What do we owe the future?

Paul Streeten

After discussing five differences in their concern for the future between growth men and environmentalists, and some accounting problems in the measurement of economic growth, it is argued that there is no case for a positive (or negative) time discount rate. Various arguments in its favour are subjected to a critique. In the next section, the notion that we have duties to future generations is subjected to criticism and it is concluded that we do not have a basis in existing moral theory for perpetuating mankind. The apparent contradiction between the case for a zero time discount rate and against the continuation of humanity is cleared up. Finally, some specific problems of responsibilities to future generations are taken up. The principles previously discussed are applied to these cases.

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It is, on the face of it, odd that both growth men and environmentalists, who share a concern for future generations, should be so much at loggerheads. The need to accumulate physical and human capital for greater output and enjoyment later, at the expense of current enjoyment, is at the heart of high growth strategies. Sometimes we hear of the objective of 'maximizing growth'. This, strictly interpreted, means that we should tighten our belts to the bare minimum consumption for productive survival, accumulate the difference between production and consumption, and then the last generation before Doomsday could indulge in an infinite consumption orgy. While the strategy is nonsensical, what greater concern could there be for the future? But, even more sensible growth strategies aim at higher levels of income and consumption for future generations. On the other hand, conservationists, environmentalists and ecologists wish to preserve a decent natural environment and an adequate supply of raw materials for subsequent generations. They, too, have the welfare of future generations at heart. What then are the issues of disagreement? We might identify five.

Provision for the future

First, growth men and environmentalists disagree on the form that provision for the future should take. Growth men emphasize reproducible capital and education and training (human capital), anti-growth environmentalists emphasize exhaustible resources – minerals, open space, virgin land, clean air, safe water. They are worried lest rapid growth destroy these and leave future generations worse off. If environmentalists take exhaustibility seriously, the advocacy of zero growth is no remedy. Even zero growth requires depreciation of existing capital and leads eventually to exhaustion, though exponential growth does so sooner. The difference is merely a matter of time. The strategy should lead to the advocacy of not zero growth but zero consumption! But, if the present generation has to be extinguished in order to leave resources over for future generations, there will be no future generations. If, on the other hand, the environmentalists assert that technical substitutes for exhaustible raw materials can be found, so that the issue is a battle between technology and resources, the difference becomes an

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empirical question about the length of time and the appropriate policies. It is anybody's guess how long it would take for technological innovation to substitute for exhaustible materials. If it were the case that the rate of our technical progress exactly offsets the rate of depletion, pollution and risk creation, intergenerational responsibilities would be met according to both growth men and environmentalists.

Sudden change for the worse

A second difference is the degree of probability that the two groups attach to a sudden drastic change for the worse, such as irreversible pollution, or complete exhaustion of an essential resource, or complete dislocation of life that would spell disaster. Growth men tend to attach rather small or zero probabilities to such events and view progress as a more continuous process, while environmentalists attach higher probability to such disasters, if current policies are continued.

Different time discount rates

A third difference may be the rate of time discount that the two groups attach to the welfare of future generations, perhaps together with different estimates of when a disaster might occur. Assume that both groups agreed that it is possible, or even probable, that a disaster will occur in 5 million years. Anti-growth men may have a longer horizon, so that they attach greater negative weights to such a prospect, whereas growth men may discount the very distant future at higher rates. This higher discount rate has to be distinguished from their greater faith in the 'technical fix', the human ingenuity of avoiding the disaster, which is a separate point, more fully discussed below.

It may also be that the two schools apply different time discount rates to the not so very distant future. The view that we owe special responsibilities to those near to us would fully take into account the lifetime of our children and their children, but might give decreasing weights to the welfare of subsequent generations. We may reply to this that if we love our children and those they in turn love, the love chain presumably extends into the indefinite future. In fact, however, we attach less weight to an extra dollar accruing to our greatgreatgreat-grandchildren than to our grandchildren. On the other hand, even if we agree that the special relationship of kinship calls for stronger weights to be given to the welfare of those near to us in kinship or space or by some other bonds, it does not call for even lower weights the further they are away in time. Once the special relationship has levelled off, say with our grandchildren, the same weights would apply. And, moreover, we do attach the same weights, irrespective of kinship or other special relationships, to the infliction of some forms of damage for example. We believe that it is wrong to harm intentionally not only our children but any human being anywhere, and at any time.

