Samuelson (1967b)], capitalizing on Joseph's article in 1933.[11] It is true that people frequently refer to the fundamental theorem of welfare economics as a support for promoting competition, but that is a mistake. Someone like Milton Friedman does not understand that it is only under a very special institutional condition that you can play the game of competition and get the beneficient results from playing the game. As soon as you have fixed cost, you have a public good problem. Free competition for buying voters does not deliver what free competition for growing corn may.

KS: What is your view on the practical use of welfare economics? To what extent can welfare economics serve as the theoretical foundations of economic policy?

PS: What a lot of welfare economics of my own writing and my own time had been trying is to rule out certain situations as almost universally conceivable as Pareto sub-optimal. Most of my generation have believed that it is better to be on a contract curve than to be off the contract curve. Who won't be for that belief? If your only choice is a point off the contract curve, and you are offered a point on the contract curve which is inside the lense-shaped area enclosed by the two indifference curves passing through the initial point, then you would agree to accept that offer. However, you don't know when you come into negotiation if you are going to end up inside the area enclosed by the two indifference curves in question. This is what is essentially wrong about Ronald Coase. The Chicago School was just delighted when Coase came along and told them: "All you have to do is to set property rights; then no deadweight loss whatever occurs." What they never asked was: "Why should anyone agree to a new situation with property rights, unless they knew their own possession would be as good as, or better than, the status quo?" Under general property rights, the people having property rights end up better off, but people who are excluded end up worse off. The best argument that could be made would be that there should be enough extra gain, and the gainers could bribe the losers. But this argument involves begging the question, as it presupposes that something is correct about the status quo.

My 1974 article entitled "Is the Rent-Collector Worthy of His Full Hire?" put forward an interesting theorem, which was also proved independently by Martin Weitzman (1974), and Jon Cohen and Martin Weitzman (1975), to the following effect. Consider the famous "problem of the common" under general diminishing returns and static conditions, where the free access equilibrium is inefficient whereas private ownership equilibrium is efficient. However, the variable factor (labor) will always be better off with inefficient free access rights rather than under efficient private property rights. If somebody says that there is no content of welfare economics with policy relevance, here is an example of something that is not obvious before you actually analyze it. As I concluded my 1974 article, "Pareto-optimality is never enough [Samuelson (1974, p.10)]."

Another case in point is my article in the Festschrift for Margaret Hall, which proved that things often get worse before they get better. It is the same set-up as the first case, but now you take half of the common and you make it enclosed, which means that you have private property.

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[11] It was Joseph's (1933) pioneering work that showed how U-shaped cost curves, belonging to replicable plants or to replicable firms under free entry, leads asymptotically to a horizontal unit cost curve for the industry and multiplant firms. Capitalizing on this seminal result, Samuelson (1967b) showed that the possibility of replication leads to "asymptotic-first-degree homogeneity" of the production function.

On that half, the marginal productivities of variable factors are equalized; on the other half, the average productivities of variable factors are equalized. The naive pre-1935 writer would say: "Surely, it is better to get half of the Pareto optimality conditions in real life." But it is not. Among the three possible situations, viz., the pre-enclosed common (the situation A), the completely enclosed common (the situation B) and something in between (the situation C), the middle is worse than the either end. There are a lot of suggestions in this little theorem of policy relevance. It suggests why a lot of good improvements don't get done. The same thing applies to the Darwinian evolution. If you can make the big leap, and have feet, then you can get out of the ocean and occupy the land. How can you, by little changes, ever make it worthwhile to make the big change? Of course, the true evolutionist knows there is no mind involved, and it is just a process. There is no selfish gene which is consciously doing this or doing that.

I should also mention Joseph Schumpeter in this context. He spoke repeatedly of the Ricardian vice to the effect that the trouble with Ricardo was that he had too much interest in policy; poor Keynes would have been a better economist than he was if he had been free from the Ricardian vice. I should say people who live in glass houses should not throw stones. Schumpeter, who professed not to give advice, gave me advice all the time. His political thought was very close to Pareto's view, although it was arrived at independently of Pareto. Schumpeter had contempt for the middle classes, because they didn't stand up for their Victorian liberties. He himself wasn't free of the Ricardian vice, which affected his otherwise good work. He was terrible on the Great Depression. He said that it was a good thing when 25% of the population was unemployed, a million homes were in foreclosure, and 10 to 15 thousand banks shut their doors with no payments to the depositors. One of the uses of welfare economics is to teach you to be alert to study how our ethical beliefs interact with it, and how they contaminate our analytical writings and viewpoints. Pareto who was contemptuous of political viewpoints interfering with economics was the most opinionated man possible. In fact, in the last part of his argument, he analysed all those irrational things but chose to call them sociology, not economics.

