

**SUSTAINABLE HUMAN DEVELOPMENT: CONCEPTS AND PRIORITIES**

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## SUSTAINABLE HUMAN DEVELOPMENT: CONCEPTS AND PRIORITIES

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### 1. UNIVERSALISM: FUTURE PROSPECTS AND PRESENT LIVES

"It is justice, not charity, that is wanting in the world", wrote Mary Wollstonecraft, the pioneering feminist, in A Vindication of the Rights of Woman, published in 1792, the same year in which her friend Thomas Paine published the second part of the Rights of Man. Both were concerned with giving everyone--women and men--power over their own lives and opportunities to live the way they had reasons to value. One particular feature of their common approach is particularly worth emphasizing in the context of policy discussions today, viz. universalism. It is of specific interest in interpreting the task of "human development" in a world that is characterized, on the one hand, by enormous inequities in contemporary living conditions, and on the other, by real threats to the prospects of human life in the future.

The rights that Wollstonecraft and Paine spoke about applied to all--irrespective of class, gender, race, community, or generation. These divisions often bias the analysis of claims of different groups, and partisanship is a recurrent threat to the equality of concern and respect that can be the only sustainable basis of a just social order. Appeals to rights and entitlements that have moved the world forcefully have often tended to ignore the freedoms of particular groups. For example, while ancient Greek philosophers presented some of the most far-reaching analyses of individual independence and autonomy, they typically did not hesitate to leave out the slaves--and often women too--from the

discourse. The language and the rhetoric as well as the reality of rights in the contemporary world are often characterized by the neglect of particular sections of the population--less privileged ethnic groups, exploited classes, sequestered women.

The basic idea of "human development" involves the assertion of the unacceptability of such biases and discrimination. The contemporary debates on public policy require that this feature of universalism be kept firmly in view. The growing concern with "sustainable development" reflects a basic belief that the interests of future generations should receive the same kind of attention that those in the present generation get. We cannot abuse and plunder our common stock of natural assets and resources leaving the future generations unable to enjoy the opportunities we take for granted today. We cannot use up, or contaminate, our environment as we wish, violating the rights and the interests of the future generations. The demand of "sustainability" is, in fact, a particular reflection of universality of claims--applied to the future generations vis-à-vis us.

But that universalism also requires that in our anxiety to protect the future generations, we must not overlook the pressing claims of the less privileged today. A universalist approach cannot ignore the deprived people today in trying to prevent deprivation in the future. The recognition of this need for integration is much in the spirit of the "human development approach" to economic and social progress. The focus of this approach is on the kind of life that all the people--irrespective

of nationality, class, race, gender, or community--can lead, and this non-sectarianism clearly must apply to generational divisions as well. The prospects of future people command respect in the same way that the opportunities of the present generation do. Universalism in acknowledging the life claims of everyone is the common thread that binds the demands of human development today with the exigencies of environmental preservation for the future.

Perhaps the strongest argument in favor of giving priority to the protection of the environment is the ethical need for guaranteeing that future generations would continue to enjoy similar opportunities of leading worthwhile lives that are enjoyed by generations that precede them. This, as we shall discuss in Section 3 of this paper, is the central idea underlying the demand for "sustainable development", and it has many important implications. But this goal of sustainability--increasingly recognized to be legitimate--would make little sense if the present life opportunities that are to be "sustained" in the future were miserable and indigent. Sustaining deprivation cannot be our goal, nor should we deny the less privileged today the attention that we bestow on generations in the future.

The living standard of a substantial part of humanity has radically moved forward in a way that would have been hard to anticipate in Paine's or Wollstonecraft's time. While it would have been, then, difficult to dispute that human life everywhere was "nasty, brutish and short" (as Thomas Hobbes had put it in Leviathan), people today in many countries in Europe, North America

and elsewhere have lives that are much longer, less miserable, and far less battered by forces beyond the person's control. And yet a great many people in the world still continue to suffer from the absence of fundamental opportunities to lead decent and satisfying lives. The continued high incidence of premature mortality, ill health, undernourishment, illiteracy, poverty, insecurity, and other forms of deprivation indicate the failure of the modern world to bring even the most basic capabilities within the reach of all. A new born child may be doomed to a life of extreme brevity or intense misery if that child happens to be born in a "wrong class", in a "wrong country", or to be of the "wrong sex".

Universalism is basically an elementary demand for impartiality--applied within generations and between them. It is the recognition of a shared claim to the basic capability to lead worthwhile lives. Not working towards guaranteeing the basic capabilities to the future generations would be scandalous, but in the same way, not working towards bringing those elementary capabilities within the reach of the deprived in the present generation would also be outrageous. Given the implicit biases in many policy debates, there is a real need for jealously guarding that universalist perspective. The Human Development Reports have been systematically concerned with uncovering the nature and extent of these deprivations and with identifying the challenges involved in reducing such deficiencies and in advancing human development across the globe. The fifth Report, for which this essay is being written, provides an opportunity to examine critically how the

analysis of the problem is standing up to the growing understanding of the nature of these deprivations and their manifold implications.

The promotion of human development in the contemporary world has to be integrated with the safeguarding of their fruits for the future. As the full significance of the issues forcefully discussed in the environmental conference (UNCED) in Rio in 1992 begins to be more fully understood, the integration of human progress and environmental conservation has emerged as one of the central challenges faced by the modern world (Pronk and Haq 1992, Speth 1992). The moral value of sustaining what we now have depends on the quality of what we have, and the entire approach of sustainable development directs us as much towards the present as towards the future. There is, in fact, no basic difficulty in broadening the concept of human development, as outlined in the previous Human Development Reports, to accommodate the claims of the future generations and the urgency of environmental protection.

The perspective of human development translates readily into a critical--and in many ways overdue--recognition of the need for active international efforts to preserve the quality of the environment in which we live. We have to see how the human developments we have achieved in the past, and what we are trying to achieve right now, can be sustained in the future--and further extended--rather than being threatened by cumulative pollution, exhaustion of natural resources, and other deteriorations of global and local environments. But this safeguarding of the future

prospects has to be done without giving up the efforts towards rapid human development and the speedy elimination of widespread deprivation of basic human capabilities which characterize the unequal and unjust world in which we live. This is partly a matter of cooperation across the frontiers, but the basis of that collaboration must take full note of the inequalities that exist now and the urgency of rapid human development in the more deprived parts of the world. The basic underlying principle is universalism, and here again, the key concept, as Mary Wollstonecraft had noted, is justice, not charity.

## 2. DEVELOPMENT APPROACHES: CONTRASTS AND CONVERGENCE

### 2.1. Human Development, Aggregate Wealth and Universalism

The foundational task of scrutinizing the demands of sustainable human development also provides an appropriate occasion to see how the "human development" approach relates to the more conventional analyses to be found in the standard economic literature--from Adam Smith onwards. Interest in human development is not new in economics. Indeed, as was argued in the first Human Development Report (UNDP 1990), this motivating concern is explicitly present in the writings of the early founders of quantitative economics (such as William Petty, Gregory King, François Quesnay, Antoine Lavoisier, and Joseph Lagrange) as well as the pioneers of political economy (such as Adam Smith, David Ricardo, Robert Malthus, Karl Marx, and John Stuart Mill).<sup>1</sup> There

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<sup>1</sup> Human Development Report 1990, pp. 9-10.

is, in this sense, no foundational departure in making economic analysis and policy take extensive note of the demands of human development. The approach reclaims an old and established heritage, rather than importing or implanting a new diversion.

But economics has never been a subject of one tradition only. The interest in human development has had to compete with other priorities and pursuits within the same body of mainstream economics. The preoccupation with commodity production, opulence and financial success can also be traced in professional economics through several centuries--involving many leading economists as well as businessmen and bureaucrats, who have preferred to concentrate more on the characteristics of overall material success than on the deprivation and development of human lives. Indeed, the dominant contemporary tradition of focusing on such variables as per-capita gross national product or national wealth is a continuation--perhaps even an intensification--of the old opulence-oriented approach.

The focus on wealth maximization can be taken at different levels, and at the common aggregative level, the spotlight is put entirely on making the community as a whole as opulent as possible, irrespective of distribution and irrespective of what that wealth does to human lives. It is, of course, true that being rich, wealthy and affluent can be among the most important contributory factors in generating well-being, and the opulence-oriented approach to economic progress certainly cannot be criticized for being irrelevant to the success of human living. On the other



hand, insofar as it neglects other crucial factors, such as public care and social organization, which also contribute to the well-being and freedom of individuals, the approach is deeply limited and defective.<sup>2</sup> And insofar as the concern is with overall wealth maximization--irrespective of distribution--there is a serious disregard of individual predicaments in favor of some conglomerative achievement, which can be blind to the most extreme deprivations suffered by many, while others make use--possibly excellent use--of the accomplishment of wealth and opulence.

Thus, the fundamental difficulty with the approach of wealth maximization and with the tradition of judging success by overall opulence of a society is a deep-seated failure to come to terms with the universalist unbiasedness needed for an adequate understanding of social justice and human development. In this sense, the wealth-based approach is not, by any means, inconsequential, but it certainly is significantly partisan. The most basic problem with the opulence view is its comprehensive failure to take note of the need for impartial concern in providing entitlements to the ingredients of human living, and thus with the universalism of human development.

## 2.2. Conflicts and Misapplications

The long history of economic analysis provides plentiful examples of both types of approaches, concentrating respectively on

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<sup>2</sup> On the constitutive and causal aspects of "living standards" and "the quality of life", see Sen (1987, 1993).

(1) opulence and overall wealth, and (2) the quality of human lives. While the latter is the tradition on which the contemporary literature on human development draws, the importance of the former tradition--despite its limitations--must not be overlooked in trying to integrate economic analysis with the demands of human development. The tension between the two approaches has often been powerful and explosive, particularly when the conflicts between the two outlooks have involved practical policy issues of major dimension.