It could also be that there are some who would want us to apply a negative discount rate to future benefits, so that we should wish to sacrifice more than a dollar now for an extra dollar accruing to a member of a subsequent generation. A value system that attaches great value to the continued existence of the human race might support such negative discount rates.

Costs of economic slowdown

A fourth difference is in their estimate of the costs incurred in slowing down economic growth, where such a slowdown is favourable to conserving exhaustible resources and reducing pollution. These costs comprise not only the costs of present forgone consumption, and the consumption forgone in the near future, but also the social and psychological consequences of a slowly growing or stagnating economy. All sorts of adjustments, between occupations, between regions and so on are much easier in a rapidly growing economy, where shrinkage of certain sectors takes the form of redeploying only new entrants, than in a stagnant or slowly growing economy, where dismissal, unemployment and dislocation have to be suffered. Rapid growth makes adjustment not only less difficult and less painful, but whatever adjustments have to be made become easier to bear. More resources are there to maintain the unemployed at a higher level of income, and retrain and relocate them. Anti-growth men, on the other hand, accept these costs and pains of slower growth as an insurance premium that we have to pay in order to avoid the risks of future dislocation or disaster, which they regard as more likely with rapid growth.

Technical fix

A fifth and final difference lies in the confidence the two schools have in a 'technical fix'. In the past, technical ingenuity has often substituted for exhaustible natural resources, but what guarantee is there that the future will be like the past? Anti-growth men, who emphasize discontinuities, may quote the story of the man who fell out of the window of the 30th floor and, when he reached the 14th, said, 'so far, so good'. In contemporary relations we do not regard it as legitimate to take detrimental actions with the presumption that the potential victims will invent ways of getting out of the scrape. Why should we rely on it in intergenerational relations? Given our ignorance and uncertainty surrounding the future, a sensible moral strategy would be to compare the costs of having relied on a technical fix when it did not turn up, with the costs of having sacrificed options and benefits now for the sake of avoiding such reliance, when in fact it did turn up!

It should also be remembered that growth can be complementary to environmental protection. If we count industrial anti-pollution devices and the technology that produces them and innovations that economize in exhaustible materials, as part of GNP (but for a different approach see the next paragraph), it is possible that a certain type of growth, consisting of many of these inventions, contributes positively to our environmental objectives. Even so, there is probably some trade off between environmental objectives and economic growth in the short run. Figure 1 illustrates temporal paths of GNP growth and of something to be measured by an index of the preservation of the environment and the conservation of resources. We are measuring the log of the GNP and of the environmental index on the vertical axes, in order to show equiproportional increases as equidistant. Until time T the high growth strategy sacrifices the environment. But for ever after T, high growth promotes a purer and safer environment. Which path is chosen depends on the rate of discount for environmental objectives, compared with that for GNP. Since the marginal utility of consumption

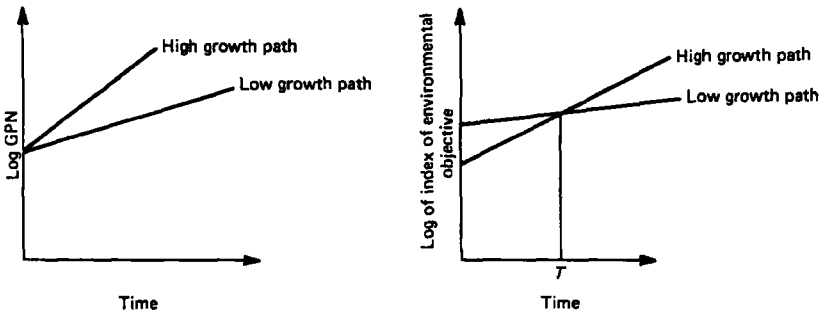

Figure 1. Temporal paths of GNP growth and index of environmental objective.