KS: In a recent article entitled "The Strange Disappearance of Welfare Economics," Anthony Atkinson expressed his strong concern about the conspicuous tendency among modern economics in general, and the standard graduate curriculum of economics in particular, to do without what has been the major concern of welfare economics, viz., the foundations of social welfare judgements. Would you please comment on this concern and give your own perspective on the future of welfare economics?

PS: As economists forget about the 1929-35 Great Depression and the 1939-1945 World War , they become more tolerant of inequality and own-wallet minded. Voters too display a similar trend in most advanced countries. Like that or hate that, it is a fact.

KS: In your opinion, what are the useful directions towards which welfare economics and social choice theory should be promoted in the future?

PS: I would be remiss not to make the point that, almost as important as being clear about one's BSWF's, in order to be useful in giving policy advice one needs to be sensible about the realistic feasibility constraints that will be binding on every SWF. A true anecdote may be explanatory.

Back before or after 1970, when U.S. College students were everywhere restive about the Vietnam war, MIT's economics students asked me to debate Noam Chomsky, the great linguist and powerful critic of the modern order. I did not feel I could refuse, and to a large audience we two did debate. That day Chomsky was gentle and we were on the homeground of the MIT economics and business departments. What I did not enjoy was to hear some MIT students with almost half a dozen years of economic study utter some surprisingly stupid remarks.

Driving home pondering over the afternoon's discourse, I asked myself: "What seemed to be the structure of Chomsky's beliefs?" Rightly or wrongly, I came up with the following hypotheses.

> Chomsky hoped that national and world societies could be economically organized along the model of a harmonious Israeli kibbutz. Families involving several scores of human beings would distribute to each according to sensible needs, while from each would be expected what was proportional to their natural and acquired abilities.

Forget Chomsky and focus on the above old familiar nomination. Based both on recent 1917-2000 experiences in the USSR, Mao's China, Castro's Cuba, East Germany and North Korea, and going back over 5,000+ years of economic history, why have large populations that eschewed considerable reliance on quasi-markets been so pitifully unable to attain feasibly high standards of living and comparable rates of growth in longevity and consumption potential? In the end, though I understand the likelihood of inadmissible inequalities and macro instabilities from any *laissez faire* market system, I do in the end want to tolerate considerable deadweight inefficiencies *inseparable from public interferences with private markets* and at the same time want to *put limits* on those public interferences. If, say, John Rawls were to differ with me and plump for more activism in the Chomsky direction, I think correct analysis of the Rawls and Samuelson BSWF's would find them to be similar (with exceptions) — and yet, differences in how realistic we are might explain most of our policy differences which differences in our transitive norms could not.

3   Concluding Remarks

Paul Samuelson is an almost inexhaustible source of first-hand information on the historical evolution of normative economics. Thanks to his generosity, in this interview we were able to cover many aspects of welfare economics, "old" and "new", as well as social choice theory, with many fresh testimonies which would prove revealing especially to those who are relatively new in the field. Yet there are many aspects of Samuelson's contributions to normative economics to which this interview could not do full justice, including, among others, his monumental work on gains from free trade, his path-breaking work on intertemporal efficiency and turnpike theorems, his pioneering work on overlapping generations economies, to say nothing of his vastly influential work on public goods. A further interview with Paul Samuelson focussing on these aspects of his work seems warranted in order to shed further light on his legacy in the whole area of normative economics. I wish him continued good health, and I am looking forward to learning further from him for many years to come.

Postscript. It is my sad duty to write that Professor Abram Bergson passed away on April 23, 2003. Professor Paul Samuelson dedicated a biographical essay [Samuelson (2004)] to honor Professor Bergson, where he wrote as follows: "When Bergson died at age 89, he was the

last survivor of Harvard's age of Frank Taussig, and had been a young star in the new age of Joseph Schumpeter, youthful Wassily Leontief, eclectic Gottfried Haberler, and after 1937 Alvin Hansen, the 'American Keynesian.' As Leontief's second protégé I am proud to have been preceded by Abram Bergson, his first protégé, for much of my own work in welfare economics owes virtually everything to his classic 1938 *Quarterly Journal of Economics* article that for the first time clarified this subject."