However, it is necessary to differentiate both these approaches (with distinguished traditions of their own) from simple policy mistakes based on appeals to allegedly appropriate prerequisites of either economic opulence, or of human development. Many of those policies have, in fact, ended up serving neither the quality of human life, nor the actual promotion of economic opulence. The Irish famines of the 1840s might have left a train of tremendous bitterness and anger with which the British Isles have to wrestle even today, but the non-interventionist leaders in London at that time were not only rather callous, they were also, in many ways, deeply mistaken in seeing no conflict between their particular view of "economic propriety" and the real ingredients of economic prosperity, not to mention the security of life and liberty of millions of vulnerable people. Similarly, those who carried out the disastrous economic policies that intensified the Great Depression of the 1930s may not have been any less humane than their opponents, but they certainly took quite a flawed view

of the effects of so-called "sound finance"--even on production and wealth, and a fortiori on jobs and the lives of human beings.

Policy mistakes of similar kinds--allegedly in pursuit of "economic soundness" and even of "human well-being"--have occurred fairly plentifully in the contemporary world as well. There are extensive literatures that throw light on the failures of national governmental policies and of bureaucracies of powerful international institutions. It is, obviously, important to avoid such mistakes, which sometimes do not even promote the objectives they are chosen to promote. But, nevertheless, in assessing the alternative intellectual approaches, it would be unfair to judge them in terms of mistakes that have been committed in their respective names. Instead, both the approaches have to be scrutinized in their own terms--rather than concentrating primarily on misapplication and wrong use--even though the propensity to generate erroneous applications can be itself a limitation of an approach and, in that form, must be taken into account.

### **2.3. Objectives and Instruments**

How cogent and illuminating are the two traditions of focusing respectively on (1) human development, and (2) overall wealth and opulence? These traditions can be seen as differing, directly or indirectly, in two distinct respects. The first concerns divergences in the ultimate objectives, and the second relates to differences in the effectiveness of distinct instruments.

While the human development approach has conformed broadly to the line of reasoning enunciated by Aristotle more than two millennia ago ("wealth is evidently not the good we are seeking, for it is merely useful and for the sake of something else"), there have been many professional experts who have seen their task as being confined to the maximization of opulence (an old illustration is the seventeenth century monograph by the pioneering mercantilist author, Thomas Mun, England's Treasure by Foreign Trade, or the Balance of Our Foreign Trade is the Rule of Our Treasure). That division about our basic objectives still surfaces in the debates on current policies in different parts of the world, and also in discussions about what importance to attach to various indicators and criteria of progress (such as GNP per capita).<sup>3</sup>

At the level of objectives, the case for following Aristotle rather than Mun is not hard to appreciate. How can we possibly give priority to the means of living, which is what treasures and wealths are, over the ends of good and free human lives? While much of economic and financial writing proceeds as if there is nothing beyond opulence with which we need be concerned, it is fair to see that as a problem of presentation, rather than a reflection of some deep-seated eccentricity about ends and means. The really interesting debates must relate to instrumental effectiveness of

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<sup>3</sup> For critiques of GNP-based judgements and explorations of alternatives, see Streeten et al. (1981), Streeten (1984), Stewart (1985), Desai (1990, 1991), Griffin and Knight (1989), Desai et al. (1991), among other contributions.

overall wealth and opulence in promoting those things for which wealth and opulence are sought.

There is, in fact, much more substance in the opulence-centered approach than the implausible view that opulence is an end in itself. This takes us to the second difference, which relates to the cause-effect relationships in the pursuit of the deeper objectives. Some have taken the view that while opulence is not to be valued at all for its own sake, it still is the most important instrument in promoting the more basic objectives--even the Aristotelian one of rich and fulfilling lives.

To take a prominent example, W. Arthur Lewis, one of the leading modern development economists, did not entertain much doubt that the appropriate objective to pursue is increasing "the range of human choice". He did also acknowledge the causal role of many factors in advancing the freedom to choose. But nevertheless he decided to concentrate specifically on "the growth of output per head", because it "gives man greater control over his environment, and thereby increases his freedom" (Lewis 1955: 9-10, 420-21). Indeed, the focus of his classic book was sufficiently precise to permit him to assert: "Our subject matter is growth, and not distribution."

Lewis's faith in the instrumental efficacy of total growth has proved to be quite disputable in terms of the experiences observed in the actual world. Many countries have grown fast without a commensurate impact on living conditions, and more importantly, some countries have achieved high quality of life despite

relatively moderate growth of GNP or GDP per head. It has also been observed that even when there is a generally positive and statistically significant relationship between GNP per head and indicators of quality of life in the gross intercountry data, much of that relationship turns on the use of extra income in the specific fields of public education and health, and in reducing absolute poverty.

It is certainly true that the higher the average income of a country, the more likely it is--given other things--that it will tend to have a higher average life expectancy, lower infant and child mortality rates, higher literacy, and in fact, a higher value of the "human development index" (HDI). A number of recent studies have confirmed this general pattern. However, the associations are far from perfect. For example, in intercountry comparisons, income variations tend to explain not much more than half the differences in life expectancy, or in infant or child mortality, and it explains a smaller proportion of differences in adult literacy rates.<sup>4</sup> Many countries, such as Sri Lanka, China, Jamaica, Costa Rica, and the state of Kerala in India, have achieved levels of

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<sup>4</sup> See Anand (1991). See also Anand and Ravallion (1993), where an  $R^2$  of 0.45 is obtained in regressing the logarithm of shortfall of life expectancy (from a postulated maximum of 80 years) against the logarithm of GNP per person. The exact fitted equation is, in fact:

$$-\log(80 - L) = - \underset{(2.07)}{6.15} + \underset{(4.00)}{0.45 \log(Y)}, \quad \text{with } R^2 = 0.45,$$

where  $L$  = life expectancy at birth in years, and  $Y$  = GNP per person (in \$PPP).

human development that are enormously higher than what would be expected on the basis of their GNP or real income per head.

What is also of importance--perhaps even more so--is the route through which growth of GNP most effectively influences human development. Economic growth not only involves increase in private incomes, it can also significantly contribute to generating resources that can be marshalled to improve social services (such as public health care, epidemiological protection, basic education, safe drinking water, etc.). In some cases such marshalling is effectively done, while in other cases, the fruits of growth are put to little use of this kind.<sup>5</sup> This can make a big difference to the outcome in terms of the expansion of basic human capabilities. Similarly, while the expansion of private income certainly is of instrumental importance in enhancing basic capabilities, the effectiveness of that impact depends much on the distribution of the newly generated incomes. In particular, the biggest impact may be expected to occur if the rise in average GNP per head goes with a sharp reduction in the poverty of the worst off people, rather than going in other directions. To what extent this will happen depends on a variety of economic and social circumstances related to the labor-intensive nature of techniques of production, the sharing of education and skills across the population, the success of land reforms and the sharing of rural resources, and so on. Here again the experiences of different

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<sup>5</sup> The distinction corresponds to what was called, in Drèze and Sen (1989), "growth-mediated security" and "unaided opulence"; there are many empirical examples of each.

countries and of different policy regimes have been quite divergent.

There is considerable evidence that the statistical correlation between GNP per head and human development tends to work through the impact of GNP expansion on higher public expenditure and lower poverty. For example, it is found in Anand and Ravallion (1993) that when life expectancy variations are linked with public health spending per person and an index of poverty, the addition of GNP per person as a further explanatory variable yields a coefficient that is not significantly different from zero.<sup>6</sup> This--and related results that focus on other characteristics of quality of life--must not, of course, be interpreted to imply that economic growth does not matter in expanding the quality of life. Rather, what they indicate is that the connections are seriously contingent, and much depends on how the fruits of economic growth are shared (in particular what the poor get) and how far the additional resources are used to support public services (for example, public health services, which are particularly crucial in influencing life expectancy).

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<sup>6</sup> More exactly, the statistical fit that Anand and Ravallion obtain, based on data for 22 developing countries for which all the relevant statistics are available, is:

$$-\log(80 - L) = - 1.08 - 0.28 \log(Y) - 0.21 \log(P) + 0.30 \log(H),$$

(2.34)
(1.34)
(2.36)
(3.02)

with  $R^2 = 0.71$ , where L stands for life expectancy in years, Y for GNP per person, P for the proportion of people in poverty (consuming less than \$1 per day in 1985), and H for public health spending per person. For more detailed explanations and related results, see Anand and Ravallion (1993).



Thus the opulence-oriented view of progress, which has little intrinsic merit (as was discussed earlier), has a conditionally important instrumental role--and that conditionality relates specifically to features on which the human development approach has tended to focus, to wit, public action and poverty reduction. There is no basic conflict between (1) regarding economic growth to be very important, and (2) taking it to be in itself an insufficient basis of human development. Insofar as growth of GNP or GDP promotes enhancement of living conditions, its biggest impact comes through the expanded ability to undertake public action to promote human development, and the share of the additional income that is enjoyed by the poor. In recognizing the importance of economic growth as a means for human development, we must also take full note of (1) the contingent nature of its effectiveness as means (depending on the use of the means for promoting human development), and (2) its non-uniqueness as means (there are other means as well, including social organization).

Again, the central issue turns out to be the need for universalist attention in valuing the enhancement of human capabilities, as opposed to partisan interest in promoting aggregate growth--while overlooking how the fruits are distributed and what is done to make those fruits serve the interests of the least privileged. The discipline of universalism directs the focus of our attention on those whose needs are greatest and whose deprivations are most acute, and that attention can be extremely effective when it is translated into practical policy.

#### **2.4. Capability and Reproduction**

The human development approach concentrates on the capability to lead worthwhile lives as the object of importance. It applies the universalist perspective to the freedom to lead lives that people today and in the future would value. This focus on freedom includes a concern with reproductive freedom as well. Since the population problem has tended to attract a good deal of attention lately, it is worth discussing whether the support for reproductive freedom might not be self-defeating--leading to such an increase in population that the well-being and freedom of all would be threatened.

Alarmist views have been expressed in this field quite plentifully in recent years. To some extent, this is a positive development since the subject of population is indeed an important one. On the other hand, to argue for violation of reproductive freedom in the cause of population control (for example, through obligatory limits on the size of families) may not be the right way to think about this complex question. Nor is a sense of alarm and panic the most favorable circumstance for reflecting rationally on matters of social policy.

There is, in fact, a wealth of evidence to indicate that given the real opportunity to choose smaller families without adverse economic and social consequences, smaller families are indeed chosen. In the experience of the industrialized West, fertility rates have come down sharply with economic and social development, reduction of mortality rates, and expansion of basic education.

