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A UTILITARIAN WELFARE ANALYSIS OF TRADE LIBERALIZATION

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A UTILITARIAN ANALYSIS OF TRADE LIBERALIZATION

The belief that efficiency and equity can somehow be separated represents one of the oldest dreams in economics ..... Mark Blaug

The currently established welfare criterion used in international trade theory results in conclusions that are not only intellectually dishonest and deceptively misleading but are not as value free as is commonly believed. Although academic economists have devoted much effort to understanding the distributional effects of trade, the current welfare conclusions of trade basically ignore entirely the distributional effects. This paper argues that trade policy needs to be framed within a legitimate moral framework that moves distribution to the forefront. The welfare effects of trade should be judged by what actually happens, not by what could potentially happen in an idealized world with costless transfers.

In the first section the inadequacy of current international welfare economics is discussed. Second, the justification for using a utilitarian framework is developed along with a brief history of the doctrine and its role in Cambridge welfare economics. Next the properties of a utility function that would be realistic as well as having desirable mathematical properties are discussed. Welfare considerations would not be especially important if trade did not create significant redistributions; therefore the size of the redistributions relative to the efficiency gains from trade liberalization is examined. Finally, the welfare effects of trade liberalization using various trade models and simulations are discussed.

The Inadequacy of Modern International Welfare Economics

The current approach to the welfare analysis of trade is to follow the recommendation of Hicks and Kaldor and equate national welfare with real national income and ignore entirely how income is distributed. Although admitting that considering distribution involves an unscientific value judgment, numerous economists (such as I.M.D. Little, Frank Knight, Edward Chamberlin) have concluded that distribution is too important to ignore and it is better to consider it even if that makes the analysis less than scientific. As Blaug has stated (1978,p. 626), "the true function of welfare economics is to invade the discipline of applied ethics rather than to avoid it."

The basic objective of trade policy under modern welfare analysis therefore is to maximize national income. This outcome is considered optimal because of the Hicks-Kaldor compensation principle whereby everyone could potentially be made better off than in any other alternative with the appropriate lump sum transfers. For some, the possibility that these transfers could be made is sufficient, regardless of whether any transfers are actually made. For others, there is a naive belief that after all the income maximizing policies are implemented, that the government (or society) then consistently redistributes income in a manner consistent with its specific social welfare function. However, Rodrik (1997, p.30) is correct when he states that in regard to trade policy changes, "compensation rarely takes place in practice and never in full." Even if society wanted to redistribute income, however, it can not be done in a zero costs lump sum fashion. The

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compensation approach is intellectually dishonest in that it incorporates the inefficiencies (and welfare losses) associated with trade but assumes that any redistribution can be made lump-sum without a welfare loss.[2] This would be equivalent to the case of someone wishing to show how trade lowered social welfare by calculating the welfare loss that would result from the disincentives of having to redistribute income through the income tax system but who totally ignored the welfare gain from reducing tariffs. This approach is deceptive in that it proposes a political adjustment mechanism that simply does not exist in the current political system (at least not in the United States). The political system is such that how income is originally distributed limits the degree to which a redistribution can actually be made. For these reasons then, income gains are not redistributed. Many including Arrow (1950, p.330) have concluded that "the compensation principle must be regarded as [an] unsatisfactory technique[s] for the determination of social preferences." Woodland (1982, p. 265) concludes, "If compensation is not paid, then it is difficult to argue in favour of free trade, unless one is prepared to base the argument upon a demonstration that the nation has a social welfare function which is actually increased in value." In addition, this technical economic interpretation of what constitutes a welfare gain is not the same as the general public's interpretation of the meaning of this term; this difference has been used by liberalization advocates to their great advantage.

Is it possible to increase actual (as opposed to potential) social welfare by redistributing the gains from trade? There have been a number of recent papers that have demonstrated why it may not be possible to redistribute the gains from trade. In the simple hypothetical case, the government is able to simply take the income from the winners and give it to the losers. However in the real world, the government does not know precisely who the winners are, and the tax structure does not allow specific groups to be targeted. For example, if the only tax is a progressive income tax, a lot of the income redistributed may have nothing to do with trade, and it's possible that some money could be redistributed from the losers to the winners. Spector (2001) has demonstrated that if a country redistributes income using a non-linear income tax to maximize a social welfare function, that with free trade the country may end up with a lower level of social welfare relative to autarky. Within this model, social welfare is maximized with a combination of redistribution and tariffs. Thus the redistribution that is at the core of the basic proposition favoring free trade may not be possible, as a practical manner, with only income taxes.

The ability to redistribute through the tax system is further reduced by the administrative costs of redistributing and the disincentives created not only for those being taxed but for those receiving income, i.e. the "leaky bucket" losses of transferring income. Furthermore, there exist a number of practical complications concerning redistribution so as to make the necessary redistributions unlikely to occur in practice. Just as the need to redistribute through the tax system has increased, the ability to do so has decreased. Rodrik (1997) has emphasized how the international mobility of capital has shifted taxes onto labor and made redistribution more difficult. This trend has accelerated in last few years as the average company tax rates in the OECD have

[2] However, Dixit and Norman (1980) have demonstrated that there is a set of domestic taxes on commodities and factors with free trade that is Pareto superior (nobody loses) to no trade.

declined consistently from 37.6 percent in 1996 to 30.8 percent in 2003 (ILO, p. 40, 2004). The failure to redistribute the gains from openness has also been compounded by the perverse nature of the U.S. political system where increased income translates into increased political power. As a result, the increases in inequality have not been corrected with increases in redistribution, but have been further magnified with political gifts of tax cuts and regulatory reform that have primarily benefited corporations and the rich. The elections of 2002 provide evidence of how money now controls the political process; more than 95 percent of the races for the U.S. Congress were won by the candidate who spent the largest amount (Makinson, 2002). The tax cuts since 1981 have favored the very rich while most of the tax increases have fallen primarily on the working class. Inequality creates greater inequality through a vicious political cycle. Krugman (2002) commenting on the political dimension of the increasing inequality writes:

> ... economic policy has reinforced, not countered the movement toward greater inequality. Money buys political influence...it also buys intellectual influence...growing income disparities in the United States, far from leading to demands to soak the rich, have been accompanied by a growing movement to let them keep more of their earnings. This obviously raises the possibility of a self-reinforcing process.

Engerman and Sokoloff (2002) document this process in the historical development of Latin America; there initial inequality in Latin America resulted in the development of institutions which further perpetuated the advantages of the elite classes. Rodrik's (1997) argument that trade openness is correlated with the size of the welfare state might be taken as evidence that the gains from trade are routinely redistributed. However, the time series evidence is totally inconsistent with this thesis; as openness has increased throughout the OECD countries over the last several decades, the welfare state has been under assault.

Besides the mechanism where those getting richer obtain more political power and are thus able to reduce redistributions, trade liberalization also makes countries more cognizant of competitive conditions and they try to maintain competitiveness by instituting policies to lower labor costs and reduce the taxation of capital. For example in the 1990s in the debates about raising the minimum wage, Newt Gingrich expressed the concern that with the recently passed NAFTA, the U.S. could not raise the minimum wage if it wanted to stay competitive with Mexico. In a similar vein, Dorman (2002) has argued that the reduction in social spending by Canada from 45 percent of GDP in 1992 to 35 percent in 1999 and the lowered corporate tax rates were motivated by the Canadian government's desire to remain competitive after the formation of the free trade area with the United States.

Here it is argued that the compensation principle where compensation does not actually occur lacks any legitimacy. The argument that it is not important how a given level of income is distributed is just as much of a normative value judgment as the argument for a specific distribution. The belief that the government redistributes income in a lump sum fashion after the fact to achieve some independent social objective is not only not consistent with actual political reality but is not even practically possible. The concern here is not with redistribution, per se; but with the effects of redistribution between groups with different income levels. Some, such as Corden (1974) have

argued that there is something special about the initial distribution of income, and any movement from it represents a welfare loss since it is only fair to compensate those harmed by an exogenous policy decision. In this paper the initial and final income distributions are evaluated using a common social welfare function; the initial distribution is not viewed in any way as preferable just because it is the initial distribution.

Therefore it is proposed that the only way to evaluate the welfare effects of trade liberalization is to specify a social welfare function and examine the actual effects of trade liberalization. The spirit of this paper is similar to that of Fair (1971) in the sense of proposing and quantifying a social welfare function. In order to do this the concepts of cardinal utility, the law of diminishing marginal utility of income, and interpersonal utility comparisons are resurrected. Although these assumptions are often referred to as value judgments, these are not normative value judgments but are subjective assessments about the true nature of reality. The weighting that each person's utility will receive is assessing the social welfare is a normative value judgment, but the belief that individuals' utility functions are similar is not. As such, these assumptions are no different than many other assumptions currently made widely in economics which are beyond empirical verification such as rational expectations or infinite horizons. From this author's perspective the assumptions concerning cardinal utility functions subject to diminishing marginal utility are more realistic than many of assumptions commonly being made in contemporary economics. Since the objective is to revive the utilitarian welfare economics associated with the Cambridge School, we begin with a brief review of that philosophical tradition.