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Chapter 28

Shigeto Tsuru, 1912-2006: Life, Work, and Legacy*

Shigeto Tsuru passed away on 5 February 2006 at the age of 93. He was one of the greatest political economists and influential opinion leaders in post-war Japan. He was also the human embodiment of mainstream economics educated at Harvard University in its pre-war golden age, as well as the Marxian tradition of political economy absorbed in pre-war Japan. It was this unique background that enabled Tsuru to be free from any rigid dogmatism. However, the same background made him rather isolated in the academic spectrum in post-war Japan, which was sharply divided into opposing camps, and having a foot in both camps was viewed with scepticism rather than with admiration for flexibility.

Tsuru's academic and social accomplishment is remarkable. They become even more impressive if we recollect that there were many storms in his life, and he was always snowed under with many official commitments which his sense of duty would not allow him to avoid. Aside from his services rendered as a Member of the Science Council of Japan, as well as at Deliberation Councils of the Japanese Government, his post-war career contained the following commitments. He served as the Program Committee Chair of the Economic Stabilization Board from June 1947 to April 1948. It was as an integral part of this duty that he took initiative in writing the famous *Report on the Economic*

Reality of Japan,[1], which was the first White Paper ever written in Japan. It was one of the most informative, influential, and readable government reports ever published in Japan. After he resigned from the Economic Stabilization Board, he was appointed in September 1948 to Professor of the Institute of Economic Research, Tokyo University of Commerce, which soon became Hitotsubashi University, where he served as the Director of the Institute of Economic Research over many years (1949-1956; 1965-1967). He was subsequently elected to the Presidency of Hitotsubashi University in April 1972, in which capacity he served until March 1975. In August 1977, he was inaugurated as the President of the International Economic Association, a position he held for three years. His already busy life could have been even busier if he had not declined the request to become the Minister of Education in Mr. Takeo Miki's Cabinet, or to stand as the Socialist Party's candidate for the Governorship of Tokyo.

Before discussing his academic accomplishment, the essence of which may be found in his *Collected Works*,[2] let us have a brief look at his early personal history.

Shigeto was born in Tokyo on 6 March 1912. In 1917, his family moved to Nagoya. His health was always a serious concern, which forced him to miss some of the early years of elementary education. When Shigeto was in the second year at a middle high school, his father asked a native English speaker to teach Shigeto English grammar and conversation once a week at home. His extraordinary command of English originates from these home tutorials. In 1929, Shigeto entered a high school under the old system, but he never completed his high school education in Nagoya. Although he had excelled in many frontiers including an English Speaking Society as well as track and field meets, he was expelled from the high school for his radical political involvement that led his arrest on 2 December 1930. The processing of his arrest and expulsion was very harsh,

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[1]Tsuru and Ohkita [15].

[2]Ito, Odaka, Takasuka, Hanayama and Miyazaki [1]. Among these volumes, the first 12 volumes are in Japanese, whereas the last volume, which is titled as *Towards a New Political Economy*, gathers some of his representative publications in English. In Tsuru's own words, "[i]t would have been more accurate to use the title of 'Selected Writings' inasmuch as [his] past writings, if assembled all together, would fill about forty volumes of a 500 pages length for each." It should also be emphasized that Tsuru's writing activities did not end with the publication of these *Collected Works*. Quite to the contrary, 20 books were published after the completion of the *Collected Works*, among which I list only those books written in English: *Institutional Economics Revisited*, Cambridge, UK: Cambridge University Press, 1993; *Japan's Capitalism: Creative Defeat and Beyond*, Cambridge, UK: Cambridge University Press, 1993; *Economic Theory and Capitalist Society*, Aldershot: E. Elgar, 1994; *The Economic Development of Modern Japan*, Aldershot: E. Elgar, 1996; *The Political Economy of the Environment: The Case of Japan*, London: Athlone Press, 1999.

as he was not allowed to continue higher education in Japan.