Similar processes can now be observed in many parts of the so-called Third World (see, for example, Easterlin 1980, Summers 1992, Barro and Lee 1993, and the references cited there). In particular, female education seems to play a critical part in reducing the birth rate, along with the availability of medical care and reduction of mortality rates.

It appears, therefore, that human development contributes to solving--rather than intensifying--the population problem. This is not surprising, since people--women in particular--have good reasons not to choose a life of continuous child-bearing and child-rearing. A family's effective freedom in having a smaller number of children is favorably influenced by the availability of medical facilities (including the opportunity of birth control), the reduction of death rates (making it unnecessary to give birth to many children to make sure that some do survive), and the expansion of basic education (especially female education, giving women the opportunity to understand better the options that exist and the social values associated with a smaller family size in a modern community). These factors have been very important even in China's remarkably rapid decline in the birth rate, even though the advocates of coercion in birth control tend to cite mainly the use of some compulsion in family planning in China. As a matter of fact, the state of Kerala in India, which has similar mortality rates, health facilities and basic education levels as China (somewhat higher female education levels), but no compulsion whatever, has a similar birth rate as (in fact, a little lower

than) China's. In intercountry comparisons, human development--related to longevity, health, education and security--seems to be significantly influential in reducing the birth rate.

If reproductive freedom is seen as a part of human freedom in general, we achieve a better perspective of challenges and demands of the population problem. The personal and social problems that are generated by over-rapid population increase are seized by educated, secure and unharassed parents when the opportunity for sensible reflection exists. The promotion of human development not only reflects itself in expanded longevity, enhanced education levels, more secure and less harassed lives, it also makes it possible for people to opt for smaller families. The solution of the population problem can be sought through expanding the options that people have, rather than through reducing options (on this general question, see Sen 1994). Human beings have to be seen as persons who are capable of sensible reflection and responsible decision, rather than being treated as a stock of breeding animals who are to be led against their will into some bureaucratically ordained path.

### **3. THE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT**

#### **3.1. The Environmental Challenge**

The idea of sustainable development arose essentially from concerns relating to the overexploitation of natural and environmental resources. Early discussions stressed the limits to economic activity imposed by the physical environment, and

concluded that species and ecosystems should be utilized in ways that allow them to go on renewing themselves indefinitely (IUCN 1980). The anxieties expressed by environmental scientists and ecologists were recognized by policymakers and economists, who attempted to formulate concepts of "sustainable development". An early formulation by Robert Repetto (1985: 10) was as follows:

"At the core of the idea of sustainability, then, is the concept that current decisions should not damage the prospects for maintaining or improving living standards in the future...This implies that our economic systems should be managed so that we live off the dividend of our resources, maintaining and improving the asset base so that the generations that follow will be able to live equally well or better. This principle also has much in common with the ideal concept of income that accountants seek to determine: the greatest amount that can be consumed in the current period without reducing prospects for consumption in the future."

As we shall presently argue, this connection between the ideal of sustainable development and the economic accountant's concept of maintaining the income level (discussed, in particular, by Hicks 1946) is an important one to explore.

A more recent characterization has been suggested by Robert Solow (1992: 15): "The duty imposed by sustainability is to bequeath to posterity not any particular thing--with rare exceptions such as Yosemite, for example--but rather to endow them with whatever it takes to achieve a standard of living at least as

good as our own and to look after their next generation similarly. We are not to consume humanity's capital, in the broadest sense."

The term "sustainable development", in fact, owes its widespread usage to the Brundtland Commission Report (1987), Our Common Future, which defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" (WCED 1987:43).

The Brundtland Commission definition is often cited and has become very influential.<sup>7</sup> As a general statement, it reminds us that sustainability is about an obligation to future generations (towards meeting their "needs"), and thus it is necessarily about intergenerational allocation. Unlike some earlier statements, it also helpfully shifts attention away from conserving specific resources and "leaving the world as we found it" in every particular. The latter would appear to be neither feasible nor necessarily sensible: resources are basically fungible and can be

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<sup>7</sup> For example, it is strongly endorsed by the World Bank's World Development Report 1992; Development and the Environment (Box 2, p. 8).

substituted for one another.<sup>8</sup> The Brundtland Commission's notion of sustainable development is indeed broader and invites examination even independently of environmental concerns.

Moreover, the obligation of sustainability cannot be left entirely to the market. The future is not adequately represented in the market--at least not the distant future--and there is no reason that ordinary market behavior will take care of whatever obligation we have to the future. Universalism demands that the state should serve as a trustee for the interests of future generations. Government policies such as Pigouvian taxes, subsidies, and regulation can adapt the incentive structure in ways that protect the global environment and resource base for people yet to be born. As A.C. Pigou (1932: 29-30) had noted, "there is wide agreement that the State should protect the interests of the future in some degree against the effects of our irrational discounting and of our preference for ourselves over our descendants. The whole movement for 'conservation' in the United States is based on this conviction. It is the clear duty of Government, which is the trustee for unborn generations as well as for its present citizens, to watch over, and, if need be, by legislative enactment, to defend, the exhaustible natural resources of the country from rash and reckless spoliation."

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<sup>8</sup> As Solow (1991: 4) states, "If you don't eat one species of fish, you can eat another species of fish... That is extremely important because it suggests that we do not owe to the future any particular thing. There is no specific object that the goal of sustainability, the obligation of sustainability, requires us to leave untouched."

### 3.2. Intergenerational Equity and Sustainable Development

What are our obligations to future generations? Joseph Addison, writing in The Spectator of 1714 was dismissive of any duty to posterity: "Most people are of the humour of an old fellow of a college, who, when he was pressed by the Society to come into something that might redound to the good of their successors, grew very peevish; 'We are always doing,' says he, 'something for posterity, but I would fain see posterity do something for us.'"<sup>9</sup> Yet, of course, there is something posterity can do for us: it can inherit less physical and natural capital, and thus allow us to achieve--though not out of its choice--a higher standard of living at its expense.

How much capital should the future inherit from us? This has been the subject matter of optimal growth theory since the pioneering article of Frank P. Ramsey (1928). The theory has formed the basis of development policy and social cost-benefit analysis in the less developed countries. In the Appendix we present a simple two-period model which captures the central features of intergenerational allocation as seen in this approach.

This framework is founded on the essentially utilitarian criterion of maximizing the sum total of welfare of different generations. It allows the welfare of one generation to be traded off one-for-one against that of another generation. If the benefit to us from economic activities which continue to emit greenhouse gases at the present rates outweighs the harm done to future

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<sup>9</sup> The Spectator, Vol. VIII, No. 583, 20 August 1714.



generations from global warming, then the criterion would recommend no change in our activities. Other ethical notions of the total "good" may allow for different tradeoffs--for example, those that take account of welfare inequality between generations (see Appendix A.1). Yet others may allow no tradeoff in certain ranges--for example, those based on the "rights" of future generations to the same quality of environment and levels of clean air as the present generation has. This latter view of justice would give priority to specific rights that generations have over decisions based on a calculation of aggregate welfare (Rawls 1971, Dworkin 1978, Sen 1982a,b).

Within the broadly welfarist framework of optimal growth theory--by far the main economic approach used to analyze questions of intergenerational justice--it is relevant to enquire whether sustainable development is necessarily a consequence of growth being optimal. If it were, then a (derived) justification for sustainability could be found in maximizing the total good. Let us take sustainable development to mean non-declining welfare over time--although other definitions are formulated in terms of non-declining income, consumption, or capital stock.

Even though Ramsey (1928) had argued for treating the welfare of different generations impartially, much of the subsequent literature assumes a positive rate of pure time preference according to which well-being at a later time counts for less than

well-being at an earlier time (see Appendix A.2).<sup>10</sup> Now if the social rate of return to investing in environmental capital (protection) is not large, and in particular it is smaller than the rate of pure time discount, it is not worthwhile for the present generation to reduce its consumption and increase investment: the gain in well-being to the future generation will not compensate for the sacrifice in well-being of the present generation. This can lead to a decline in well-being over time.<sup>11</sup> Moreover, a similar result obtains with a positive rate of pure time preference even in an economy with exhaustible resources (see Solow 1974b, Dasgupta and Heal 1979). On the other hand, universalism in the space of generational welfares--in the special form of no pure time discount--will typically lead to rising welfare over time in such models.

Yet there is no general presumption that sustainability will be implied by optimality in models of intertemporal allocation. It becomes an even less likely consequence once we incorporate environmental productivity and quality into production and welfare, respectively (see Pezzey 1992). Hence a justification for

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<sup>10</sup> As Henry Sidgwick (1907: 414) had argued, this is incompatible with universalism within the context of utilitarianism: "It seems...clear that the time at which a man exists cannot affect the value of his happiness from a universal point of view; and that the interests of posterity must concern a Utilitarian as much as those of his contemporaries, except in so far as the effect of his actions on posterity -- and even the existence of human beings to be affected -- must necessarily be more uncertain."

<sup>11</sup> Appendix A.1 discusses extensions of this result to situations involving technical progress, population growth, and a concern for well-being equality between generations.

sustainability will have to be sought outside the framework of maximizing aggregate intergenerational well-being.

For Robert Solow (1974b, 1991), sustainability is simply a matter of distributional equity, about sharing the capacity for well-being between present people and future people: "[It is] an obligation to conduct ourselves so that we leave to the future the option or the capacity to be as well off as we are. It is not clear [to me] that one can be more precise than that. Sustainability is an injunction not to satisfy ourselves by impoverishing our successors" (Solow 1991: 3).

The notion appears to be founded on a forward-looking application of Rawls's Difference Principle, even though Solow (1974b) recognizes the difficulties of applying this principle to the problem of saving (see Appendix A.1). Still, his concern for intergenerational equity leads him to the view that we have done rather well at the hands of our ancestors, who were much poorer than we are and hence might properly have saved less and consumed more. According to Solow (1991: 7): "You could make a good case that our ancestors, who were considerably poorer than we are, whose standard of living was considerably less than our own, were probably excessively generous in providing for us. They cut down a lot of trees, but they saved a lot and they built a lot of railroad rights-of-way. Both privately and publicly they probably did better by us than a sort of fair minded judge in thinking about the equity (whether they got their share and we got our share or whether we profited at their expense) would have required. It

would have been okay for them to save a little less, to enjoy a little more and give us a little less of a start than our generation has had." For Solow, then, sustainability would appear to be an obligation to preserve the present-day economic opportunities (such as productive capacity) for the future, not necessarily to increase them. This can be seen as an interpretation of the demands of "universalism" applied to intergenerational equity, and as such has much intuitive appeal.