declines with rising income, whereas the relative value of reducing pollution rises with rising income, the rate of discount for environmental objectives is likely to be lower than that for GNP (some have even argued for a zero or negative rate). If this is so, those who lay much store by the environment and by the welfare of future generations ought to advocate a higher, not lower, growth strategy than that dictated by optimizing consumption over time. Only then can devices to protect the environment (a growth industry), the technology that develops anti-pollution techniques, processes and products and innovations that economize in the use of exhaustible materials develop sufficiently rapidly.

Goods and anti-bads

Another way of approaching the difference and reconciling them is from the point of view of measurement. Growth men, after all, are concerned with the annual percentage growth of an aggregate of heterogeneous goods and services. Since we do not aggregate these according to their weight or size, but their prices, which are supposed to reflect human valuations, a way to reconcile some of the conflicts is by adjusting the measurement of GNP and its growth. Now it is largely a measure of production and, as the name says, it is gross, not net. We might approach the collection by trying to measure welfare and to measure it net, rather than production measured gross. Some might think that such a revision would bring together growth men and environmentalists. If, for example, it were to be found that what we had been measuring was not goods, but 'anti-bads', produced in order to combat the bads produced by the process of growth, we might all agree that economic growth was not all that wonderful. But before discussing these issues, a more fundamental difference might exist. If the divergence between private costs, reflected in market prices, and social costs is so pervasive that it is not the exception (as in the smoke emitted by a factory that raises other people's laundry bills) but the rule, conventional accounting methods might fail. Environmentalists might justifiably ask: can the choice between fresh air and unspoilt land on the one hand, and the motor car with all its implications on the other, be brought under the calculus of the pricing system? The choice between different total lifestyles, it may be said, cannot be subjected to the measuring rod of money.

Let us next assume that we do not have to accept such a radical critique of income measurements, and that shadow pricing can capture all divergencies between private and social costs and benefits. We might still concede that we should not include in our income and welfare measures what have been called 'regrettable necessities', or anti-bads.

Perhaps growth men and environmentalists might then agree that the growth of properly measured economic welfare is desirable.

Bads derive from three distinct sources: enemies, nature and the economic system itself. Anti-bads made necessary by the activities of our enemies would cover expenditure on the army and the police. Anti-bads made necessary by nature are such things as the provision of shelter, clothing and heating against cold, or of air conditioning against heat. Carried to logical consistency, almost all goods and services are intended to remove some void. We eat because our physiology requires food for survival, and we sleep for the same reason. So food and beds could be regarded as anti-bads against the bads created by our nature. Only the most superfluous frills would, on this approach, be counted as 'goods' (it would be an anti-Marxist definition of national income), and even they fulfil some whim, the removal of which could be considered as an anti-bad. But one can drive logical consistency too far. The most relevant bads in the present context are those created by the process of production itself. If production pollutes and we then produce an anti-pollution device, say a scrubber, it is an anti-bad that combats a bad produced in the course of producing other goods.

The anti-bads made necessary by our enemies and by nature are not relevant in the present context, but those made necessary by the production process itself are (as is the appropriate evaluation of exhaustible natural resources) because they affect the fate of future generations. But it does not follow that we must then opt for a lower rate of correctly measured economic growth, ie growth of income from which anti-bads are subtracted. For although we might opt for fewer goods, if they brought with them more bads and the need for anti-bads, we might also opt for even more goods, compensated by more anti-bads (the solution suggested in Figure 1). Or we might opt for technical innovation that produces different types of goods, perhaps with fewer of the attractive qualities of goods, but also with fewer complementary bads. What we should avoid doing is just producing more goods that produce bads (such as pollution), without either the anti-bads or the redesign. Some of the differences between growth men and environmentalists can be reduced by a proper redefinition and measurement of net national income as a measure of welfare and its growth.