Shigeto's father quickly acted so that he could pursue higher education in America. In January 1931, Shigeto arrived at Lawrence College in Appleton, Wisconsin. After two years there he made a decision to transfer to Harvard College for his final undergraduate years, and then to Harvard University. It was at Harvard that Shigeto encountered his life-long teachers of the highest academic calibre such as Frank Taussig, Joseph Schumpeter, and Wassily Leontief. He also developed close friendship with young and brilliant scholars such as Paul Samuelson, Paul Sweezy and Robert Triffin. Characterstically, Samuelson recollected this period as follows:[3]

> Harvard did much for us. But ... we did much for Harvard too. Tsuru in particular brought to that rather complacent citadel of mainstream economics, a knowledge of and an interest in Marxian economics. Paul Sweezy's *The Theory of Capitalist Development*, which still serves as one of the best expositions of Marxian economics for economists trained along mainstream lines, was written at Harvard in this period. Tsuru's appendix to the book, relating the steady and expanded reproduction tableau of Marx to Quesnay's tableau economique and to Leontief-Keynes' circular flows, occupies a permanent place in the history of economic doctrines.

Herbert Norman was a Canadian historian with whom Shigeto developed a close friendship at Harvard. Norman was born in September 1909 in Japan. His parents were Methodist missionaries stationed in Japan since 1901. After completing an MA in Ancient History at Trinity College, Cambridge University, Norman came to Harvard in 1935, where he met Shigeto. They found a common interest in the development of the modern state in Meiji Japan. Norman completed his MA and PhD in Japanese History at Harvard and he returned to Japan in 1940 as an employee of the Canadian Department of External Affairs. His next encounter with Shigeto was under an extraordinary circumstance.

In the meantime, Shigeto also completed his PhD dissertation on "Business Cycle Theories and Their Application to Japan" in June 1940. The empirical part of his dissertation was soon published in the *Review of Economic Statistics*.[4] Sweezy's book was published in 1942 with Shigeto's aforementioned appendix entitled "On Reproduction Schemes." Shigeto found a teaching job at Harvard, and he was entrusted to take responsibility for a seminar on Marxian Economics with Sweezy. Thus, life appeared to be

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[3]Samuelson [6].

[4]Tsuru [9].

very pleasant for Shigeto and his wife, Masako, whom he married in June 1939. However, an unprecedented calamity was about to fall on the whole world, which disrupted Tsuru's blossoming career substantially.

On 7 December 1941 war broke out between America and Japan. According to Shigeto's own recollection in his *Autobiography*,[5] he soon arrived at a personal conviction that Japan could not possibly win this war against America. This conviction was partly based on his conversation with Harry Dexter White (1892-1948) whom he knew since his old days in Lawrence College. It was Shigeto's personal conviction to this effect that encouraged him to return to Japan in order to contribute to the resurgence of his mother country after the inevitable defeat. The opportunity to fulfill this desire came abruptly. It was on 1 June 1942 that he received a telegraph from the State Department that offered Mr and Mrs Tsuru repatriation as part of war exchange between America and Japan. They had only five days before entrusting themselves to the authorities in charge, so that Shigeto had to dispose of almost all books and documents in a hurry. He put aside all books on Japanese economic history for Norman to collect later. Samuelson was another recipient of his books, who related this episode as follows: "During the war, Shigeto was evacuated to Japan. When he had to dispose of his books, I was the lucky recipient of his copy of the 1932 edition of Pigou's *Economics of Welfare*, which I read carefully."[6]

A Swedish merchant ship, *Gripsholm*, carried 1,500 repatriated Japanese to Lourenço Marques in Portuguese East Africa,[7] where they were exchanged for those who had been likewise repatriated from Japan. Among those who embarked on *Gripsholm* were a mathematician returning from Princeton, Shizuo Kakutani, and a seven-year-old-boy who later became an econometrician with worldwide reputation, Takeshi Amemiya. They then embarked on a Japanese merchant ship, *Asama Maru*, which brought them back to Japan in August 1942.

When the two sides of repatriated people passed each other in Lourenço Marques, Shigeto found Norman on the other side. According to Shigeto's *Autobiography*, he found a few brief seconds to tell Norman how he could locate Shigeto's books on the Japanese economic history at Harvard. Nobody knew that this would lead to a terrible tragedy much later.