A Brief History of Utilitarianism and Cambridge Welfare Economics

Utilitarianism is generally viewed as the dominant political philosophy or ethical theory over the last century, if not the last two (Brown, 1986; or Sen, 1999). In the words of Welch (1987, p.775), utilitarianism "dominates the landscape of contemporary thought in the social sciences." That is not to say that there have not been a large number of strong critics, including John Rawls, Amartya Sen, Karl Marx, and Robert Nozick; however, none of these alternatives has garnered more than a small percentage of opinion. Almost all of these competing philosophers (Welch, 1987,p.775) "share a preoccupation with disposing of the claims of utilitarianism as a necessary preclude to developing their own positions." As such, utilitarianism is the moral philosophy by which all others are compared. It appears that little has changed since John Stuart Mill (1863, p.3) summed up the situation in his day, "after more than two thousand years the same discussions continue, philosophers are still ranged under the same contending banners, and neither thinkers nor mankind at large seem nearer to being unanimous on the subject." Utilitarianism can be interpreted as providing principles for a personal moral code as well as for conceptions of social justice. It is the latter issue of interest here: that being, what principles define a just society, with the emphasis on the question of distributive justice.

Although the spirit of utilitarianism has been present in ethical theory since ancient times, Sidgwick (1902) concluded that utilitarian doctrine was first formally advanced by Shaftesbury in 1711. Hutcheson (1720) was the first to explicitly state what would become the philosophy's central principle – "that action is best which procures the greatest happiness for the greatest numbers." The

philosophy developed on the premise that the divine rights and "self-evident" natural rights philosophies had (Welch, 1987, p. 775), "been discredited beyond rehabilitation as criterions of moral choice."[3] In England, initially, utilitarianism followed a theological channel, while in France it was developed into a reform oriented practical political philosophy by the Encyclopedists (and tax collector) Claude A. Helvetius's in *De l'esprit* (*Essays* o*n the Mind*) in 1758. Since it attacked morality based upon religion, Helvetius's book was promptly condemned by the Pope, the Paris Parliament, and the Sorbonne and burnt *au centre ville*; Helvetius was ordered to recant his views and he complied in order to save his position, if not his life. Francois Quesnay, of the physiocrats, incorporated aspects of the philosophy into their movement with the publication of *Tableau economique* which was also published in 1758 (Sabine, 1961).

It was from this French strain that Jeremy Bentham and James Mill created the intellectual structure of the English political movement referred to as the Philosophical Radicals.[4] The terminology "utilitarianism" first appeared in Bentham's *An Introduction to the Principles of Morals and Legislation* in 1781 (but not published until 1789). Bentham's student and James Mill's son, John Stuart Mill further formalized its principles and integrated them into economic thought. The philosophy has been intertwined with welfare economics ever since. Many of the most prominent economists of the 19th century and the early 20th century were advocates; this group included Hermann Gossen, John Marshall, Francis Y. Edgeworth, William Stanley Jevons, Henry Sidgwick, J.B. Say, Dennis Robertson, and Arthur C. Pigou. Utilitarian welfare principles provided the basis of what Bergson (1938) would refer to as the Cambridge School's welfare economics. In order to apply utilitarian principles to economic welfare analysis, it was necessary to both measure utility by some cardinal means and to make interpersonal comparisons between individuals.

A number of those prominent in the early development of utility theory, such as Menger and Walras, saw no problem with interpersonal utility comparisons (Blaug, 1978). Others accepted that this was not scientifically possible, but attempting to do so through intuition was nevertheless justified on the grounds of expediency and pragmatism. The shortcomings of this approach were acceptable because it was believed that there simply were no other legitimate alternatives for evaluating social welfare. Bentham states this explicitly (from Halevy, 1901, p. 481):

> This addibility of the happiness of different subjects, however, when considered rigorously it may appear fictitious, is a postulatum without the allowance of which all political reasoning is at a stand.

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[3]However, Sabine (1961) argues that few writers of the eighteenth century, except Hume who had led the attack on natural rights, fully appreciated the fact that utilitarianism essentially invalidated Locke's natural rights.

[4] Ricardo was also a member of this group (Canterbery, 2001); although Ricardo accepted the philosophical objective of utilitarianism (greatest good, etc.) he was critical of the subjective aspects as developed by Bentham (Canterbery, oral communication).

Since utility is not directly observable, if the philosophy is to be used for the evaluation of economic and social policies, it is necessary to specify the factors on which it depends. Although it does not follow logically from the philosophy of utilitarianism, most utilitarianists from Bentham, Mill, and through the Cambridge Welfare School, also believed in the diminishing marginal utility of income. In fact, they believed in this principle to such a degree that it was referred to as the law of diminishing marginal utility of income.[5] Although this was a explicit belief of the utilitarianists, it was implicitly a belief of most of the early economists credited with developing utility theory. For example, all three of the economists who are generally credited with integrating utility analysis firmly into neoclassical economics – Walras, Menger, and Jevons (as well as Pareto and Marshall)– all considered an individual's total utility to be an additive function of the utilities from consuming each good such that $U_N=U(C_1) + U(C_2) + ... U(C_N)$ where C_N is the quantity of good N. Since each product was assumed to be subject to diminishing marginal utility $(\partial^2 U/\partial C_N{}^2 < 0)$, the marginal utility of income must also decrease as income increases. According to Stigler (1950), this implication of the additive function may not have been widely appreciated by many of these economists.

Combining utilitarianism with the diminishing marginal utility of income suggested that a rather egalitarian distribution of income would maximize social welfare. However, it should be noted that Bentham and his contemporaries, although egalitarian in terms of political rights were less so in terms of distributive justice (although Bentham broke with tradition and advocated that each child get an equal division of inheritance); Russell (1945) concluded that in the 19th century conflict between capital and labor (p.724), "the Benthamites, broadly speaking, sided with the employers against the working class." Bentham was cognizant of the likelihood that equality might reduce the size of the pie; in addition, his enthusiasm for too much equality, liberty and fraternity was tempered by the chaos that had engulfed France after the revolution. It was John Stuart Mill as he grew older who shifted the focus to improving the working conditions for labor and the poor; he even went so far as to advocate confiscatory (100 per cent) inheritance taxes (Scitovsky, 1964). By the end of the century, the idea that a redistribution of income towards equality would increase social welfare was found in most of the economic texts of the time (such as Pigou). According to Blaug (1978, p.318):

> Most writers after 1870 were extremely critical of the existing inequalities in income distribution and did not hesitate to use utility theory to fortify their critical outlook.

Little (2002, p.54) concludes that historically "utilitarianism was the main intellectual force driving most equalizing social reforms of the nineteenth and twentieth centuries." However, concerns about the detrimental effects that too much equality might have on economic growth and liberty were also widely recognized (Edgeworth, 1897).

Pareto raised objections to this line of inquiry, most specifically the ability to measure and compare utility, and proposed that economics should be "value-free" and based on a more scientific

[5] The proposition that there is a diminishing marginal utility of income was first formally advanced by Bernoulli in 1738.

footing.[6] This view was later adopted by Robbins and came to dominate the economics profession in the second half of the 20th century; however, the Cambridge School was never really converted. Pigou, although accepting Pareto's critique at the highest scientific level, nevertheless viewed it as irrelevant for the practical application of economic welfare analysis. Pigou concludes (1951, p.292):

> If we take random groups of people ... we find that in many features that are comparable by objective tests they are on average pretty much alike. On this basis we are entitled, I submit, to infer by analogy that they are probably pretty much alike in other respects also. In all practical affairs we act on that supposition. We cannot prove that it is true. But we do not need to do so. Nobody can prove that anybody besides himself exists, but nevertheless, everybody is quite sure of it. We do not, in short, and there is no reason why we should, start from a *tabula rasa*, binding ourselves to hold every opinion which the natural man entertains to be guilty until it is proved innocent. The burden is the other way. To deny this is to wreck, not only Welfare Economics, but the whole apparatus of practical thought. On the basis of analogy, observation and intercourse, interpersonal comparisons can, as I think, properly be made.

This assessment was typical of the Cambridge economists of the time, according to Scitovsky (1951, p. 303) they "duly noted these difficulties and promptly dismissed them as unimportant." They continued to accept the law of diminishing marginal utility and assume that individuals had equal propensities for enjoyment (which allowed interpersonal comparisons). This was also the assessment of Keynes who, although not a utilitarianist, took issue with Robbins and argued that economics was a moral science that justifiably employed introspection to analyze the intentions, motivations, and reactions of economic agents (Bateman and Davis, 1991).

This issue as to whether the capacity of individuals for enjoyment is similar in all was central in the debate about interpersonal utility comparisons. For those wishing to salvage the old welfare economics, it was argued that although individuals might vary, random groups of individuals would not, and since there was no reason to believe that income would be correlated with this ability for enjoyment, it was appropriate to assume equality of capacity for enjoyment (Melville, 1939). Similarly, Keynes argued that although introspection may not allow one to know the thoughts and feelings of a particular individual, it was reasonably possible to understand average behavior (Bateman and Davis, 1991). In addition, Lerner (p.355 in Blaug, 1978) showed that even if some were more able to get enjoyment from a given level of income than others (i.e., had higher marginal utilities), as long as it is unknown who these people are, any movement away from equalitarianism lowered the expected value of overall utility. Although these refinements did not make interpersonal comparisons more scientific, it did provide some support for making this an "acceptable" value judgment. Arrow (1973, p.252) has observed that "the problem of interpersonal comparisons of utilities seems to bother economists more than philosophers."