The principle of preserving productive capacity, or society's broad "stock of capital", can also be defended in deontological terms without a direct appeal to distributional equity. The relevant notion here is that of usufruct rights. We may enjoy the fruits of the accumulated capital and environmental resources that we inherit (in the form of the income and amenities to which they give rise), but we may not deplete the total stock. This principle requires us to pass on to future generations what we have inherited from past generations--since we did not accumulate or produce it ourselves. It is not based on a claim of equal well-being for the next generation.

Preserving productive capacity intact is not, however, an obligation to leave the world as we found it in every detail. What needs to be conserved are the opportunities of future generations to lead worthwhile lives. The fact of substitutability (in both production and consumption) implies that what we are obligated to leave behind is a generalized capacity to create well-being, not any particular thing or any particular resource. Since we do not

know what the tastes and preferences of future generations will be, and what they will do, we can talk of sustainability only in terms of conserving a capacity to produce well-being. As Solow (1991: 13) again emphasizes: "Sustainability as a moral obligation is a general obligation not a specific one. It is not an obligation to preserve this or preserve that. It is an obligation, if you want to make sense out of it, to preserve the capacity to be well off, to be as well off as we. That does not preclude preserving specific resources, if they have an independent value and no good substitutes. But we shouldn't kid ourselves, that is part of the value of specific resources. It is not a consequence of any interest in sustainability."

The idea that "income" is what can be spent while leaving the asset base intact is precisely the concept of sustainable income established by John Hicks (1946: 172) almost fifty years ago: "The purpose of income calculations in practical affairs is to give people an indication of the amount which they can consume without impoverishing themselves. Following out this idea, it would seem that we ought to define a man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning. Thus, when a person saves, he plans to be better off in the future; when he lives beyond his income, he plans to be worse off. Remembering that the practical purpose of income is to serve as a guide for prudent conduct, I think it is fairly clear that this is what the central meaning must be." It is easily seen why Repetto (1985) saw

an analogy between the idea of sustainable development and the economic accountant's notion of what spendable income is.

Preservation of the resource base does not imply that all exhaustible (e.g. mineral and fossil fuel) resources must be conserved<sup>12</sup>; that is likely to be unfeasible. But if society's broad stock of capital is to be maintained, we have to replace the non-renewable resources that are used up with something else. That has to be reproducible capital, whether physical or human. The idea that the proceeds from a "wasting asset" should be set aside and reinvested so that the yield from these investments compensates for the dwindling resource is also traceable to Hicks (1946: 187). He argued that: "If a person's receipts are derived from the exploitation of a wasting asset, liable to give out at some future date, we should say that his receipts are in excess of his income, the difference between them being reckoned as an allowance for depreciation. In this case, if he is to consume no more than his income, he must re-lend some part of his receipts; and the lower the rate of interest is, the greater the sum he will have to re-lend in order for the interest on it to make up for the expected failure of receipts from his wasting asset in the future".

It is essentially this Hicksian logic which lies behind Hartwick's (1977) Rule--a rule that has become, justly, much used in the recent environmental literature. He showed exactly how much from the use of a depletable resource should be set aside and invested in reproducible capital so that the total return (i.e.

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<sup>12</sup> See, however, Pearce, Barbier and Markandya (1988: 6).

income) could be sustained over time. Hartwick's Rule says that if the entire competitive rents from an economy's use of a wasting resource are invested in reproducible capital, then it will be able perpetually to maintain a constant level of consumption. The competitive rents, or pure return to the non-renewable resource, are given by Hotelling's (1931) classic result that the shadow value of the resource rises at a rate equal to the current marginal product of reproducible capital.<sup>13</sup> The accumulation of reproducible capital through investment of the Hotelling rents exactly offsets the (efficient) depletion of the exhaustible resource.

Although Hartwick's original rule applied to rather simple economies (with constant returns to scale, a given stock of exhaustible resources, no technical progress, and no population growth), there have been significant generalizations and elaborations of it, including the incorporation of resource amenities (see Dixit et al. 1980).<sup>14</sup> Solow (1986) suggests that Hartwick's Rule can be given the interpretation that an appropriately defined stock of capital is being maintained intact, and that income is the interest on that patrimony. The broad notion of the stock of capital allows for exhaustible and renewable resources, for human capital, for freedom from pollution, and for

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<sup>13</sup> See Anand and Nalebuff (1987) for further discussion of Hotelling's rule.

<sup>14</sup> See also Hammond (1993), Hartwick (1978), Solow (1986), Ahmad et al. (1989), El Serafy (1991), Lutz (1993), Bartelmus (1993), among others.

other suitable forms of "environmental capital".<sup>15</sup> Moreover, the rule has considerable intuitive appeal within the general framework of universalist ethics. It seems appropriate enough to meet our obligation to the future by channelling the rents on our use of non-renewable resources into capital formation, any kind of capital formation--physical or human. The policy allows future generations to sustain indefinitely the income, or capacity to consume, of the present generation.

### **3.3. Intragenerational Justice and Human Development**

We have emphasized that sustainability is a matter of distributional equity in a very broad sense, that is, of sharing the capacity for well-being between present people and future people in an acceptable way--that is in a way which neither the present generation nor the future generations can readily reject. This is a criterion of justice that has been forcefully used--though not in the context of intergenerational equity--by Thomas Scanlon (1982) and, more recently, by John Rawls (1993).

There would, however, be something distinctly odd if we were deeply concerned for the well-being of the future--and as yet unborn--generations while ignoring the plight of the poor today. The moral obligation underlying sustainability is an injunction to preserve the capacity for future people to be as well off as we are. This has a terribly hollow ring if it is not accompanied by

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<sup>15</sup> What is maintained constant in Hartwick's Rule is a chain (or Divisia) index of the combined value of resource and capital stocks.



a moral obligation to protect and enhance the well-being of present people who are poor and deprived. If one thinks that people will be deprived in the future unless different policies are followed, then one is morally obliged to ask whether people are deprived right now. It would be a gross violation of the universalist principle if we were to be obsessed about intergenerational equity without at the same time seizing the problem of intragenerational equity: the ethic of universalism certainly demands such impartiality.

A concern for equity right now, and not merely for equity between periods of time, requires redistribution to the deprived contemporaries.<sup>16</sup> But redistribution to poor people today might be felt to be disadvantageous from the standpoint of sustainability. It might be interpreted as leading to an increase in current consumption, not to an increase in investment. However, much depends on what form that redistribution takes.

This is precisely where the significance of human development as a means comes in (on this see the discussion in Section 4.4). Redistribution to the poor in the form of improving their health, education and nutrition is not only intrinsically important--in enhancing their capabilities to lead more fulfilling lives--but it

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<sup>16</sup> There are few models of intertemporal allocation which incorporate a concern for distribution among contemporaries. Anand and Joshi (1979) present one, and derive the optimum solution for extreme values of the "aversion" to well-being inequality--both inter- and intra-generational. With no pure time discount, as this inequality aversion parameter tends to infinity, the entire surplus from production is redistributed to the poor of today, and there is no capital accumulation. This is like the Rawlsian solution derived by Solow (1974b).

is also instrumentally important in increasing their "human capital" with lasting influence in the future. A general increase in educational levels, for example, will raise productivity and the ability to generate higher incomes, now and in the future. The importance of maternal education in raising the quality of life and agency of later generations has also been well established (see, for example, Summers 1992). Thus human development should be seen as a major contribution to the achievement of sustainability.

This argument should be contrasted with other arguments that have been proposed in the context of sustainable development. For example, poverty alleviation has been suggested as an instrument to protect the environment from degradation (World Bank 1992). There it is argued that alleviating poverty is a prerequisite for environmental conservation:

"The poor are both victims and agents of environmental damage. About half of the world's poor live in rural areas that are environmentally fragile, and they rely on natural resources over which they have little legal control. Land-hungry farmers resort to cultivating unsuitable areas--steeply sloped, erosion-prone hillsides; semiarid land where soil degradation is rapid; and tropical forests where crop yields on cleared fields frequently drop sharply after just a few years.... Poor families often lack the resources to avoid degrading their environment. The very poor, struggling at the edge of subsistence, are preoccupied with day-to-day survival. It is not that the poor have inherently short horizons; poor

communities often have a strong ethic of stewardship in managing their traditional lands. But their fragile and limited resources, their often poorly defined property rights, and their limited access to credit and insurance markets prevent them from investing as much as they should in environmental protection" (World Bank 1992: 30).<sup>17</sup>

This argument provides an instrumental justification for poverty alleviation, as a means of protecting the environment. There is much substance in this. But the human development argument goes beyond that. Human development is defended as a goal in itself; it directly enhances the capability of people to lead worthwhile lives, so there are immediate gains in what is ultimately important, while safeguarding similar opportunities in the future. There is hardly any example in the world of the expansion of education and health being anything other than monotone: good education and good health seem to generate powerful demand for these opportunities (and more) for our children. This is a relationship that goes well beyond the redistribution of income to the poor at a given point of time--important though that is. It should also be noted that any instrumental justification for human development is not gripped by some impersonal objective such as conserving the environment, but relates concretely to people's ability to generate for themselves more income and other means of good living.

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<sup>17</sup> This view of the poverty-environment nexus is also prominent in Mink (1993) and Pearce and Warford (1993).

#### **4. DEVELOPMENT AND HUMAN AGENCY**

##### **4.1. Human Agency and Institutions**

A universalist concern with the rights and interests of all can be effective only through a combination of individual efforts and institutional support. Over the last few decades, skepticism about planning and about reliance on government wisdom has grown by leaps and bounds. The utopian image of a benevolent state looking after the interests of everyone with equity and justice carries little conviction today, no matter what popularity it might have enjoyed in the past. The need for the individual adult to look after herself, rather than relying on a "nanny state", is well understood, and the point has been stated often enough not to require much repetition.