Future generations are particularly exposed to our creation of bads. As Sidney Holt has argued,[1] they are not only without a voice, without votes in the present, but in addition, they are 'downstream' (in time) and therefore vulnerable to any harmful effects we may be inflicting on them, like people who have to live downstream from a polluting factory. They are, therefore, both powerless and vulnerable. It is from this awareness that the claim to appoint a trustee or guardian for the interests of future generations has sprung. What may be needed is a society for the propagation of anti-bads, especially for the protection of future generations.

But deducting anti-bads from a measure of net economic welfare raises more fundamental problems. We have so far concentrated on bads such as pollution that require anti-bads such as scrubbers. The economic system also creates certain desires (or voids), the satisfaction of which calls for scarce resources. Had it not been for this creation, the resources could have been left unused, or used for purposes of satisfying 'natural' not 'artificially created' desires. Advertisers persuade us that, unless we keep ourselves dandruff free, we shall not be rechosen by our

[1]Sidney Holt, 'Towards ensuring the rights of future generations: scientific aspects', UNESCO paper, UNESCO, Paris, September 1982, p 4.

loved ones at breakfast. Or they create in us the fear that if we do not use the deodorants or mouthwashes they sell we shall be shunned by our friends and neighbours. The fear of not being socially acceptable or loved may have been there all the time, but its focus on specific deficiencies that can be removed by buying the advertised product is generated by those producing and selling the product. Is this situation not parallel to the emitter of smoke who imposes the need to install a scrubber? Should we not eliminate from our welfare calculations goods bought only to remove created fears? The situation is like that of a blackmailer or kidnapper or protection racketeer who creates a nuisance for the removal of which he then extracts a payment. Such payments, it might be argued, bring us back to square one, they do not add to our welfare.

Yet, the problem is not so simple. Not only can some of the nastiest feelings of jealousy, competitiveness and fear of ostracism be artificially created, or stimulated, but also some of the highest desires: the desire for beauty, truth and goodness, the wish to buy and enjoy books, paintings and music; these are not 'natural' but the result of an often painful process of education. Those of us who are university teachers know. It is not a question of whether the created desires are artificial or natural that should guide us, but whether they are bad or good. We need a value judgment before we can decide whether an item should be included in or excluded from our measure of economic welfare. Not all artificially created 'bads' call for 'anti-bads' that we should want to exclude from our measure.

The only reason for not including all goods and services responding to the 'artificially created' desires of education is that some have to be excluded from net income as replacements of human capital. As older people retire from the labour force, and as skills become obsolete, their replacement calls for educational efforts which are of the same nature as those items of physical capital that replace worn-out plant and equipment.

The main conclusion of this discussion is not that we cannot identify 'bads' with voids generated by the society (and not 'naturally' given), but that we must exercise value judgments before we can evaluate the net national income as a measure of economic welfare. This leaves an area for possible disagreement between those who put a higher value on resource-using or polluting activities that add to current welfare and those who put a lower value on these things in favour of the welfare of future generations.

The time discount rate

Why should I do anything for the future? The frivolous and facetious question: what has the future done for me? may, as Wilfred Beckerman has pointed out,[2] have an important content worth further exploration. Positive discount rates are powerful instruments for downgrading the future. At a discount rate of 10%, a given increase in welfare next year counts for ten times as much as the same increase in 20 years, and at 5%, next year's benefit counts for more than a thousand times as much as the same benefit in 200 years.