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[6] Of course, as argued by Sen (1982), the Pareto criteria is not value-free but is based on a value judgment that is just more universally accepted.

It should be noted that even Lionel Robbins who strongly questioned the scientific validity of making interpersonal utility comparisons did not question the desirability of doing so. Robbins stated (1938, p.641):

> ... its justification is more ethical than scientific. But we all agree that it is fitting that such assumptions should be made and their implication explored with the aid of the economist's technique. Our dispute relates to definitions and to logical status, not to our obligations as human beings.

The introduction of the social welfare function (SWF) by Bergson and Samuelson allowed ethics to be integrated into welfare economics in a more transparent manner. The social welfare function explicitly defined the social welfare as a function of the utilities of the individual members of the society. Thus the social welfare function could be expressed mathematically as $W = f(U_1 ..U_N)$ where W is social welfare and U_N is the welfare of the N^{th} individual. The mathematical form of the function was dictated by the ethical standard. Bergson (1938) appears to have been the first to mathematically specify the Cambridge School's utilitarian objective as $W = \Sigma U_N$; this mathematical form has sometimes been labeled as the Benthamite SWF.[7] This has generally been accepted as the utilitarian objective, although it still might be possible for a utilitarian to object to this formulation by arguing that social welfare is more than simply a function of the individuals' welfares of the population. However, according to Bentham, " The interest of the community is -- what? The sum of the interests of the several members who compose it."

Harsanyi (1953; and 1955) used Neuman-Morgenstern decision theory under uncertainty to propose the "veil of ignorance" concept of justice whereby justice could be defined as the social state a person would pick if he knew that he would be a member of a given society but was not aware of which specific individual he would be.[8] Presumably, under these conditions a person would be impartial and therefore his decisions would be fair. Under this veil of ignorance Harsanyi proposed that an individual would use the Neuman-Morgenstern decision rule of maximizing expected utility. He demonstrated that an individual who wished to maximize his expected utility would choose the social state where the objective was to maximize the sum of utilities of the individuals. Thus Harsanyi demonstrated that utilitarianism was a philosophy that a rational individual would choose if he accepted the higher ethical principle of the veil of ignorance. Lerner (1944) had previously demonstrated that an equal distribution of income maximizes the expected utility of a person who is uncertain of his future position.

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[7] There have been numerous discussions through the years as to whether the utilitarian objective should be to maximize W or W/n; in this analysis the number of members (n) is considered exogenous and thus the two objectives will be considered equivalent. The question of whether future generations utilities should be discounted is also ignored.

[8] The actual terminology comes from Rawls (1971); previously writers such as Harsanyi used the similar concept of the original position. Rawls credits the origin of the concept to Kant's categorical imperative. There is also a vague correspondence with the biblical golden rule.

Yew-Kwang Ng (1975) demonstrated that the only type of social welfare function consistent with certain "reasonable" assumptions had to be of the additive form, i.e., $W = \Sigma U_i / a_i$. This outcome results from acceptance of an individualistic social welfare function, i.e., $W=f(U_i, .., U_N)$ and the Weak Majority Preference Criterion which requires that if at least half of the population prefers state x to y, and no one prefers y to x, then x can be considered superior to y. This additive mathematical form results in making the convex egalitarian social welfare function unacceptable. With additional assumptions similar to the postulates for the expected utility hypothesis applied to social choice, the social welfare function can be further restricted to the form $W=G\Sigma U_i + H$ where G and H are constants. Thus Ng provides further justification for an utilitarianist social welfare function.

The new field of evolutionary psychology suggests that mankind's moral sense is to some degree genetically ingrained (Wilson, 1993); within this framework there is a possible biological root for a utilitarian belief.[9] If utility represents different levels of biological fitness,[10] then under conditions of uncertainty as to what shocks an individual might expect to experience, a utilitarian rule for social decisions would maximize not only one's expected utility but one's expected biological fitness. Therefore a preference for a group or coalition of individuals to be governed by a utilitarian standard might have a biological basis since those belonging to groups that adopted that standard would have had a higher probability of surviving.[11] Of course, explaining that there might be a biological basis for a utilitarian belief does not in any way provide it with moral legitimacy, but may only explain the widespread appeal of the doctrine.

Finally, to conclude the discussion of moral philosophy, the field of moral psychology has attempted to investigate what determines one's moral choices. For example, a number of researchers (Dickinson and Tiefenthaler, 2002; and Andreoni and Vesterlund, 2001) have found that when there is an efficiency (higher joint payoff) equity tradeoff, men are significantly more likely to favor the former. Another finding is that often the same person makes a different choice for what would appear to be essentially the same moral dilemma. It has been determined, using brain imaging technology, that the different result occurs because the different situations are analyzed in different sections of the brain depending on the level of emotional response induced by the specifics of the situations proposed (Greene, et al, 2001).

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[9] As an interesting side note, Charles Darwin (1871), the father of evolutionary psychology, who had argued that mankind's moral sentiments had a biological basis was also a utilitarianist; however he never made the connection between these two strands of thought (Wright, 1994).

[10] This concept and some addition possible outcomes are discussed in Waldman (1994), and Hansson and Stuart (1990).

[11] There is an element of group selection in this argument if considering a group-wide decision criteria, but selection could occur at the level of the individual if small voluntary coalitions of individuals had a decision criteria.

Modern welfare analysis of trade has proceeded down a long and winding road to nowhere since Robbins' critique. Although a number of other avenues have been suggested, there is no accepted approach for deriving social welfare from individual welfares without incorporating cardinal utility and interpersonal comparisons. Arrow demonstrated (1950) that voting could not be used to derive the social welfare from the individual's ordinal rankings of welfares. Even the objectivity of this line of thought was questioned by Hildreth (1953) who argued that although Arrow's objective was to rank social states without interpersonal comparison's of utility, that in fact accepting the legitimacy of majority voting implicitly created a mechanism that essentially made interpersonal comparisons of utilities. Thus Hildreth concluded that if there is to be welfare economics, the issue is not whether it is necessary to make interpersonal comparisons of utility, but rather what sorts of interpersonal comparisons we are willing to make. Kemp and Ng (1976) and Parks (1976) demonstrated that in order to rank social welfare states using a SWF it was necessary to not only have interpersonal comparisons, but also that individual utility functions must be cardinal.[12] Thus Welch (1987) has concluded that "far from resolving these problems, the [modern] economic theory of social choice has merely transposed them into different terms." Chipman and Moore (1978, p.581) conclude, "When all is said and done, the New Welfare Economics has succeeded in replacing the utilitarian smoke-screen by a still thicker and more terrifying smoke-screen of its own." It is therefore apparent as argued by Landreth and Colander (1989, p.335) "that economists will either have to abandon the study of welfare economics or join other disciplines in a search for a theory of social welfare that explicitly recognizes the necessity of normative judgments."

In conclusion the ethical principle of utilitarianism, although widely criticized and rejected by many, remains the ethical belief system by which all others are judged. In the analysis to follow, social welfare will be defined using a more generalized form so that it remains relevant for those of other philosophical persuasions. However, the emphasis will be on the utilitarian implications given the dominance of the philosophy and the important role it has played historically in economic welfare analysis.

Quantifying the Utility Function

In order to apply utilitarian welfare analysis to issues concerning income distribution, the Cambridge tradition was to assume a utility function which was dependent on income and subject to the law of diminishing marginal utility. The law of diminishing marginal utility of income assumes that utility increases with income (I) at a decreasing rate, i.e., for the N^{th} individual, $U_N = f(I_N)$ where $\partial U_N / \partial I_N > 0$ and $\partial^2 U_N / \partial I_N^2 < 0$. Debates as to whether this utility function was cardinal or ordinal dominated the first half of the 20th century. As discussed, the SWF can only be usefully used to rank social welfare if utility is assumed to be cardinal.

[12] Ordinal utility functions are sufficient to derive the conditions for Pareto optimality; however, the choice between Pareto optimals requires the assumption of individual cardinal utility functions (Mueller, 2003).

Cardinal utility was resurrected, with the work of J. von Neuman and Oscar Morgenstern[13] who resurrected the early 18th century work of Daniel Bernoulli and Gabriel Cramer (of matrix algebra fame), on how individuals make decisions under uncertainty. Many of the old welfare school, including Roy Harrod and Dennis Robertson, remained strong "cardinalists" to the end; Robertson was a member of the Cardinal Club for which he even offered to design a club tie (Clark, 1973). Nobel prize winner Frisch (1964) continued to argue for cardinal utility, stating (p. 418), "The idea that cardinal utility should be avoided in economic theory is completely sterile."

Even assuming cardinal utility, the empirical acceptability of the principle of diminishing marginal utility of income was questioned by the observation that some people were willing to gamble. An individual wishing to maximize his expected utility would not accept a fair bet (i.e., he would be risk averse) if his utility function had the property of the diminishing marginal utility of income. It was also observed that many of these same gamblers also took out insurance. Numerous papers, including those of Friedman and Savage (1948) and Markowitz (1952) have suggested that there are various inflection points in the utility function; however, it has generally been assumed that the overall shape of the utility function was generally subject to diminishing marginal utility of income, although smaller segments might be convex. If the inflection point is dependent on current income, it does raise the possibility that there is not a universal stable utility function.