On the other hand, it is important to recognize that what an individual can do with her own agency is conditional on many circumstances, over which she may or may not have much control. For example, a child who is not sent to school, not taught any skills, and not given much means to support herself, might conceivably still do well for herself, given unusual initiative, ability and luck, but the cards are certainly stacked very firmly against her. On the other hand, institutional support from the family, from the public education system, and from social cooperation in general can transform radically what she can or cannot do on the basis of her own agency. It is the complementarity between individual agency and institutional support that is crucial for individual opportunities and achievements in

different fields, including the capability to lead satisfactory and worthwhile lives.

In general, the quality of life that may be enjoyed by people depends not just on the exercise of individual initiative of the respective persons, but also on social circumstances--which are thoroughly dependent on institutional arrangements. Social policies in enhancing education and skill formation, in expanding employment opportunities, in safeguarding the rewards of individual initiative and enterprise, and so on, can make a major difference to what we are able to achieve in the lives we may try to lead.

This complementarity is important enough even when attention is confined to the lives and prospects of the present generation. If, on top of that, the focus of attention includes the prospects of future generations as well, it becomes even more important to take full note of the complementarity between individual agency and institutional policy. The idea of sustainability, which was discussed in some detail in Section 3, sets an agenda which can be fulfilled only through systematic institutional arrangements. Whether we are concerned with limiting emissions of greenhouse gases, or restricting effluents into the waters, or preventing the destruction of forests and natural habitats, or averting premature depletion of exhaustible resources, there is need for institutional intervention and support in making the agencies of contemporary individuals take adequate note of the interests and rights of the generations that are yet to come.

In analyzing the complementarity between personal agency and social institutions, it is also important to note the different levels at which this complementarity works. Institutional changes themselves are dependent on human agency, even when the changes result from evolution rather than conscious selection. In fact, however, both for environmental protection and for the elimination of contemporary poverty and deprivation, there is much need for deliberate institution building. There is indeed considerable scope for deliberate decision making in giving individuals the incentive (through ownership rights, or through taxes and subsidies, or through public education) to economize on consumption patterns that are harmful to future generations. The same applies to arranging social services (such as education, or health facilities, or social insurance) that would help lift the underprivileged from the cycle of poverty and destitution. In influencing these decisions--through debate, discussion or agitation--human agency must again play a central role. The dynamics of public action involves interaction at different levels, and in interdependent ways.<sup>18</sup>

The informational focus on human development can be seen as a contribution to intelligent decision-making for the building of institutions. By focusing on central features of human lives, opportunities and deprivations, which are often neglected in opulence-oriented financial accounting, it is possible to force

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<sup>18</sup> Some of the underlying issues have been discussed in Drèze and Sen (1989), in the specific context of public action for eradicating hunger and famines.

attention on challenges that may otherwise go unaddressed. One of the characteristics of human agency--as opposed to the agency of other animals--is the ability to scrutinize and reexamine our values and priorities in the light of fresh information and new understanding.<sup>19</sup> The process of institutional reform is thoroughly dependent on such scrutiny and critique. The enterprise of reporting on human development can be usefully interpreted in this broad light.

#### **4.2. Markets and Governance**

The successes and failures of any institutional arrangement tend to include both commission and omission. This applies to the market mechanism also. The markets do certain things, and abstain from doing others. In assessing the efficacy of markets, we can distinguish between commissional problems and omissional difficulties. Most of the traditional critiques of the market mechanism focus on the omissions.

For example, the market mechanism may deal badly with so-called "public goods", where the consumption of the good by one person does not conflict with the consumption of the same good by another person. Examples vary from uncrowded public parks to socially oriented public education and the elimination of infectious diseases. The role of the government and of other social institutions is easy to see in this context, aimed at

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<sup>19</sup> On this and related matters, see Charles Taylor's important investigation of "what is human agency?" (Taylor 1985: Cha-

eliminating the identified omissions, to wit, the absence or inefficacy of the relevant markets.

Environmental arrangements (e.g., those needed to reduce the emission of greenhouse gases) are often also of this type. Many of the environmentally relevant "products" are not bought or sold in the markets. These omissions call for rectification, either through the use of "as if" markets, or through direct state intervention in lieu of relying on a market-like structure. The approach of human development, applied to the prospects of the future generations (in addition to the present), can help to draw attention to environmental priorities. Some of the policy requirements call for public action at the global level. This has been a subject of intense international discussion in recent years, and there are many global initiatives afoot. The supplementation needed over reliance on individual initiatives and market behavior calls not only for well-formulated policies of national governments, but also for the more difficult exercise of selectively global governance. In some ways, the consulting apparatus set up at the Rio conference in 1992 and other moves of that kind can be seen as the beginning of a much bigger initiative centering around environmental issues, including the task of making development safely sustainable.

It also worth noting in this context that the absence and unworkability of the markets for environmental effects has the consequence of significantly reducing the informational value of the standard statistical measures of GNP, GDP, etc.--even as



possible guides to economic prosperity--since these measures do not include the value (or disvalue) of environmental impacts that are not marketed. The informational failures go hand in hand with misdirection of policy, and there is a need to consider the necessity of policy change together with the case for greater informational coverage of environmental issues. The Human Development Reports have a direct role in the latter task (that of informational presentation), but they can also be relevant to the former, that is, policy response--by contributing to the effort to bring informed discussion to bear on these challenging questions.

#### **4.3. Values, Information and Indicators**

The making of policies and the building of institutions have to be based on systematic and informed evaluation. In doing any evaluation, we can distinguish between two different questions: (1) What objects do we value? (2) How valuable are the respective objects? Even though the former question is really an elementary aspect of the latter (in the sense that the objects of value are those that have positive weights), nevertheless the identification of the objects of value is substantively the primary exercise which makes it possible to pursue the second question. Also, the identification of the set of value-objects, with positive weights, itself precipitates a "dominance ranking" (x higher than y if it

yields more of at least one of the valued objects and at least as much of each).<sup>20</sup>

The objects of value identifies what may be called an evaluative space. In standard utilitarian analysis, the evaluative space consists of the individual utilities (defined in the usual terms of pleasure, happiness, or desire-fulfillment). Indeed, an evaluative system can be helpfully analyzed in terms of the informational constraints that it entails.<sup>21</sup> The issue of valuation is not settled by the choice of an evaluative space, but it is nevertheless an important step in the direction of getting a more complete valuation.

The informational focus of the Human Development Reports has tended to force attention towards particular features of the evaluative space, making it necessary to take adequate note of the characteristics of human living, rather than of finance, income and commodities only. In contrast, the reliance on a standard measure of economic progress such as the growth of GNP not only specifies an evaluative space (the world of commodities--irrespective of their distribution and use), but also particular weights to be put on the respective commodities. For example, the use of market prices for the purposes of weighting--in calculating real income or real consumption--amounts to attaching the same weight per dollar to the rich person's many dollars as to the poor person's meager means.

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<sup>20</sup> This dominance ranking, which can be shown to have standard regularity properties such as transitivity, can indeed take us some distance--often quite a distance--in the evaluative exercise.

<sup>21</sup> On this see Sen (1970, 1977).

This "completeness" is often seen as an advantage of the traditional GNP-centered measures of progress.<sup>22</sup> Certainly, it reduces the need for social values, but for the same reason, it also eliminates the opportunity of conscious social valuation. The completeness is achieved at the price of forcing an accounting system that we have good reason to reject: for example, why must we be locked into a system that obliges us to take each casual dollar of a millionaire as having the same social weight as a much-valued dollar of the very poor? In contrast, the specification of an evaluative space in the form of conditions of living, even when supplemented by some indicators of economic means such as the GNP, leaves the analyst with the freedom to decide what weights would be most appropriate for the exercise in which he or she might be engaged. It is on this major shift of the informational focus that the rationale of the human development approach has rested.

As was argued in Section 2.3, the recent reassertion of the classic humanist approach (in the Human Development Reports and related documents) has involved engagement on two fronts. The first is a defense of the ultimate objective of the enhancement of the opportunity to lead a worthwhile life (and not, for example, the pursuit of opulence as a goal in itself). The second is a clarification of the by-now well-established fact that economic growth is only one instrument among many in promoting life opportunities, and the effectiveness of that instrument is itself

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<sup>22</sup> See, for example, Srinivasan (1994).

contingent on a number of factors which the approach of human development has tended to highlight.

These disputations have occurred at different levels, including professional economic argumentation, in which many economists, philosophers and others have engaged over the last few decades.<sup>23</sup> The arguments have also had implications for the presentation of systematic information by international organizations, which draw attention to different aspects of achievements and failures in the modern world. There has begun to be more convergence in each of these fronts, but perhaps more so in the latter. Organizations other than the UNDP, which has been producing the Human Development Reports, have also increasingly focused on conditions of human life across the world, enriching financial and narrowly economic statistics by information on life and death, health and morbidity, education and illiteracy, and the tell-tale signs of inequality between women and men in many countries in the world.<sup>24</sup> The statistics presented by these organizations as well as by the UNDP have, perforce, been of varying quality, and the need for improving data collection and processing is certainly very strong. And yet a major battle has been won in establishing the central relevance of information about

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<sup>23</sup> See, for example, the collection of papers in Nussbaum and Sen (1993).

<sup>24</sup> One of the pioneering sources of information on this has been the annual publication of UNICEF's The State of the World's Children. The World Bank's World Development Report, which has always been a good source of general background data, has in very recent years started putting in noticeably more effort to present information on specific aspects of human development.

human lives in judging the progress and backwardness of nations, communities, regions and peoples.

It is important, in this context, to emphasize that the value of reporting on human development goes well beyond the usefulness of the narrowly based "human development index". The efficacy of that index lies in providing an alternative general focus of attention--alternative to the ubiquitous GNP per capita. This is an exercise in presenting an alternative immediate view of the overall situation in a country or a region--a situation that may be very badly reflected by GNP statistics. On the other hand, to go beyond that into a fuller analysis of the situation of human development in that country or region, it is quite essential to step over the human development index on to the more detailed information provided in the Human Development Reports.

This systematic informational enhancement is more significant than it might first appear. In welfare economics as well as moral philosophy it has been increasingly recognized that a great deal of the debates on valuations and ethical norms turn on the use of some information and the non-use of others.<sup>25</sup> Ethical judgments can, to a great extent, be axiomatized by the information that is kept "out" of ultimate accounting, in addition to the information it includes "in". For example, the utilitarian approach is characterized not only by the note that is taken of utility values, but also by the complete neglect of all information other than

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<sup>25</sup> On "the informational basis of alternative welfare approaches", see Sen (1974, 1977).

utilities, and even a neglect of the inequalities in utilities (concentrating, as utilitarianism does, on the sum-total only).