Some people regard it as irrational to discount the future at all. Many of the apparent reasons for discounting the future are based on other

[2]Wilfred Beckerman, 'Human resources: are they worth preserving?', in Paul Streeten and Harry Maier, eds, *Human Resources, Employment and Development*, Vol 2, *Concepts, Measurement and Long-Run Perspective*, International Economic Association, Macmillan, London, 1983.

principles than the passage of time, though some are loosely related to time flow. Events in the future are uncertain, and this would require that we attach probabilities of less than one to them. A special case of the reduced probability of a harmful event in the future is the case where the same event if it occurred now would be very damaging, but we believe that inventiveness will later produce a technology that will enable future generations to overcome the problem. An example would be the disposal of nuclear waste. But the reason for discounting such damaging events is then not that they are in the future, but that their occurrence will be less probable. Although there is a relationship between the future and uncertainty, events do not grow more uncertain the more distant they are in time. Indeed, in some cases it is easier to predict events in the more distant future.

Future generations may be better off than we are now, and the marginal utility of an extra dollar to a richer man is less than to a poorer man. Or his moral desert of getting an extra dollar may be smaller. We should not permit a member of our generation to go hungry in order to add a second car to a member of a future generation. But, again, the reason for discounting his benefit is not future time, but higher income. If someone in the future were to be poorer than we are now, his marginal utility or desert would be greater, and the appropriate 'discount rate' would be negative.

Derek Parfit discusses additional apparent reasons for discounting the future, which he rejects.[3] One is the argument from opportunity costs. Earlier benefits can be used to yield greater benefits later. An investment next year can yield much more over the next ten years than had we made the investment after ten years. Delaying the investment therefore imposes opportunity costs. But once again, the reason for putting a premium on nearer events is not time, but their yield. This can be seen when we consider benefits that are not invested but consumed. Parfit uses the example of the enjoyment of a beautiful landscape that results from not building an airport. This enjoyment is the same next year and in ten years' time, and should not be discounted. It is also true that if, for example, we were to compensate for certain genetic deformities, a sum invested now would yield more money for compensation than the same sum invested later. But Parfit argues, correctly, that it is not the distance in time of the later deformity that matters, but the investment and compensation. Were we not to compensate, this would become irrelevant.

Parfit also discusses what he calls the argument from democracy. Since most people care less about the future, the government, reflecting the views of the electorate, should discount it. But unless we believe that what the electorate wants is *ipso facto* right (*vox populi, vox dei*), the question of whether we should or should not care less about the future has to be answered independently of what the majority wants.

Another argument considered by Parfit is the argument from excessive sacrifice. Without a discount rate, any small increase in benefit that extends indefinitely in time could demand any amount of sacrifice in the present, because in time the benefits outweigh the costs. But, once again, the objection to the argument is that no generation can be required to make excessive sacrifices for future generations. Parfit illustrates this by supposing that, at the same costs to us now, we could prevent either a minor catastrophe in the nearer future or a major catastrophe in the further future. 'Since preventing the major catas-

[3]Derek Parfit, 'Energy and the further future: the social discount rate', in Douglas MacLean and Peter G. Brown, eds, *Energy and the Future*, Maryland Studies in Public Philosophy, Rowman and Littlefield, NJ, USA, 1983, Chapter 2.

trophe would involve at no extra cost, the "argument from excessive sacrifice" fails to apply.'

Finally, Parfit discusses the argument from special relations. We have greater responsibilities to certain people to whom we stand in special relations: our children, parents, students, patients, clients, fellow citizens. And future generations do not stand in any of these relations. But first, it is the distance in the relationship, which may be correlated to distance in space or in time, rather than the distance in time that matters. Second, the discount rate according to special relationships levels off, and does not increase with time. Our obligations to the tenth generation are no less than to the ninth or eighth. Third, the duty to avoid inflicting grave harm applies to all people, now and in the future.

People who argue that we should not discount the future at all would attach the same weight to enjoyment by myself now, in a few years' time and by all future generations. The refusal to do this has been called by A.C. Pigou the lack of telescopic faculty, and by Roy Harrod the conquest of reason by passion. It must be concluded from the previous arguments that there is no case for a positive time discount rate.