Given an utilitarian SWF it is possible to derive some conclusions such as the desirability of an egalitarian income distribution from the generalized utility function when total income is fixed; however, in order to rank situations of less than perfect equality, or situations where the distribution alters total income, it is necessary to specify a specific functional form for the utility function in order to derive welfare conclusions. Although there has been considerable effort devoted to discussion of the utility function in the abstract, it is surprising that in the long tradition of Cambridge welfare analysis that this issue of functional form did not receive any substantive treatment. Thus not only is there no "utilitarian consensus" but there was no real discussion of the issue at all. The only hint of what properties a functional form should have is to found in Bentham, who stated (1834, III, p.229), "It will even be a matter of doubt whether ten thousand times the wealth will in general bring with it twice the happiness." Thus a Bentham utility function would appear to require that the utility level of a very rich person should be no more than twice that of a poor individual.

Bernoulli (Blaug, 1978), who was the first to explicitly propose a diminishing marginal utility of income in the early 18th century, hypothesized that total utility is a function of the log of income. This functional form has the property that the marginal utility of income is $\partial U/\partial I = 1/I$. Also, each time a person's income is doubled, his utility goes up the same amount and his marginal utility falls by one-half; thus the gain in utility going from \$10,000 to \$20,000 is the same as going from \$20,000 to \$40,000. The log function also would appear to be generally consistent with the belief of Bentham since an income of 10,000 times greater than a subsistence level (assumed to be \$10,000) is required for total utility to double. Stiglitz (2000, p. 116) concludes that, "most

[13] More specifically, utility could be measured up to a linear transformation.

economists argue that a doubling of income will lower the marginal utility of income by a factor of between 2 and 4." Therefore Stiglitz's general assessment would be consistent with the log function. The classic linear logarithmic utility function where: $ln\ (U) = \Sigma\beta_i\ ln(q_i)$ and q_i is the quantity of each good i (β_i is a constant) also has the same fundamental relationship between income and marginal utility as the basic log function, i.e., when income goes up by x, marginal utility falls to $1/x$ (assuming the same commodity bundle). The log function is also consistent with the Weber-Fechner Law from psychological studies where: *Sensation= k log(Stimulus)*.

Frisch (1964) argued that consumption studies could be used to measure the rate at which marginal utility declines with income (his flexibility coefficient) although the level of marginal utility could not be empirically determined. Clark (1973) attempted to calculate this rate of decline and came up with estimates that a doubling of income would reduce the marginal utility of income by one-half and a quadrupling of income would reduce it to a fourth. This is generally consistent with a log function.

Some may consider that the degree that the marginal utility decreases (as income increases) in the log function is excessive, so a more general function may be desirable. A utility function of income to an exponential power provides a useful class of functions, where if $U=I^{\beta}$, the $MU=\beta I^{\beta-1}$. For the marginal utility of money to fall, $\beta < 1$. As the value of β is decreased the marginal utility of money falls more rapidly. In Table 1 below the marginal utility of income for multiples of any given level of income I is provided for values of β equal to .75, .5, .25, and .1. Also included is the log function for comparison. Thus for example, assuming the square root utility function (β=.5), someone making four times the income of someone else derives only one half of the marginal utility of the poorer person from the last dollar of income.[14] Note that as $\beta \rightarrow 0$, the function approaches the log function, since when using the exponent function, the ratio of marginal utilities of an individual with an income of x times another is $x^{\beta-1}$ while using logs is x^{-1}.

This functional form is essentially equivalent to the utility function widely used by Atkinson where $U=Y^{(1-\alpha)}/1-\alpha$, and $1< \alpha <2$. The late Brookings Institution's scholar, Arthur Okun (1975), in this study on inequality provided a number of specific redistributions that he considered acceptable. These redistributions turn out to be consistent with a utility function that is a $3/4^{th}$ root function of income ($U=I^{.75}$).[15] Fair (1971) using a similar mathematical form concluded that the exponent on

[14] Note that Plato (1960, p.127) argued that no one in a society should be more than four times richer than the poorest member.

[15] Okun (1975) provides several combinations of tax-transfers that would be acceptable to him; from these this author has derived a utility function that would be consistent with these transfers being desirable. Great liberties have been taken in invoking Okun's name, however, since he was critical of interpersonal utility comparisons in the abstract. In addition, it is possible that built into these transfers are his perceived concerns about incentives, thus he might have advocated a more egalitarian split of a fixed pie.

income was approximately .3.[16]

Table 1 – Diminishing Marginal Utility and the Utility Function

Utility Function	MU at 2I/MU at I	MU at 4I/MU at I	MU at 16I/MU at I
$U = I^{.75}$	.841	.707	.5
$U = I^{.5}$	.707	.5	.25
$U = I^{.25}$	.595	.354	.125
$U = I^{.1}$	.536	.287	.082
U = ln(I)	.500	.250	.063

However, the use of a simple log or exponent function has several significant shortcomings. Firstly, utility is not invariant to nominal changes in income; in addition, cross-country comparisons where the standard of living varied significantly might also be questionable with this function. Thus, it would seem that the level of income level should be standardized by some factor to eliminate this nominal effect. Here it is proposed that income should be standardized by redefining it as the level of nominal income (*N*) divided by the level of subsistence income (S); thus *I=N/S*. When using the log form for the utility function, i.e., *U= ln(N/S)*, the subsistence level of income has a value of zero. If a subsistence level is given a value of zero, however, relative comparisons to this base line level (such as this individual is 3 times better off than this individual) become somewhat meaningless or undefined since it involves division by zero. In addition, it might be reasonably argued that even at the minimum level of subsistence, the utility level is some positive number and some addition disutility must be included such as work or pain in order to get the individual to a level of utility of zero where he may be indifferent towards living. In addition, most individuals consider life at subsistence preferable to death, and most societies are not indifferent between a person at subsistence and a dead person. Thus it would appear to be reasonable to assume that the utility level of minimum subsistence corresponds to some positive level of utility. A desirable utility function would have the form of *U= ln(N/S) + ln C*, where *C* is a constant equal to how many times the subsistence level of income is required in order for utility to double. This functional form is therefore able to incorporate Bentham's "doubling" proposition (i.e., *C*=10,000). A third factor could be added to include disutility from pain, etc., but that is not relevant to the issues addressed in

[16] Fair (1971) assumes a Cobb-Douglas utility function with income and leisure. The exponent on income is then derived to be the percentage of the total possible working time an individual works.

this paper.

An alternative approach to using one's introspection about marginal utilities at different levels of income to determining the degree of curvature in the utility function, is to use the expected value of utility hypothesis to evaluate the desirability of different levels of income. For example, consider the following choice. An individual has the option of either making $100,000, which is the average for an economics professor at a doctoral institution; or being given a 50 percent chance of consuming at the level of about $10,000 which is the assumed level of a subsistence existence (or graduate student), or a 50 percent probability of consuming $1,000,000. Almost all of my acquaintances in an unscientific sample picked the $100,000 without hesitation. Thus we should expect that the functional form chosen will at least be consistent with this choice. In order to pick the $100,000 alternative, the exponent utility function needs a β of less than .1 while the log function requires that C be greater than 100.

It has also been argued by Hardin (1982) that in order to address the problems raised by Bernoulli's Saint Petersburg Paradox it is necessary to assume that at some level of income total utility reaches some maximum. In addition, there have been attempts, such as Mosteller and Nogee (1951), to determine the shape of the utility curve by using empirical experiments. These researchers used fairly complex games of chance using very small dollar amounts to estimate the shape of utility curves. Unfortunately from these experiments the authors concluded that it did not appear that the subjects had similar or constant utility curves nor did they appear to maximize their expected utility. A number of explanations for these behaviors have been postulated, but further analysis along this line is not considered here; these issues are mentioned simply to point out that many questions remain about this line of thought.

Note also that we have continued to assume that each person's utility is dependent only on their own income; each person's utility level is not a function of the incomes or welfares of others. However, there is evidence that utility levels are interdependent. In fact there is much research which suggests that relative income, and not absolute income is the most important factor (Easterlin, 2001). Thurow (1971) suggests that the distribution of income may be an argument in each person's utility function. Generally when relative income is introduced into the utility function, social welfare maximization requires more equality than when relative income is left out (Boskin and Sheshinski, 1978). Envy is also clearly a human trait, but this also is entirely ignored in applying the Pareto criterion. Although these issues of interdependence will not be addressed in this paper, it further demonstrates how flimsy the current foundation of welfare economics is. It is only by ignoring this relative effect that the Pareto criteria for social welfare concerning utilities can be applied to income. Alesina, Tella, and MacCulloch (2001) find that the level of inequality in a society is a significant factor in explaining the level of happiness in Europe, but not America. Thus this would suggest that our proposed welfare function possibly undervalues economic equality by not adjusting the individual utilities appropriately. Since quantification of this interdependence involves another great leap into the normative abyss, it will not be undertaken. But it must be recognized that any gain in our social welfare function that includes greater inequality is probably less than its actual gain.