Similarly, the approach of wealth maximization not only takes "in"--and makes use of--wealth data, but also keeps "out" other information, including the characteristics of human lives. As was discussed earlier, it thus manages to concentrate entirely on information related to the means and not the ends, and in particular, on one class of means only--ignoring others. One of the objectives of the Human Development Reports has been to focus attention on the variables that relate most directly to the lives of people, distinguishing them from other variables that are valued for instrumental reasons only--as good means to other ends. Some of these means can, of course, be extremely important and would certainly deserve a great deal of attention. But it is still important to separate out those characteristics that are valued for their own sake, as things that are intrinsically valuable (such as the quality of life we can lead), from other things (such as income and wealth) that are desired--as Aristotle put it--"for the sake of something else". For the analysis of political ethics and practical reason, ready access to information on the characteristics of human development can indeed be truly central.

#### **4.4. Human Capital and Human Development**

We end this critical account of sustainable human development with some remarks on the relationship between ends and means. The basic rationale of the human development approach, as we have

discussed, lies in the fact that the constitutive elements of human development are closer to the shared human ends than are some of the more commonly used criteria of progress, such as the growth of GNP per person. In contrast, the importance of GNP growth and related achievements in expanding the means of life lies in their instrumental relevance. This thesis--based on the significance of human development as an end--should not, however, be construed as a denial of the importance of human development as a means as well. Human development, in the form of people being better educated, more healthy, less debilitated, and so on, is not only constitutive of a better quality of life, but it also contributes to a person's productivity and her ability to make a larger contribution to the progress of material prosperity.

Indeed, recent works on economic growth have demonstrated the far-reaching role of education, health, and other human qualities in generating economic growth. For example, in interpreting the causal antecedents of the so-called "East Asian miracle", it has increasingly become clear that a foundational and immensely far-reaching role has been played by the enhancement of the quality and skill of labor.<sup>26</sup> This is, in fact, "the human capital aspect" of human development. The economic roles of better and more widespread schooling, good health and nourishment, learning by

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<sup>26</sup> See particularly the World Bank study, The East Asian Miracle: Economic Growth and Public Policy (1993), and the extensive literature cited in that report. See also Nancy Birdsall's (1993) forceful exposition of the accumulated evidence in favor of the view that "social development is economic development". For a classic contribution to the importance of education as a prime mover of progress, see Schultz (1980).

doing, and technical progress all point to the importance of human agency as a prime mover of material progress. There are many lessons to be learned from these experiences, and the powerful instrumental role of human development--in addition to its intrinsic importance--is certainly quite central to our understanding of the economic and social world.

The human development approach must take full note of the robust role of human capital, while at the same time retaining clarity about what the ends and means respectively are. What has to be avoided is to see human beings as merely the means of production and material prosperity, taking the latter to be the end of the causal analysis--a strange inversion of objects and instruments. That is the danger to which an approach that sees women and men only as "human capital" is open. Rejecting such exclusive concentration on people as "human capital" is central to the human development approach. But that disputation does not, in any way, deny the commanding role of human capital in enhancing production and material prosperity as well.

Rather, we have to see human development as having both direct and indirect importance. Since education, health and quality of life have intrinsic value, human development has direct--and immediate--importance. In addition, since the quality of human agency is enhanced by better education, health, etc., it is also the case that human development has great indirect importance. The material prosperity that is advanced by human development can, in its turn, contribute to further increases in the quality of human



life. The importance of this indirect connection adds to the relevance of human development, but does not detract from its direct importance. The human development approach includes the significance of human capital without making that perspective supplant the view of human beings as the end of the exercise, rather than as means of production and of economic activity.

Immanuel Kant's injunction "to treat humanity" ultimately "as an end withal, never as means only"--an injunction with which the first chapter of the first Human Development Report had been launched in 1990--remains just as powerful, even when the great importance of human capital in economic growth is appropriately acknowledged. Needless to say, this applies to our obligations to the future generations as well. The importance human capital indicates that the pivotal role of education, health, training, etc., in work and production must be kept firmly in view in considering alternative scenarios of sustainable development; human skill and agency would be important not just in raising productivity, but also in devising ways and means of dealing with environmental and other challenges. However, while taking full note of this instrumental importance of human quality in maintaining and expanding the material basis of human life, we must not lose sight of the central importance of the quality of human life as an end in itself. What is to be sustained is the nature of the lives that people can lead, and the fact that in that sustaining, human agency would be pivotal, does not reduce in any way the significance of human life as an end.

The discipline of universalism requires us to extend the same concern for all human beings--irrespective of race, class, gender, nationality, or generation. The underlying ethics of it sees different human beings as important in the same way. This importance relates to the personhood of people: human beings seen as persons--not as means of production. As a matter of fact, human beings are also superb means of production. But that is not the most momentous fact about us. The overarching relevance of human development lies in that basic recognition.

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**APPENDIX. OPTIMALITY, SUSTAINABILITY, AND PURE TIME PREFERENCE**

In this Appendix we explore the relationship between optimal development and sustainable development. A simple two-period model is presented to examine the central ideas; it is general enough for the points we wish to make. The purpose is not to present a full-blown optimizing model which incorporates capital of different types (physical, natural, etc.) into production, and environmental amenities, pollution, etc. into the utility or well-being function; there are many such models available in the literature (for example, see Dorfman 1992, Pearce and Warford 1993, and the references cited there). Rather, our purpose is a conceptual one: to ask whether in the simplest possible optimizing model, sustainability is implied by optimality. If it is not, then by introducing environmental externalities and non-renewable resources into the model, sustainability will be an even less likely consequence of optimality. In other words, we will have to look elsewhere for an ethical justification of sustainability. It will also follow that intertemporal optimization models which incorporate environmental variables are not necessarily models of sustainable development. Conceptually, then, a different type of model from those usually adopted for planning purposes in developing countries will be required. It is important to recognize this significant departure from standard practice if there is an intrinsic concern with sustainability.

This Appendix can in some ways be seen as a response to the challenge in Pearce and Warford's (1993) book, World Without End:

"...insofar as past development policy has been influenced by the theory of optimal growth--and it clearly has--there is a critical need to analyze the conditions under which optimal growth is also sustainable growth" (p. 36).

### **A.1. Concepts of Optimality and Sustainability**

The now standard economic literature on optimal growth goes back to the classic article of Frank P. Ramsey (1928) entitled "A Mathematical Theory of Saving". In it, Ramsey solved the problem of maximizing the sum total of utility (or welfare) over an infinite time horizon subject to a given technology and initial capital stock. Ramsey's seminal paper has spawned a vast literature in the 1960s; this is reviewed by Tjalling Koopmans (1967a). Most of this literature adopts as the objective to be maximized--the optimality criterion--an integral over time of the discounted utility flow  $e^{-\rho t} u(c_t)$ , where  $c_t$  is consumption at time  $t$ ,  $u(c)$  is an increasing and strictly concave function, and  $\rho > 0$  is the rate of pure time discount. Thus the optimality criterion is generally taken to be the maximization of

$$\int_0^{\infty} e^{-\rho t} u(c_t) dt$$

subject to given assumptions about the aggregate production function, population growth, and technological progress.

This optimal economic growth framework allows us to examine many of the questions to do with sustainable development. We can,

for example, talk of "sustaining" consumption  $c_t$ , income or output  $q_t$ , capital stock  $k_t$ , or well-being  $\omega_t$ --which is broader than utility  $u_t$ .<sup>27</sup> Does intertemporal optimization imply that each of these variables will be non-declining over time? If not, optimality and sustainability may be in conflict. How might one justify a concern with sustainability in this case? Would a greater concern for intergenerational equity in the optimality criterion lead to the stock of capital  $k_t$  or level of welfare  $\omega_t$  being maintained over time? How do the rate of time preference and technical progress, respectively, affect the sustainability of each of the variables considered? Under what assumptions, if any, can sustainability be derived as a consequence of optimization? If it cannot, then we must seek an intrinsic justification for sustainability and decide upon what it is that should be sustained. And at what level should whatever it is be sustained? This will take us outside the "welfarist" framework of optimal economic growth, and require us to consider other principles of intergenerational justice.

The relationship between sustainability and optimality of a path of development can be illustrated by means of a simple discrete two-period model. Many of the questions posed above can be answered in the context of such a model, without any loss of generality. Moreover, the reasons for the outcomes can be

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<sup>27</sup> With  $\omega(.)$  a function solely of consumption  $c_t$ , sustaining  $\omega_t$  and sustaining  $c_t$  will be equivalent. But our well-being function  $\omega(.)$  can also depend on pollution, environmental amenities, etc., so that sustaining  $c_t$  and sustaining  $\omega_t$  could in general be different.

explained just as effectively as in a full-blown infinite time horizon model.

We assume there are just two periods, indexed by 0 and 1, and only one good ("corn"), which can be either consumed or invested. An amount  $k_0$  of the good (the initial "capital stock") is available for consumption  $c_0$  or investment  $(k_0 - c_0)$  in period 0. The production function is  $q = f(k)$ , which is increasing and strictly concave in capital  $k$  (i.e. displays positive and diminishing marginal product). Since there is no future beyond period 1, we assume that all output is consumed in period 1, i.e.  $c_1 = f(k_0 - c_0)$ .<sup>28</sup> Our two-period allocation problem is then to maximize the present discounted value of well-being

$$\omega(c_0) + \frac{1}{1+\rho} \omega(c_1)$$

subject to the constraint that

$$c_1 = f(k_0 - c_0).$$

Substituting the constraint into the objective function reduces the problem to choosing  $c_0$  to maximize

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<sup>28</sup> In this or any finite time horizon model, we cannot solve for the optimal capital stock to bequeath to the future since the welfare of future generations (beyond the time horizon of the model) does enter into the model. Finite time horizon models arbitrarily specify a terminal capital stock, which in our case we specify as 0.



$$\omega(c_0) + \frac{1}{1+\rho} \omega(f(k_0 - c_0)).$$

This yields the first-order condition

$$\omega'(c_0) = \frac{1}{1+\rho} \omega'(c_1) \cdot f'(k_0 - c_0)$$

or

$$\frac{\omega'(c_0)}{\omega'(c_1)} = \frac{1+MPK}{1+\rho}$$

where MPK is the marginal product or "return" per unit of capital net of the amount invested.