It arose in 1956 during Shigeto's visit to Harvard, where he taught two courses,

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[5]Tsuru [14].

[6]See Suzumura [8].

[7]This place is now known as Maputo in Mozambique.

one on comparative economic development and the other on socialism, the latter being jointly taught with Jan Tinbergen. Shigeto was summoned to the US Upper House to make a statement. Despite an official statement by the Canadian Government to the contrary, Norman was under suspicion of having communist sympathies during his diplomatic activities. Shigeto believed that the purpose of the summons was to inquire about his relationship with Norman so as to substantiate this suspicion. Part of the background of this surmise had been a radio news item to the effect that Norman tried to retrieve some "secret documents" which Shigeto had left behind at the time of his repatriation. Shigeto thought that he could clear up this allegation by pointing out what had actually happened. However, the purpose of this summon turned out to be more about Shigeto's own involvement in communism. To make matters even worse, Norman committed suicide in Cairo on 4 April 4 1957, just a few days after Shigeto's statement. Despite his intention to clear Norman from suspicion, Shigeto was condemned by the Japanese mass media for providing a confession at the expense of his close friends. The fact that the accusation against Norman was subsequently proved to be groundless provided little relief for Shigeto.

Tsuru's academic contributions to economics are numerous and range over many areas, but there are three areas of research that may be singled out.

The first area is the critical examination of the methodology of economic aggregates. The quintessence of Tsuru's work in this area is contained in his book in Japanese, *National Income and Reproduction Schemes*,[8] which was later republished in the first volume of the *Collected Works*. In Tsuru's self-evaluation, this book was his major initial work in theoretical economics. Tsuru's teacher at Harvard, Joseph Schumpeter, known for his scepticism against Keynes' use of economic aggregates, instructed young Tsuru to examine the methodology of Keynes' aggregative concepts vis-à-vis that of Marx. This book, which may be construed as Tsuru's belated progress report submitted to Schumpeter, may be summarized as follows. Any aggregative concept can play an active role in economic analysis if and only if it has a theoretical significance of its own. In other words, an aggregative concept is meaningful if and only if it can play an indispensable role as a building block of an objective economic law, unimpeded by any outside interference. It is worthwhile to recollect that the use of aggregative concepts by classical authors such as François Quesnay, Nassau William Senior, John Stuart Mill, and Karl Marx was precisely in this sense. In sharp contrast, the use made of aggregative concepts by John Maynard Keynes was not as an instrument of an objective economic law, but as a moment

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[8]Tsuru [10].

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of state control of the working of an economic system. To substantiate this claim, Tsuru cited a passage from Keynes' *General Theory*:[9] "Our final task might be to select those variables which can be deliberately controlled or managed by central authority in the kind of system in which we actually live." According to Tsuru, this change of stance in the use of economic aggregates was brought about by the systemic dysfunctioning of competitive market mechanism in the 1930s. To the extent that the barometric function of prices became less reliable as the market imperfections became conspicuous, Keynes' use of economic aggregates had to be accepted as a means to complement the unsatisfactory performance of market mechanisms. This leads to a serious question. In the case of traditional microeconomic theory, there is a basic principle of constrained optimization which enables us to derive the basic functional relationships — such as demand and supply functions — among economic variables. What, then, is a basic principle which underlies the statistical functional relationships — such as the statistical consumption function — among statistical aggregates? Tsuru posed this important question, but he left it unanswered. All he did was to call the reader's attention to what is now known as the microeconomic foundations of macroeconomics.

Tsuru's second major area of research was comparative economic systems and institutions. His work in this field may be represented by the book entitled *Has Capitalism Changed? An International Symposium on the Nature of Contemporary Capitalism*.[10] This was a collection of papers by John Strachey, Paul Sweezy, Charles Bettelheim, Maurice Dobb, John Kenneth Galbraith, Paul Baran and some others, each one trying to answer the questions posed by Tsuru on the recent changes in American capitalism, their theoretical implications, and the expected transition path towards socialism. It is often mentioned as the most important post-war work on the comparative analysis of capitalism versus socialism. Compared with the socialist planning controversy in the 1930s,[11] which was fought between Ludwig von Mises, Friedrich von Hayek and Lionel Robbins, on the one hand, and Oscar Lange, Maurice Dobb and Paul Sweezy, on the other, and focused on the theoretical possibility of rational economic planning under socialism, there are two conspicuous differences which are worth pointing out. The first is that the Tsuru Symposium consisted solely of scholars who were critical to capitalism to begin with, whereas the socialist planning controversy in the 1930s was fought

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[9]Keynes [2, p.247].