Quantifying the Social Welfare Function

Modern welfare economics has not been especially concerned with the ideal functional form for the social welfare function. This has been due to the fact that the derivation of the Pareto conditions only requires that the SWF be ordinal; thus whether the SWF is multiplicative or additive is not significant since one can be transformed into another by a monotonic transformation of the individual utility indices. However, in order to specify the level of social welfare it is necessary to have a specific cardinal function. For the analysis here, the social welfare will be defined using a generalized social welfare function first proposed by Alexander (1974). Social welfare is defined with the general function $W = (\Sigma(U_N{}^{\alpha}))^{(1/\alpha)}$ where α is unconstrained; in the two-person case (*A* and *B*) this is expressed as $W= (U_A{}^{\alpha} + U_B{}^{\alpha})^{(1/\alpha)}$. When $\alpha=1$, the function essentially becomes the utilitarian social welfare function where $W= U_A + U_B$ for the two person case. If the utilities of the two individuals are put on the axes, then a utilitarian social welfare curve is a straight line with a slope of minus one. There is nothing desirable about a more equal distribution of utilities. Many of those who have objected to utilitarianism have objected to it as not being egalitarian enough. When $\alpha<1$, the social welfare function becomes convex in utility space implying a preference for equality of welfare.[17] The practical importance of this disagreement may possibly be reduced once inequality is discussed using income as opposed to utilities. Since the utilitarians in practice also believe in the law of diminishing marginal utility of income, in terms of income space, the points of equal social welfare are a convex curve. It is possible for a utilitarian with a significantly concave utility function to have a more convex social welfare function in income space than an egalitarian with a more linear utility function. It is interesting that so much of the philosophical opposition to utilitarianism has come from those advocating a more egalitarian perspective, since as a practical political matter, it is clear that the majority opinion of the general public is even less egalitarian than utilitarianism. Little (2002, p54) likewise has concluded that "utilitarianism is too egalitarian for almost everyone's taste." Given this observation, as well as the long historical support for utilitarianism, in this paper the social welfare function is formulated using Alexander's formulation but with special emphasis on the utilitarian specification.

In picking the most desirable form for the utility function, it is necessary to consider not only

[17] There are other more egalitarian functional forms such as that used by Nash (1950) and Fair (1971) who suggested $W = \Pi U_N$. Kaneko and Nakamura (1979) provide a theoretical justification for that formulation. Fair stated that this function "seems to be consistent with commonly held ethical views." Ng (1981) found this function to be the most popular one in a random survey of economists in British universities. However, the function gives inordinate weight to small gains to those most worse off. This seems inconsistent with individual behavior under uncertainty and inconsistent with economic policy as actually practiced. This inadequacy is especially important when death is a probable outcome; this function assumes that society would be willing to reduce the utilities of all members of a society by a tremendous amount in order to keep one person from dying. However, poor members of society die all the time from the lack of medical care, freezing on the street, or having to drive an unsafe car. Realistically, society obviously does not put that much weight on one individual. In this case the function even violates the Pareto principle.

its realism towards how utility is related to income for an individual but also how usefully that functional form can be incorporated into a social welfare function. If we adopt Alexander's specification for the social welfare function, a utility function with utility as an exponential function of income[18] has certain desirable mathematical properties which can be best demonstrated by assuming two individuals (*A* and *B*). With the Alexander social welfare function and assuming utility is a function of income to the β power where $0<\beta<1$, then:

$$W= ((I_A^{\beta})^{\alpha} + (I_B^{\beta})^{\alpha})^{(1/\alpha)}$$
$$W^{\alpha} = ((I_A^{\beta})^{\alpha} + (I_B^{\beta})^{\alpha})$$

Along a given social welfare curve where $d(W^{\alpha})=0$,

$$d(W^{\alpha})=(\partial(I_A^{\beta\alpha}) / \partial I_A)\, d I_A + (\partial(I_B^{\beta\alpha}) / \partial I_B)\, d I_B = 0$$
$$(\partial(I_A^{\beta\alpha}) / \partial I_A) / (\partial(I_B^{\beta\alpha}) / \partial I_B) = - (d I_B)/(d I_A)$$
$$(I_B/I_A)^{(1-\beta\alpha)} = - (d I_B)/(d I_A)$$

Thus in income space, the social welfare function is homothetic in that the optimal distribution of a given amount of income is independent of the level of income. Also, as can be seen β and α affect the income trade-off essentially in the same manner. Thus this functional form for the social welfare function is desirable since its coefficients can be interpreted in a number of different ways that would be consistent with a wide number of ethical standards. For example, with a exponent of one half, the function can be interpreted to be a situation with a utilitarian social welfare function with a utility function which is the square root of income, or alternatively could be interpreted as a social welfare function with a preference for equality of utilities ($\alpha = .5$) but where utility is proportional to income ($\beta = 1$). Therefore if income were to increase by a certain percentage, the amount of inequality that could be tolerated in order to maintain the same level of social welfare is the same for any function with the same value of αβ. Also note that a utilitarian ($\alpha=1$) who believed in rapidly diminishing utility of income (i.e., $\beta=.25$) would have a more convex social welfare function in income space than an egalitarian with $\alpha=.75$ who believed in a less steep diminishing marginal utility of income of $\beta=.5$. Also note that although the shape of a social welfare curve (for a given distribution of income) is dependent only on the product αβ, the spacing of the indifferent curves is a function only of β (along a ray, an increase of income by *x* increases social welfare $x^{1/\beta}$). Thus the substantive differences between utilitarianism and the more egalitarian philosophies in terms of the preference for an egalitarian distribution of income is much less than is generally assumed once it is accepted that a concave utility function is and always has been a fundamental and integral part of utilitarian philosophy.[19] There may, of course, be situations in

[18]For this section, the income variable can be defined as either *N/S* or *N*; the results are the same.

[19]The discussion of Blackorby and Donaldson (1978) is typical of much of this literature; they define social welfare as a function of "the incomes or utilities" and apparently which doesn't seem to affect their function. Similarly, Kelsey (1994) discusses utilitarians with linear utility functions; utilitarians from the very beginning have never assumed a linear utility function. These authors assessments that "the utilitarian rule has no distributional content" is true for the utility

which these differences become substantive, such as when discussing utilities that are not related to income or the quantity of consumption.

If utility is defined as a log function of income, $U_N=ln(I_N) +lnC$, then in the two person case, the slope of the Alexander social welfare function is:

$$- (d I_B)/(d I_A) = (\alpha (ln I_A+ln(C))^{\alpha-1}/I_A)/(\alpha (ln I_B+ln(C))^{\alpha-1}/I_B)$$

which in the utilitarian case (i.e., α=1) condenses to I_B/I_A. Since the slope of a social welfare curve is the ratio of the two individuals' marginal utility of income, then any point on this social welfare curve has the property that $MU_A/MU_B=I_B/I_A$. Note that this results in a function similar to the exponent case where β=0, and has the very intuitive feature that if individual *A* is *x* times richer than individual *B*, then individual *B* has *x* times the marginal utility of individual *A*; likewise, if we take *x* dollars from A we need give only one dollar to *B* in order to keep social welfare constant.

Thus we have a class of social welfare functions with the desirable property that for a given ratio of income between the two individuals, their ratios of marginal utility are fixed. The convexity of the social welfare function is a function of α β. In the utilitarian case (α=1), when β=0 (defined as $U=ln\ I+ln\ C$) the social welfare curve is quite convex, and becomes flatter as β increases (defined as $U=I^{\beta}$ when β>0) until it becomes a straight line with no preference for income equality when β=1. When α<1, the social welfare curve is more convex (than when α=1) and becomes less convex as β increases but never becomes linear.

Finally it should be pointed out that the implication of this social welfare function, where increases in national income that are unequally distributed might actually lower welfare, is consistent not only with the introspective assumptions about utility but is also consistent with a wide range of objective social welfare measures. Figure 1 shows how the Fordham Institute's Index of Social Health for the United States, using indicators such as child poverty, health care coverage, and youth homicide, declined over the last several decades despite the increases in GDP; this divergence began with the increases in inequality which started in the 1970s.

Trade and Income Distribution

The fact that trade could increase national income but could also redistribute income has been recognized since Ricardo. It was understood that the Corn Laws (tariffs on the import of corn into England) benefited the owners of land and lowered the real wages of the urban workers. Debate about the effects of the Corn Laws was central in the debates about welfare economics in the 19th century. The distributional consequences of trade for the factors of production in the neoclassical

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distribution but not the income distribution. Ng (1975) has suggested that many of those preferring a convex SWF in utility space suffer from "utility illusion" resulting from double discounting for income's effect on utility.

trade model were generally understood by Heckscher (1919) who believed that a factor could lose from trade. This was more rigorously developed by Lerner in 1933 (Chacholiades, 1978), although many prominent economists of the time (i.e., Haberler) contended that trade could not lower absolute wages. The definitive treatment was provided by Stolper-Samuelson (1941) who showed formally that trade liberalization would lower not only the relative return to the scarce factor but its absolute return as well. An important assumption of the modern welfare theory of international trade is that a dollar of income produces the same amount of social welfare regardless of who spends it. However, once it is recognized that the income levels of the winners and losers differ, and that the marginal utility of that dollar is different for the losers and winners, the question arises as to whether the social welfare changes produced by the income redistributions inherent in trade are able to dominate the social welfare improvement from a larger national income. This outcome is most likely if the redistributions of income are large relative to the efficiency gains and if the income of the winners is appreciably larger than the losers.