The standard marginalist reasoning can be invoked to justify the first-order condition. The loss in present discounted well-being from consuming one unit less in period 0 is  $\omega'(c_0)$ . The gain in output next period is  $(1+MPK)$ , which is valued at  $\omega'(c_1)$ , implying a gain in well-being in period 1 of  $\omega'(c_1) \cdot (1+MPK)$ . But well-being in period 1 is worth only  $1/(1+\rho)$  in terms of well-being in period 0. Hence the gain in present discounted well-being is  $\omega'(c_1) \cdot (1+MPK)/(1+\rho)$ . At the optimum, the loss in the objective function (present discounted well-being) from consuming one unit less in period 0 must equal the gain. Hence the above first-order condition.

We can now ask whether the optimum solution to this intertemporal problem implies non-declining consumption and well-being. From the optimality condition, it follows that

$$\omega'(c_0) \geq \omega'(c_1)$$

according as

$$MPK \gtrless \rho.$$

Hence if the marginal product of capital is greater than  $\rho$ , then  $\omega'(c_0)$  will be greater than  $\omega'(c_1)$ , and  $c_0$  will be less than  $c_1$  because of strict concavity of the function  $\omega(c)$ . In this case, sustainability (i.e. rising  $c_t$  and  $\omega_t$ ) follows as a consequence of optimization. In particular, if  $\rho=0$  and the technology is productive ( $MPK > 0$ ), consumption and well-being will rise over time.

But what if the technology is not as productive as  $\rho$ , the rate of pure time discount? If  $MPK$  is smaller than  $\rho$ , then  $\omega'(c_0)$  will be less than  $\omega'(c_1)$ , and  $c_0$  will be greater than  $c_1$  (by concavity). In this case, consumption  $c_t$  and well-being  $\omega(c_t)$  will fall over time, and the optimum path will not be sustainable. Thus sustainability is not necessarily implied by optimality. Indeed the higher is the rate of pure time discount  $\rho$ , the less likely it is that the optimal path will be sustainable. The example also demonstrates that requiring a path of consumption to be sustainable can be at the expense of achieving the maximum present discounted value of well-being.

This simple two-period model serves to illustrate that optimality and sustainability are logically distinct criteria of

development. One cannot be deduced from the other as a necessary consequence. It may, however, be objected that the model is overly simple: it does not take account of technical progress, population growth, or an intrinsic concern for equity between generations. We examine these features in turn by extending the model while retaining its two-period assumption.

Technical progress is readily incorporated into the model by assuming that the productivity of capital rises exogenously at the rate of  $\lambda$  per period. This implies that consumption in period 1 will be  $c_1 = (1+\lambda)f(k_0 - c_0)$ , and the new first-order condition will be

$$\frac{\omega'(c_0)}{\omega'(c_1)} = \frac{(1+\lambda)(1+MPK)}{(1+\rho)}.$$

For sustainability we require  $\omega(c_0) < \omega(c_1)$ , or  $\omega'(c_0) > \omega'(c_1)$  given strict concavity of the well-being function  $\omega(c)$ . Thus sustainability requires that  $(1+\lambda)(1+MPK) > (1+\rho)$ , and this condition is more likely to be fulfilled the higher is the rate of technical progress  $\lambda$  (and the lower is the rate of pure time discount  $\rho$ ). Intuitively, the gain from consuming one unit less in period 0 is now higher at  $(1+\lambda) \cdot (1+MPK)$ , rather than simply  $(1+MPK)$ , times  $\omega'(c_1)$ . Hence consuming less today relative to tomorrow will yield a higher present discounted value of welfare;

this makes it more likely that consumption and well-being will rise over time.<sup>29,30</sup>

Population growth can also be incorporated into the basic model. But we now have to consider two different forms of the welfare function, corresponding respectively to the "average" and "total" forms. In the average form, we simply maximize the present discounted value of average well-being over time. If the rate of population growth is  $n$  per period, then average consumption in period 1 will be

$$c_1 = \frac{f(k_0 - c_0)}{1+n}$$

because the total output in period 1,  $f(k_0 - c_0)$ , must now be shared by  $(1+n)$  times as many people as in period 0. The discounted value of average well-being is

$$\omega(c_0) + \frac{1}{(1+\rho)} \omega(c_1)$$

where  $c_0$  and  $c_1$  are average consumption in periods 0 and 1, respectively. The first-order condition for this case is

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<sup>29</sup> It does not, however, follow that the capital stock  $k_t$  is also more likely to rise over time. The same amount of physical capital is now more productive over time and less of it is required to produce any given level of output.

<sup>30</sup> Solow (1992: 15) points out that: "Sustainability is not always compatible with discounting the well-being of future generations if there is no continuing technological progress. But I will slide over this potential contradiction because discount rates should be small and, after all, there is technological progress."

$$\frac{\omega'(c_0)}{\omega'(c_1)} = \frac{(1+MPK)}{(1+\rho)(1+n)} .$$

Sustainability requires  $c_0 < c_1$  or  $\omega'(c_0) > \omega'(c_1)$ , which implies  $(1+MPK) > (1+\rho)(1+n)$ . The condition for sustainability is thus more stringent compared with the no population growth ( $n=0$ ) situation, making it less likely to be achieved.

The "average" criterion can, however, be criticized on a number of grounds (Parfit 1984, Broome 1992, *inter alia*). The criterion of "total well-being" weights average well-being in each period by the number of people, so that the welfare function (present discounted value of total well-being) becomes

$$\omega(c_0) + \frac{(1+n)\omega(c_1)}{(1+\rho)}$$

where  $c_0$  and  $c_1$  are average consumption in periods 0 and 1, respectively. In this case, the first-order condition reduces to the earlier zero population growth condition

$$\frac{\omega'(c_0)}{\omega'(c_1)} = \frac{1+MPK}{1+\rho},$$

and implies the same condition for sustainability as before, viz.  $MPK > \rho$ . The reason is that although the gain in output from a unit sacrifice in consumption in period 0 is shared by  $(1+n)$  more people in period 1, and is therefore only  $1/(1+n)$  times its former size per person, there are now  $(1+n)$  times as many people enjoying this gain in average consumption. These two factors exactly

balance out to give the same first-order condition as in the no population growth case.

We can also incorporate a concern for equity between generations into the model. The welfare function thus far has been the sum total of discounted well-being over time. Discounting implies placing less weight on the well-being of future generations, not because they are better off--but because their well-being happens to arise later. But we might also wish to place less weight on the well-being of generations that are better off. In other words, the welfare function should reflect that a unit increase in well-being to a worse-off generation counts for more than a similar increase to a better-off generation. The simplest way of allowing for both pure time discount and well-being inequality between generations is to take a (quasi-) concave transformation of the well-being values that are comparable over time, viz.  $\omega(c_0)$  and  $\omega(c_1)/(1+\rho)$ . A form which is separable and isoelastic in these numbers is

$$\frac{1}{1-\epsilon} [\omega(c_0)^{1-\epsilon} + (\omega(c_1)/(1+\rho))^{1-\epsilon}] \quad \text{for } \epsilon \geq 0, \quad \epsilon \neq 1$$

or

$$\log[\omega(c_0)] + \log[\omega(c_1)/(1+\rho)] \quad \text{for } \epsilon = 1.$$

Such a welfare function reduces to the sum total of discounted well-being when  $\epsilon=0$ ; and it tends to the Rawlsian function

$\text{Min}\{\omega(c_0), \omega(c_1)/(1+\rho)\}$  when  $\epsilon$  tends to  $\infty$ .<sup>31</sup> For  $\epsilon > 0$  it embodies a concern for inequality in the discounted well-being of different generations. The parameter  $\epsilon$  is a measure of aversion to inequality in comparable levels of well-being across generations.

Substituting  $c_1 = f(k_0 - c_0)$  into this welfare function, and maximizing it with respect to  $c_0$  yields the first-order condition

$$\frac{\omega'(c_0)/\omega(c_0)^\epsilon}{\omega'(c_1)/[\omega(c_1)/(1+\rho)]^\epsilon} = \frac{1+MPK}{1+\rho}.$$

Now the function  $\omega'(c)/\omega(c)^\epsilon$  is decreasing in  $c$  for  $\epsilon \geq 0$ . Hence the condition for sustainability in this case is

$$(1+MPK) > (1+\rho)^{1-\epsilon}.$$

This is more likely to be satisfied the larger is  $\epsilon$ , ceteris paribus. Moreover, if  $\epsilon \geq 1$ , the condition is assured with a positive MPK. As  $\epsilon$  tends to infinity, the optimum solution tends to equality of  $\omega(c_0)$  and  $\omega(c_1)/(1+\rho)$ . For  $\rho > 0$ , this of course implies that  $\omega(c_1) > \omega(c_0)$  or, in other words,  $c_1 > c_0$ .<sup>32</sup> But if  $\rho=0$ , then the Rawlsian solution is equality of  $\omega(c_0)$  and  $\omega(c_1)$ , i.e. consumption is constant over time.

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<sup>31</sup> With pure time discount  $\rho$ , the Rawlsian welfare function corresponds to maximizing the smallest value  $\omega_t/(1+\rho)^t$ , for  $t = 0, 1, 2, \dots$ .

<sup>32</sup> Note that sustainability has been made more likely here by specifying a concern for inequality in discounted well-being rather than in the actual level of well-being of different generations. In the extreme (the Rawlsian case), this leads to equality of discounted well-being, which (with a positive pure time preference rate) implies a rising level of well-being over time.