[10]Tsuru [11].

[11]Those who are interested in the socialist planning controversy in the 1930s are cordially referred to Suzumura [7].

between the two camps with sharply contrasting stances towards capitalism versus socialism. The second is that the controversy in the 1930s was focused on the theoretical possibility of rational socialist planning, whereas the Tsuru Symposium was focused on the concrete reality of American capitalism and its possible transition towards socialism. These features are intrinsic in Tsuru's approach to comparative economic systems and institutions.

Tsuru's third major area of research was environmental disruption and the design of economic policies to cope with this problem. His work in this arena may be represented by his two books, viz., *The Political Economy of Environmental Disruption*[12] and *The Political Economy of the Environment: The Case of Japan*,[13] but his strong concern about environmental disruption dates back at least as far as 1950. In an essay entitled "Reflection of an Economist," which was originally published in 1950 and republished in his *Collected Works*, Tsuru maintained that if an economist cannot meet the challenge of environmental disruption, he should not be called an *economist*, who studies real economic problems; he should rather be called a *scholar on economics*, who preaches or interprets a doctrine of economics established by somebody else. Faithful to his own words, Tsuru started his serious effort to face environmental disruption in 1963. The first step of his strenuous effort was to organize a study group on environmental disruption, which originally consisted only of seven members, and investigate the actual circumstances of such notorious pollution cases as the Yokkaichi asthma case and the Minamata disease case. This study group eventually grew into the Society for Environmental Economics and Policy Studies, whose membership now exceeds 1,200. There are also many policy proposals by Tsuru's study group which were successfully incorporated into actual policies and institutions in Japan. Another notable feature of Tsuru's study on environmental disruption is that he was free from the dogmatism that prematurely and blindly imputes the cause of environmental disruption to the capitalist economic regime. Indeed, Tsuru's *The Political Economy of Environmental Disruption* started from the pollution of Lake Baikal under the USSR regime. It was a scientific analysis of the causal link between environmental disruption and underlying economic regime rather than the dogmatic faith in the cause of socialism that led Tsuru to go beyond the market mechanism in his search for effective measures against environmental disruption.

In closing this part, I need to mention Tsuru's expositional ingenuity, which he amply exhibited in lectures as well as writings. This ingenuity was best exhibited in his

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[12]Tsuru [12]
[13]Tsuru [14]

introductory expositions for novices and the man in the street. The best example can be found in his small book called *Economics Without Tears*.[14] A phrase which naturally came to my mind when I first read it was the following:[15] "What oft was thought but ne'er so well expressed." It is no wonder that this book occupies the central place in the first volume of Tsuru's *Collected Works*.

What lies at the heart of Tsuru's work may be best illustrated by his favourite passage from John Ruskin:[16] "There is no wealth but life." It was his strong concern about human well-being that led Tsuru to criticize the use of national income as an index of well-being. It was also the same concern that led him to emphasize the relevance of the Fisherian stock concept rather than the Keynesian flow concept. Although he was critical of many aspects of capitalist economic regime and retained his faith in the idealized socialist economic regime, his strong desire to contribute to the promotion of human well-being prohibited him from shutting his eyes from environmental disruptions in the Soviet Union. I cannot but think that he was a life-long practitioner of welfare economics along the line of Arthur Pigou who wrote as follows:

> The complicated analyses which economists endeavour to carry through are not mere gymnastic. They are instruments for the bettering of human life. The misery and squalor that surround us, the injurious luxury of some wealthy families, the terrible uncertainty overshadowing many families of the poor — these are evils too plain to be ignored. By the knowledge that our science seeks it is possible that they may be restrained. Out of the darkness light!'[17]

To succeed Tsuru as the torch bearer is the responsibility of any economist, at least of Japan, who cares about the promotion of human well-being.

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[14]Tsuru [13].

[15]Pope [4, Part ii, Lines 97-98].

[16]Ruskin [5].

[17]Pigou [3, p.vii].

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