The average advocate for trade greatly underestimates the amount of redistribution involved with trade policy changes. In their view trade produces large efficiency gains with only a second order distributional shift. The evidence, however, suggests that trade taxes are similar to most other taxes; the redistributions are large, and the efficiency effects are of only second order importance. Rodrik (1992) has created an index referred to as the political cost-benefit ratio (*PCBR*) calculated as the amount of redistribution required in order to obtain one dollar of net income gain. Rodrik's formula for the $PCBR = -1/(\mu\varepsilon t)$, where μ=the share of imports in domestic consumption, ε=import demand elasticity, and t=tariff level. The *PCBR* index increases with increases in μ, ε, and t. Rodrik concludes (p.12) " in most reasonable circumstances the *PCBR* lies above 5." In other words, the losers will lose $5 in order for the winners to get $6. However when the share of imports is low (i.e., 10 percent) and when the tariff is low (i.e., 10 percent) the *PCBR* approaches 25. The large amount of redistribution relative to efficiency gain is most obvious in the simple partial equilibrium diagram of a tariff in Figure 2. If S_W represents the world price, then the domestic price with a tariff is $S_W + t$. If the tariff is eliminated, the efficiency gain is represented by the area of the two small triangles *EDH* + *BGC*, while the redistribution of income is represented by the area of *JEHK* + *EBCD*; as can be seen, the amount of income redistributed is much greater than the net efficiency gain. Samuelson and Nordhaus (1992, p. 682) are one of the few to recognize the relative size importance of redistribution; they state, "When a tariff is imposed, part of the impact is upon economic efficiency but the largest effect is often redistributive."

For the analysis here, the ratio of factor income redistribution (*R*) to efficiency gain (*E*) will be defined slightly differently than by Rodrik and made more applicable for analyzing trade liberalization in general equilibrium. The tariff revenue is assumed to be redistributed to the factors in general proportion to their overall income shares; thus changes in tariff revenue do not produce measurable redistributions of income. If the tariff revenue changes are included as part of the redistributions, then the calculated amount of redistributions would be about 50 percent higher. Since prices change, the usual questions arise as to how to calculate real income changes; in this analysis the redistribution and efficiency gains are calculated as equivalent variations in income. Since the definition of what constitutes a redistribution differs slightly from how Rodrik calculates it, the terminology used here will refer to the ratio of redistributions to efficiency as the *R/E* ratio

instead of using Rodrik's *PCBR*. Note that both the redistributions and the efficiency gains are calculated within the standard framework of real trade theory, where any transitional costs are ignored and where none of the factor endowments are lost. Including the transitional costs of unemployment and relocation costs, and the possible loss of sector specific physical and human capital would reduce the efficiency gains and increase the redistributional effects. Since these transitional costs are not included, the government's provision of trade adjustment assistance is also not considered relevant since it is concerned primarily with reducing these adjustment costs.

In the standard general equilibrium H-O trade model; the ratio of redistribution to efficiency depends on a number of parameters in the model such as the similarities of the factor endowments and factor intensities, the marginal rate of substitution in consumption, the level of tariffs, and the terms of trade. In a standard 2-factor 2-good H-O model with fixed terms of trade and with Cobb Douglas consumption and production functions, the ratio of factor income redistribution (R) to efficiency gain (E) has a general magnitude usually between one and three. Thus when the R/E=3, the losing factor loses three dollars for every four dollars gained by the gaining factor.

For the small country case, where the terms of trade are fixed and external to the model, the redistribution-efficiency ratio increases as the tariff rate (t) falls, increases as the terms of trade decline (tot), and increases as the factor intensity of the two goods increases($k_x=K_x/L_x$). Changes in demand created by changing the exponents in the consumption function either increase both factors' incomes or decrease both depending on initial demand conditions. Thus

$$\underset{\text{R/E}}{} = f(\underset{-}{t},\ \underset{-}{tot}\ ,\underset{+}{k_x/k_y})$$

It is often suggested that the factor relocations implicit in the standard H-O model will only occur over many years, perhaps even a decade, and that a model with capital fixed in its sectors is a more realistic approach to modeling trade policy outcomes. The reallocation to efficiency ratio is also calculated for the specific factor model where capital is specific to its industry using similar coefficients (and fixed TOT) as in the H-O simulations. Using the Cobb-Douglas functional forms and capital specificity, results in a reallocation of labor by sector, as well as efficiency gains that are only about 6 percent of those that result in the standard H-O case. A tariff reduction increases the return to capital in the expanding industry and decreases its return in the contracting industry; the wage rate can either increase or decrease (depending on demand conditions), and therefore need not move in the direction specified in the long run by Stolper-Samuelson (Mayer, 1974; and Mussa, 1974). In this model, therefore, there are redistributions not just between capital and labor, but between capital in the different sectors. If the owners of capital are assumed to hold a diversified portfolio, then only the redistributions between capital and labor may be important; in this case the R/E ratio has a similar magnitude, as in the H-O case. If the redistributions between the owners of capital are considered, the R/E ratio increases to over 5. Thus the losers lose $5 for every $6 gained by the winners. Although the R/E ratio may be higher in the specific factors case, the implications of this for social welfare, as will be discussed in a later section, turn out not to be significant for welfare calculations, since the income level of many of the winners and losers may be the same, since they are capital owners.

As is well known, the gains from trade liberalization can be reduced significantly or even turned into losses once possible terms of trade changes are allowed. Using a simple miniature CGE (with a H-O core, and reasonable parameters for technical efficiency differences, trade tariffs, and endowment differences, etc.) developed by Shelburne (2004) to describe North-South trade, this *R/E* index for the North is found to be 1.7 for a foreign (i.e., South) liberalization, 3.4 for a mutual liberalization, and 7.7 for a domestic (i.e., North) liberalization.

An examination of other CGEs developed by other economists provides similar estimates. For example, it is possible to calculate the *R/E* implicit in a model developed by Lawrence and Evans (1996). This model was developed to examine the trade and wages issue; Lawrence is well known as an author who has argued that wage effects from trade are minimal. Yet the *R/E* ratio in their "base case" model is 4.93; that being, $4.93 must be taken from unskilled workers (high school or less) for every $5.93 that goes to skilled workers (at least some college education). This study also presented various results using different assumptions about the elasticity parameters using constant elasticity of substitution production and consumption functions; from these it is possible to determine how these alter the implications for distribution and efficiency. Generally, as the elasticity of substitution between the factors in production is reduced (e.g., less elastic) and as the elasticity of substitution between the goods in consumption is increased, the greater the overall net efficiency gains from trade. Even in the case where the efficiency gains are the largest relative to the distributional change (production elasticity of .5 and consumption elasticity of .99), the *R/E* is still 2.66. Generally, parameter changes that increase the efficiency gains from trade also increase the allocative distributional changes, so that the implicit *R/E* is relatively invariant to the assumed parameters.

Krugman (1995) presents a stylized tiny CGE to assess the possible role of increased North-South trade on increasing the wage premium for skilled labor. This model, like much of the literature on the trade wages debate, assumes two factors -- skilled labor and unskilled labor. Although he does not present the necessary data to calculate *R/E* ratios in that article, this author has recreated his model (see Appendix A) and obtained the necessary data. The exogenous change in domestic prices assumed by Krugman that would be necessary to produce the observed level of North-South trade results in a *R/E* ratio of over 61. Thus the amount of income redistributed from unskilled labor to skilled labor by increased trade far exceeds (by a factor of 60) the increase in income from efficiency gains.

These results are derived from simple trade models using the standard assumptions. More complex CGE models may incorporate additional factors. The results of a study undertaken by the U.S. International Trade Commission (2003) on the economic effects of the U.S. safeguard tariffs on steel (imposed in 2002) provide sufficient information to compare the efficiency gains against the redistributions. This study used the ITC's workhorse CGE; unfortunately the values of the R/E ratio as previously defined cannot be derived from the published results because the tariff revenue is not allocated back to the basic factors of production. In addition, all labor is lumped together so that the likely gains accruing to the steel workers are not differentiated from the loses to the workers in the steel using industries. Nevertheless, the model finds that the tariffs resulted in $650 million of additional tariff revenue, the capital owners of the iron and steel industry getting an additional $240

million, capital owners in auxiliary industries to the steel industry such as iron ore mining, coal mining, custom roll forming, energy and services gain $67 million, while labor income falls by $386 million and capital owners of steel-consuming industries lose $601 million. The "central case" overall welfare gain is $41.6 million. Therefore, the elimination of the safeguard tariffs would redistribute almost $1 billion while the efficiency gains would be $41.6 million; the implied redistribution to efficiency ratio (but not technically the R/E ratio as defined) is around 23.