A rigid egalitarianism is implied in Rawls' Difference Principle, interpreted by economists as the Maximin Rule in the space of utilities. In discussing the application of this rule in an intertemporal context, we shall henceforth take  $\rho$  to be 0, and will attempt to justify this assumption later. Although Rawls objects to utilitarianism applied between generations on the grounds that it will demand too much sacrifice by some generations for the sake of a greater gain by other (richer) ones, he is reluctant to apply his Difference Principle between generations. Thus, on the problem of optimum savings, Rawls (1971: 284-293) states:

"...the question of justice between generations...subjects any ethical theory to severe if not impossible tests...I believe that it is not possible, at present anyway, to define precise limits on what the rate of savings should be. How the burden of capital accumulation and of raising the standard of civilization is to be shared between generations seems to admit of no definite answer. It does not follow, however, that certain bounds which impose significant ethical constraints cannot be formulated...Thus it seems evident, for example, that the classical principle of utility leads in the wrong direction for questions of justice between generations...Thus the utilitarian doctrine may direct us to demand heavy sacrifices of the poorer generations for the sake of greater advantages for later ones that are far better off. But this calculus of advantages which balances the losses of



some against benefits to others appears even less justified in the case of generations than among contemporaries...It is a natural fact that generations are spread out in time and actual exchanges can take place between them in only one direction. We can do something for posterity but it can do nothing for us. This situation is unalterable, and so the question of justice does not arise...It is now clear why the (max-min criterion) does not apply to the savings problem. There is no way for the later generation to improve the situation of the least fortunate first generation. The principle is inapplicable and it would seem to imply, if anything, that there be no saving at all. Thus, the problem of saving must be treated in another fashion."

In one of the earliest contributions to the economic literature on intergenerational equity (in the presence of exhaustible resources), Solow (1974b) explores the implications of adopting the Maximin Rule--even though he concedes he is being "plus Rawlsian que le Rawls". The solution is as obtained in the above two-period model with  $\rho$  set at 0 and  $\epsilon$  made indefinitely large. Consumption and the standard of living will be constant over time: it is not desirable for any generation to sacrifice consumption for the sake of greater consumption by a better-off generation.<sup>33</sup> The problem with this solution, as hinted above by

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<sup>33</sup> In a multiperiod model, this implies zero net saving with a stationary technology, and negative net saving with advancing technology ( $\lambda > 0$ ). In this case, the capital stock  $k_t$  will decline over time.

Rawls himself, is that it is too much at the mercy of the initial conditions. If the initial capital stock  $k_0$  is small, then no more will be accumulated, and the standard of living will be low forever. As Solow (1986: 144) put it, "a society starting out poor would find no justification for the initial accumulation that could provide a higher standard of consumption in the future."

Considerations of this sort suggest a constraint on the floor level of consumption or well-being. Apart from the criteria of optimality and sustainability (the latter being a constraint on the time derivative of consumption or well-being), we can incorporate a constraint in terms of a minimum desirable standard of living. This can be specified as a lower bound on the level of consumption,  $\underline{c}$ , or of well-being,  $\underline{w}$ , or of output,  $g$ , at all times. It can be justified in terms of notions of "basic needs" fulfillment or "subsistence" which, for example, underlie the Brundtland Commission Report (meeting the needs of the present without compromising the ability of future generations to meet their own needs).

There are three distinct criteria we have discussed in relation to intertemporal allocation: optimality, sustainability, and a minimum standard of living. They are characterized in the table below.

<u>Criterion</u>	<u>Characterization</u>
1. Optimality	Maximize $\int_0^{\infty} e^{-\rho t} \omega(c_t) dt.$
2. Sustainability	$\dot{c}_t \geq 0, \dot{\omega}_t \geq 0, \dot{k}_t \geq 0, \dot{q}_t \geq 0$ , for all $t$ .
3. Minimum standard of living	$c_t \geq \underline{c}, \omega_t \geq \underline{\omega}, q_t \geq \underline{q}$ , for all $t$ .

We have seen in the context of the two-period model that a path of development can be optimal but not sustainable, and can be sustainable but not optimal. Also, it is possible to set the minimum standard of living constraint at a level which violates either or both of optimality and sustainability. In other words, the three criteria of development are logically independent: all three, any two, just one, or none, may be satisfied. It follows, in particular, that the concept of sustainability cannot be derived from either of the other two criteria.

#### **A.2. The Rate of Pure Time Preference**

One of the main reasons why sustainability does not follow from intertemporal optimization (in the broadly welfarist framework of the two-period model above) is that future generations' well-

being is discounted at a positive rate.<sup>34</sup> What is the justification for such an assumption? Ramsey (1928: 543) had himself "...assumed that we do not discount later enjoyments in comparison with earlier ones, a practice which is ethically indefensible and arises merely from the weakness of the imagination." Pigou (1932: 24-25) felt that although "everybody prefers present pleasures or satisfactions of given magnitude to future pleasures or satisfactions of equal magnitude, even when the latter are perfectly certain to occur", "this preference for present pleasures...implies only that our telescopic faculty is defective."

Roy Harrod (1948: 37-40) went even further, and suggested that: "Time preference in this sense is a human infirmity, probably stronger in primitive than in civilized man...On the assumption...that a government is capable of planning what is best for its subjects, it will pay no attention to pure time preference, a polite expression for rapacity and the conquest of reason by passion."

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<sup>34</sup> Pigou (1932: 25) felt such discounting revealed "...a far-reaching economic disharmony. For it implies that people distribute their resources between the present, the near future and the remote future on the basis of a wholly irrational preference. When they have a choice between two satisfactions, they will not necessarily choose the larger of the two, but will often devote themselves to producing or obtaining a small one now in preference to a much larger one some years hence. The inevitable result is that efforts directed towards the remote future are starved relatively to those directed to the near future, while these in turn are starved relatively to efforts directed towards the present."

Finally, Solow (1974a: 9) argues that: "In social decision-making, however, there is no excuse for treating generations unequally, and the time-horizon is, or should be, very long. In solemn conclave assembled, so to speak, we ought to act as if the social rate of time preference were zero (though we would simultaneously discount future *consumption* if we expect the future to be richer than the present). I confess I find that reasoning persuasive, and it provides another reason for expecting that the market will exhaust resources too fast."

These are arguments about impartiality with respect to time: well-being at one point in time should not count for more than well-being at another. They do not affect the case for discounting future consumption if consumption is expected to grow over time. The consumption discount rate reflects both the higher level of consumption in the future and the decrease in the marginal value of consumption: it is simply the growth rate of consumption per capita times the elasticity of the marginal well-being function. The marginal well-being function  $\omega'(c)$  represents a distributional weighting system between generations attaining different levels of consumption.<sup>35</sup> The weights  $\omega'(c)$  ignore the time at which a generation lives.

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<sup>35</sup> Distribution problems between individuals living at the same time are ignored by assuming there is equal distribution among contemporaries. See, however, Anand (1981) and Anand and Joshi (1979), where distribution both among contemporaries and over time are incorporated in a dynamic model.

Assuming a pure (i.e. well-being) time preference rate of  $\rho = 0$  raises a technical problem for the intertemporal optimality criterion

$$\int_0^{\infty} e^{-\rho t} \omega(c_t) dt.$$

Without a positive discount factor ( $\rho > 0$ ), this integral will not converge over an infinite horizon for all paths of interest.<sup>36</sup> Ramsey (1928) got around this difficulty through his ingenious device of a "bliss" level of consumption  $\hat{c}$  at which, in his formulation, marginal utility falls to zero. Instead of maximizing the above integral, Ramsey minimized the integral of the excess of bliss utility over attained utility:

$$\int_0^{\infty} [u(\hat{c}) - u(c_t)] dt.$$

This is equivalent to maximizing

$$\int_0^{\infty} [u(c_t) - u(\hat{c})] dt.$$

A modern variant of Ramsey's device, which serves the same purpose, is the so-called overtaking criterion proposed by von Weizsäcker (1965). This criterion achieves comparisons of

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<sup>36</sup> For some authors this appears to be a sufficient reason for assuming a positive pure time preference rate. However, this is more a matter of convenience than of reflection.

consumption paths over an infinite future while comparing integrals over finite horizons only. A path  $c_t$  is declared better than an alternative path  $c'_t$  if there exists a time  $T'$  such that

$$\int_0^T \omega(c_t) dt > \int_0^T \omega(c'_t) dt \quad \text{for all } T \geq T'.$$

From time  $T'$  onward, the (finite) utility integral for path  $c_t$  has overtaken that for path  $c'_t$ .<sup>37</sup> Although the overtaking criterion does not choose between every possible pair of paths, the partial ordering defined by it suffices to determine a unique optimal path in the circumstances assumed by Ramsey.

The circumstances assumed by Ramsey were no population growth and a constant technology. Koopmans (1965: 239) admits to "an ethical preference for neutrality as between the welfare of different generations", and generalizes Ramsey's results to a situation of exponential population growth and technical progress. The device he uses is not Ramsey's bliss level of consumption, but a different asymptote from which he subtracts attained utility. This is the so-called Golden Rule level of consumption (Phelps 1966), defined as the maximum level of consumption (and utility) per head that can be maintained indefinitely. Note that the Golden Rule of accumulation is a concept of sustainability, but at a level

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<sup>37</sup> When the discount rate  $\rho$  is positive, the overtaking criterion is equivalent to the maximization of discounted utility over infinite time.

that achieves the highest constant consumption per head over time. Phelps (1966: 5) christened it a golden rule because then "...each generation saves (for future generations) that fraction of income which it would have past generations save for it".

We can incorporate a concern for equity between generations into the overtaking criterion in much the same way as before. Instead of taking the integral (i.e. sum total) of well-being over time, we can take the integral of a concave (isoelastic) transform of the numbers  $\omega_t$ . Thus in the criterion, we simply substitute  $\omega(c)^{1-\epsilon}/(1-\epsilon)$  for  $\omega(c)$ , where  $\epsilon \geq 0$ .

An alternative approach to equity between generations has recently been suggested by Asheim (1993). Essentially, he proposes a combination of the overtaking criterion and generalized Lorenz dominance in the space of "quality of life", i.e. well-being. He defines a path  $c_t$  to be as just as an alternative path  $c'_t$  if there exists a  $T'$  such that for all  $T \geq T'$

$$\int_0^T \omega(c_t) dt \geq \int_0^T \omega(c'_t) dt$$

and

$$\{\omega(c_t) | t \in [0, T]\} \text{ Lorenz dominates } \{\omega(c'_t) | t \in [0, T]\}.$$

This criterion of justice requires  $\omega(c_t)$  both to catch up with  $\omega(c'_t)$  in finite time and to be as egalitarian in the Lorenz sense. Thus preferred paths are those that both increase the total sum to be shared between generations and share it in a more egalitarian way.



In a productive technology, this leads to the result that a path is just if and only if it is dynamically efficient and non-decreasing (i.e. sustainable).

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