The standard trade model does not incorporate possible economies of scale, increased employment, or induced endogenous economic growth; inclusion of these factors would increase the efficiency gains relative to the distributional shifts. Although including these factors has become a popular device for trade liberalization advocates, the empirical literature supporting these factors is weak (a skeptical look at these factors is provided by Deraniyagala and Fine-2001). What is clear, however, is how dependent the actual benefits of trade liberalization are on these secondary factors. An additional factor in more complex models is sectoral wage differentials; generally it has been found that observed wage rents for workers in the import-competing sectors are lower. Liberalization then moves workers from low wage industries to high wage industries; this effect can easily outweigh any Stolper-Samuelson effect stemming from the reduction in demand for labor as production shifts to more capital-intensive sectors. However econometric evidence also suggests that increased imports further reduce the size of the rents in the import sector but increased exports do not appear to increase rents in the export sectors. Thus trade lowers the average (unweighted) labor rent; what happens to the average weighted labor rent has not been formally addressed. Another complexity that may be significant in calculating welfare effects concerns the assumption of homothetic utility functions. For example, there is some evidence that the poor spend a higher percentage of their budgets on import-competing goods such as apparel, and therefore the poorer workers gain more from the price reductions than consumers generally; it is possible that these price effects could potentially offset the real wage declines (Hanson and Reinert, 1997). Rodrik (1992) has argued that the efficiency gains may increase relative to the redistribution changes during times of macroeconomic turmoil. Thus a fuller analysis of the welfare effects may have to consider many factors not developed here. Unfortunately, the information published about these more complex CGEs was insufficient for calculating the *R/E* ratios implicit in those models. In addition, many of the CGEs which have played a significant role in the trade policy debates such as those developed by Brown, Deardorff and Stern have chosen to combine the labor types into one labor group which has had the effect of washing out an important component of the distribution effects of trade liberalizations. Historically, CGEs developed to examine the effects of trade policy on income distribution by income level (size distribution) have concentrated on developing countries. Adelman and Robinson (1988) in examining possible Korean economic policies, found that although trade policy affected the functional distribution of income, it had an insignificant affect on the size distribution. Levy and van Wijnbergen (1995) examined how regional integration would alter the household distribution of income in order to determine how emigration would be impacted.

Welfare Changes from Trade Liberalization

In the previous section it was demonstrated that the income redistributions from trade generally exceed the efficiency gains. This conclusion, by itself, does not allow an evaluation of how

a trade liberalization affects welfare. An additional piece of information that is required is how the income levels of the winners compare to the income levels of the losers[20]. It should be clear that if the income levels of the winners are greater than the losers, and the redistributions are large relative to the efficiency gains, that a trade liberalization could lower welfare if evaluated using a utilitarian social welfare function. In the purely theoretical model there is no presumption as to what the income levels are of the owners of the different factors, nor is the level of subsistence specified; therefore a determination of whether trade is welfare increasing or decreasing is difficult to make for the purely abstract model. If the utility function is assumed to be of the generalized form previously developed, $U=I^{\beta}$ when $\beta<1$ and $U=ln(I)+ln(C)$ when $\beta=0$, then for a trade liberalization to increase social welfare it must be the case that:

$$R/E \leq (x^{1-\beta}-1)^{-1}$$

where x is the ratio of the income of the winners (I_W) to the income of the losers. Therefore any change in social welfare will be negatively related to the R/E ratio, x, and I_W and positively related to β.

$$\Delta U_S = f(R/E,\ x,\ \beta,\ I_W)$$
$$\quad - \quad - \quad + \quad -$$

In order to draw more specific welfare conclusions, it is necessary to specify how the income of the gainers compares to the losers. Before proceeding with a more detailed examination of the empirical data, the assumptions made by the modelers previously discussed are examined. The general assumption that has been made in the literature is that the gainers have approximately twice the income of the losers. This is the basic assumption in Krugman (1995); in Lawrence and Evans (1996) this value is assumed to be 1.87, and is empirically derived to be 2.08 by Wood (1991).[21] These assumptions are generally derived from the wage differential between nonproduction and production workers, which was 57 percent in 1989, or the ratio of wages based upon education attainment. In 1995, the real hourly wage of those with only a college degree (i.e., no advanced degree) made 66 percent more than those with without a college degree (Mishel et. al, 1996). Applying the values of the R/E and x in their respective models suggest that in order for trade to increase social welfare, β must be greater than .98 in the Krugman model and greater than .70 in the Lawrence and Evans model. Thus in these models, in order to conclude that increased trade improved social welfare, it must be assumed that the marginal utility of income does not decline significantly as income increases.

The significant increase in inequality that has occurred in the United States over the last 25 years has been well documented. Almost every study undertaken to explain the factors causing the

[20] If the change in the overall distribution of income was known, it might be more useful to do the analysis in terms of how the distribution changed or some summary measure of it such as a Dalton-Atkinson measure.

[21] Wood (1991) estimated using 1985 data that skilled workers in the North made $14.99 an hour and unskilled workers made $7.21 (see his Table 2).

increasing income inequality in the United States have concluded that trade played a role. Many of these researchers like to point out that trade played only a minor role, but a small percentage of a negative number is still a negative number. Although much of the empirical literature on the trade and wages debate has focused exclusively on the role of trade in increasing the relative wage of the skilled, it is also probable that increased North-South trade has increased the return to capital as well. At the simplest level, there are three basic factors – capital, skilled labor, and unskilled labor. Unfortunately, most of the analysis has been done at the even simpler level of assuming only two factors, either capital and labor, or skilled labor and unskilled labor. Therefore the empirical studies do not provide much information about how increased trade impacted the income of these three factors.

Examining the changes in family income distribution by quintiles reveals that from 1970 to 1992, the bottom 60 percent of families lost 3.85 percent of total national GNI to the top 40 percent.[22] The average income of those in the top 40 percent were 3.69 times greater than the average income of those in the bottom 60 percent. Using the distribution of individual pre-tax income by quintiles, reveals that from 1979 to 1997, the bottom 80 percent of individuals lost 7.2 per cent of national income to the top 20 percent.[23] Between 1979 and 1998, the bottom 95 percent lost 10.6 percent of total income to the top 5 percent (Piketty and Saez, 2001). Those gaining significant income over the 1979-98 period were those in the top ten percent. This group derives a significant percentage of its income from capital; the top ten percent own 80 percent of net financial assets which includes business assets, stocks, and bonds (Wolff, 2000). Although the capital share of national income remained relatively constant, the capital share, even excluding capital gains, of U.S. personal income increased from about 14.5 percent in 1979 to 19.5 percent in 1998 (Piketty and Saez, fig. 10) and the after-tax profit rate has increased from 5.1 percent in 1979 to 7.0 percent in 1995. Given that for North-South trade, the capital-labor ratio of exporting industries in the North is on average about 50 higher than that of import-competing industries (Wood, 1994), it is likely that a portion of this increased inequality due to increased capital income is the result of this trade. Those in the top ten percent who essentially own the capital stock make 7.4 times the average income of those in the bottom 90 percent, and over 10 times the income of those in the bottom 40 percent. Thus considering that increased trade has redistributed income from unskilled labor to skilled labor and capital, the likely value of x is probably in the range of three to five. Combining this figure with the results of the simulations previously discussed, would suggest it is only possible to conclude that increased North-South trade improved welfare if the utility function is reasonably close to being linear; this would appear to be an unreasonable assumption.

This conclusion aside, the real objective of this paper is not to provide a definitive conclusion

[22] These estimates exclude households of unrelated individuals; data are from Cline (1997), Table 1.1. The bottom 60 percent of families went from 35.2 percent of national income in 1970 to 31.4 percent in 1992.

[23] Individual incomes are based upon comprehensive household income adjusted by the square root of household size. Data from CBO (2001), Appendix table G-1c, pp.76-77.

about the welfare effects of North-South trade but is instead to suggest a new framework for evaluating the welfare effects of policy changes. Buy adopting the Alexander social welfare function, one can then specify the conditions (i.e., the curvature of the utility function or social welfare function) under which a policy change would increase welfare, and then each person is able to judge for himself whether or not the policy actually increased welfare based upon his perceptions about the shape of these curves. Thus it is being suggested that instead of concluding that a policy increased potential welfare by say 2 percent, it is preferable to conclude that welfare would increase when $\alpha\beta$ is greater than some value, say .9. Thus instead of the researcher concluding that welfare has increased based upon a questionable criteria, each person can evaluate for himself the welfare consequences by using what they consider to be the appropriate values of α and β.

Although, it has been argued here that follow-up redistributions do not actually take place in practice, the large ratio of redistribution to efficiency changes limit the ability to redistribute the gains even if society wanted to. The transfer losses can be represented in two ways, either by the amount of income (T) that must be taken from the individual being taxed in order for the recipient to get one dollar of income, or by leaky bucket losses where L is the amount of income that the recipient receives for every dollar obtained from the taxed individual. Obviously T is equal to $1/L$. Ballard (1988) concluded that generally \$1.50 to \$2.30 had to be taken from the higher-income groups in order to increase the income of the lower-income groups by \$1 (i.e., a T of about 2). Burtless (1986) found 50 percent was lost (T=2) with negative income tax welfare transfers. Ballard, Shoven and Whalley (1985) concluded that the net efficiency loss of collecting government revenue were between 17 to 56 cents on a dollar; however, these estimates do not include the possible welfare losses from the possible disincentives of providing income to the recipients. In addition, they find that the efficiency costs are greatest when taxes are placed upon more elastic activities and that savings are much more elastic than labor; thus taxes on capital have the largest efficiency losses. The increasing international mobility of capital is likely to raise these estimates still higher. Stuart (1984) provides estimates of a similar magnitude. Therefore taxation of capital, since it is the winner from trade, imposes especially steep efficiency loses. Browning and Johnson (1984) estimated that upper-income households lose \$9.51 for each dollar increase in disposable income for the lower-income quintiles. Okun (1975) concluded that about 20 percent of a transfer is lost (T=1.25) for most redistribution schemes. These articles do not investigate the degree to which it matters whether the taxes are on capital directly, or in the form of income taxes on the very rich whose income derives from ownership of the capital stock. A number of these estimates of transfer losses are derived from assumptions about labor supply elasticities, while the estimates of the R/E ratio presented earlier generally assume a fixed labor supply. Thus these comparisons of R/E ratios and transfer losses presented here may not be entirely consistent; obviously it will be necessary to derive them both from the same underlying model.

If 33 percent of income is lost in the redistribution process through incentive effects and administrative costs, then with an R/E ratio of three there is nothing to be gained by trade liberalization with a full compensation redistribution. Therefore, it is not at all clear whether free trade with compensating redistribution can produce a Pareto superior outcome relative to protectionism. The commonly held belief that this is possible stems from the intellectually dishonest step of assuming that the redistribution can be accomplished costlessly.

It should also be pointed that trade need not always benefit the richer individuals. The H-O model would suggest that in the South that trade would improve the income of the poor, which is unskilled labor, and lower the return to the rich, made up of the capital owners and skilled labor. In this case the distributional changes add to the efficiency gains. If as before, x is defined as the income of the gainers (I_W) divided by the income of the losers, then the change in social welfare is related to the variables as follows:

$$\begin{matrix} & + & + & - & - & - \\ \Delta U_S = & \text{f} & (R, & E, & x, & \beta, & I_W) \end{matrix}$$

The reality of the current situation is sometimes different, however. Although trade liberalization in Asia during the 1960s and 1970s seemed to have lowered inequality by increasing the demand for unskilled labor, liberalization in many countries, especially in Latin America including Argentina, Chile, Colombia, Costa Rica, Mexico, and Uruguay, during the 1980s and 1990s appears to have increased inequality. This is due to a number of factors, but in many Southern nations their primary comparative advantage is in natural resource products which are owned by the rich and require a lot of capital and skilled labor for their extraction. In addition, Wood (1997) has argued that with China's entry into the global market, most developing countries no longer have a comparative advantage in unskilled-labor-intensive products. For example, Stiglitz (2002, p.86) in summarizing the experience of Mexico states:

> the benefits have accrued largely to the upper 30 percent, and have been even more concentrated in the top 10 percent. Those at the bottom have gained little; many are even worse off.

Finally a cosmopolitan utilitarianist would probably suggest that trade policy should be evaluated based upon how policy changes alter world welfare. This framework is quite adaptable to that objective, especially since the utility functions as developed here have been standardized and could therefore be reasonably aggregated across countries.

Conclusion

When economists came to a fork in the road in the 1920s they had to determine whether to continue along the Cambridge utilitarian welfare tradition or to follow a new path of "value-free" welfare analysis. Although students of today are taught the Pareto-Robbins critique as if it is the undisputed truth and definitively self evident, there was much debate about this in the 1920s and many of the prominent welfare economists of the time were not particularity convinced. However, now that we have proceeded down the road of modern welfare analysis, it is obvious that the path has proven to be much more disappointing than originally expected. Although the Pareto criteria at its purest level remains unobjectionable, when combined with a number of complementary assumptions, such as the compensation principle, the disregard for the theory of second best, and independent utility functions based solely on income, modern welfare economics results in questionable conclusions which are not particularly value free. These complementary assumptions were adopted not because of their realism but because they allowed the market fundamentalists to derive their desired political conclusions. The compensation principle without actual compensation

lacks any moral legitimacy. As a practical matter, compensation (to the losers) is not made, and in fact there may actually be a vicious redistribution cycle, where increased inequality resulting from economic processes results in even more inequality derived from the political process. It is time to retrace our steps to the earlier principles and attempt to build a welfare theory on reasonable and ethical principles. In returning to the old testament of welfare economics, the concepts of cardinal utility, the law of diminishing marginal utility of income, and interpersonal utility comparisons are resurrected. These are not normative concepts but are positive value judgments about the true nature of reality. It is not clear why certain other highly questionable assumptions have been accepted as legitimate by the economics profession while these have been scorned.

Although there are a large number of ethical theories, a social welfare function (previously proposed by Alexander) is adopted which allows for a wide range of ethical beliefs. When utility is assumed to be subject to diminishing marginal utility of income, one basic coefficient ($\alpha\beta$) is able to capture the shape of the social welfare function. Utilitarianism is suggested as the base case since it is a somewhat "middle of the road" ethical standard and one of significant historical importance from which most alternative ethical theories are compared.

The redistributions inherent in trade liberalization are large relative to the efficiency gains. In addition the winners in the developed countries, as well as many developing countries, have incomes several times the income of the losers. Skilled labor, the primary winner, has several times the income of unskilled labor, the primary loser; the owners of capital (another winner) have incomes 5 to 10 times greater than unskilled labor. With a decreasing marginal utility of income, a trade induced distributional change harming the poor can override an efficiency gain which increases national income, so that net social welfare falls. Using reasonable ethical assumptions, it is easy to reach a conclusion that liberalized North-South trade, without accompanying redistribution, does not increase social welfare in the North.

With the social welfare function and utility functions presented, it is possible to derive the conditions under which a policy change would increase welfare. Thus it is proposed that instead of researchers concluding what the welfare effects are based upon the highly questionable compensation principle, they should state their results in terms of what underlying parameters (concerning the social welfare and utility functions) would be consistent with a welfare improvement. With the functions proposed here, this condition can be summarized with one coefficient which describes the convexity of the social welfare function in income space.

As an historical note on economic thought, it should be pointed out that there is some irony in this essay in that the utilitarian framework is being used to question the desirability of free trade when in fact the early utilitarians including the Philosophical Radicals used it to argue for free trade (Welch, 1987).[24] However, the situation has changed: the Corn Laws benefited the landed aristocracy and harmed the urban poor; current protectionism in the developed countries benefits the poor.

[24] Yet another irony is that Nicolas Kaldor whose name is so associated with the compensation principle once had an office just down the hall from this author.

Appendix A-The Krugman (1995) Model

Essentially, the Krugman model can be characterized by the following equations: where *S* is skilled worker units which is two for every actual skilled worker; *U* is unskilled workers; *W* is welfare; *Q* is production; *C* is consumption, and there are two industries (1 and 2).

$S=S_1+S_2=80$
$U=U_1+U_2=60$
$Q_1=1.89S_1^{(2/3)}U_1^{(1/3)}$
$Q_2=1.89S_2^{(1/3)}U_2^{(2/3)}$
$W=C_1^{(5/7)}C_2^{(2/7)}$
And the units were chosen so that before trade with the NIE's (South)
$\partial Q_1/\partial S_1=\partial Q_2/S_2=\partial Q_1/\partial U_1=\partial Q_2/\partial U_2=P_1=P_2$
Krugman then allows P_1/P_2 to increase to 1.01 and measures the effects on the endogenous variables.

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Figure 1- Social Welfare and GDP

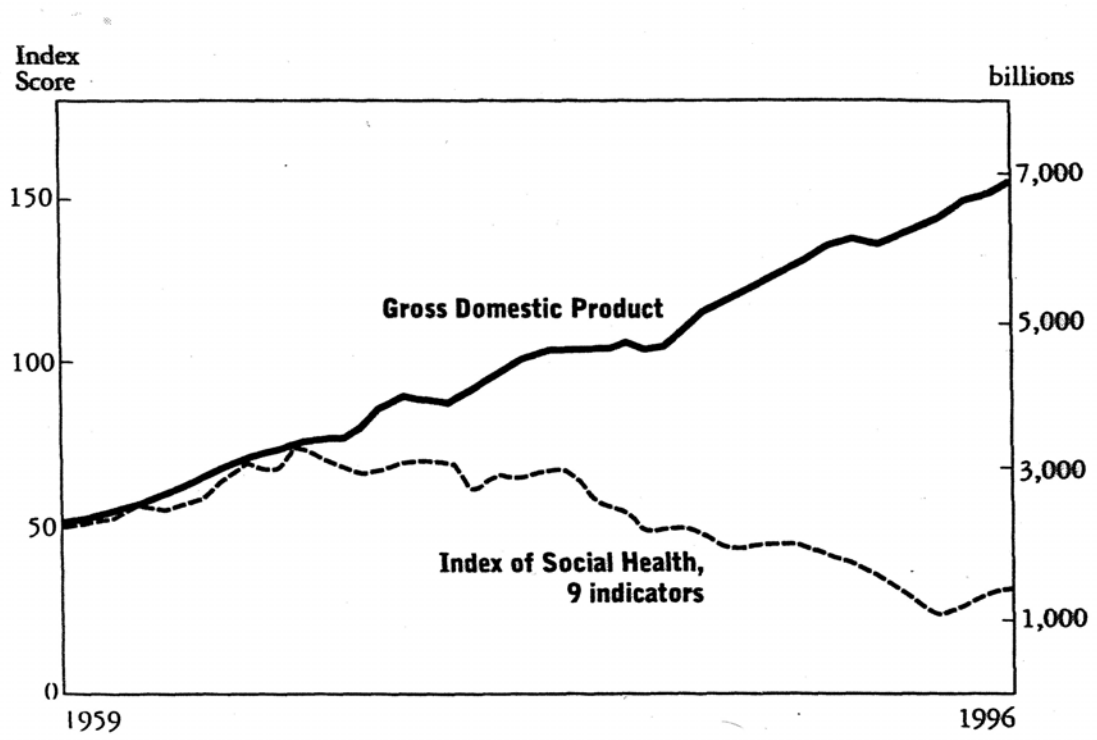

Figure 2- Redistribution and Efficiency in Partial Equilibrium