Our responsibilities to future generations

What does intergenerational justice demand? A utilitarian approach might suggest that we owe future generations the same level of utility that we are enjoying now. Since we do not know and cannot determine the size of future generations, this may apply to total utility, distributed among their numbers according to a different set of principles. But there are well known difficulties in distributing utility, happiness or welfare equally, and Brian Barry has argued convincingly[4] that it is opportunities, not welfare, that should be distributed equally over generations. For energy this would mean that we should leave future generations the same productive capacity and therefore the same opportunities to produce that we now enjoy. If we deplete some exhaustible resource, we would have to compensate for this by some technological innovation or capital accumulation that makes any given amount of oil or coal yield more energy, or substitutes some other source for the depleted resource. But compensating for depletion presupposes our knowing how much we should have left to future generations without the depletion. Would it be just if we consumed all the capital we inherited from previous generations and only compensated for the depletion of natural resources we caused? Or would it be just if we added to man-made capital as much as the previous generations had added? Or should we leave the same amount of man-made capital that we inherited, plus compensation for the depletion we caused? These are difficult questions and no answer will be attempted here.

Brian Barry discusses the question, 'what does adequate compensation in practice mean?'[5] If we develop a technology that enables us to raise the rate of extraction by the same proportion that we have used up the resource, that would be adequate compensation. Or if we invent a technology that gives us as much power as we have used up, effectively maintaining performance, that would also qualify. Such guidelines take us some way, but not all the way, for different forms of energy have different benefits and costs, which it is not easy in practice to bring to a common denominator.

All this presupposes that humanity should survive. Yet, as Wilfred

[4]Brian Barry, 'Intergenerational justice in energy policy', in Douglas MacLean and Peter G. Brown, eds, *Energy and the Future*, Maryland Studies in Public Philosophy, Rowman and Littlefield, NJ, USA, 1983.
[5]*Ibid.*

Beckerman and others have shown, the assumption that we should perpetuate mankind is not logically justified. What is the loss of people who were never conceived and born (say, as a result of contraception or abstention or annihilation of the human race)? Who, if anybody, is worse off because these people have not been born, compared with their potential existence?

We have to turn to the basis of our moral obligation to others and specifically to future generations. Different answers have been given. The facetious question raised above suggests that future generations cannot benefit us. But they also cannot harm us. And one tradition in moral philosophy bases moral obligation on the ability to do harm. Hobbes talked about 'convenient articles of peace', which prevent us from harming other people in order to avoid being harmed ourselves by them.[6] If this is the social basis of moral law, we would have no obligations towards future generations, for they are not capable of harming us.

Another basis for moral obligations is Locke's theory of entitlement, according to which a man can do whatever he wishes with his own, if he has legitimately acquired it. The main current expositor of his view is Robert Nozick. From it follow no obligations at all to future generations. If we wished to destroy everything we own, or ask our executors to do so after we die, this would be fully consistent with our moral obligations. A third theory is that of Rousseau, who bases moral obligations on our sense of community. But here again, it is hard to see how we can postulate a sense of community with numerous as yet unborn members of future generations.

So neither the approach and tradition of Hobbes, nor that of Locke, nor that of Rousseau help us in formulating moral duties for the welfare, interest or benefit of persons not yet, or never, born. And it is this that we are concerned with when we talk of future generations. Can it be in a person's interest, or, for that matter, against the person's interest, to have been born? Beckerman and Parfit argue that the answer is No.[7,8] For if we say it is in a person's interest to have been conceived, we say that this person has benefited from receiving life. But to benefit is to be made better off than he would otherwise have been. But if he had not been conceived, he would not 'otherwise have been'. However happy his life would have been, had he been born, he does not miss this happiness, not having been born. It is therefore meaningless to say that people benefit from having been conceived and born. The argument is taken one step further by Beckerman.[9] He suggests that even happy people should commit suicide. They will not miss their happiness and might miss some unhappinesss that they might suffer later on.

Does the same apply to being worse off for having been born? Some time ago there was a lawsuit of an utterly disabled, miserable person against a doctor's inefficient sterilization of that person's mother. Beckerman argues that the situation may not be symmetrical, and that it might be possible to say that a person would be better off not having been born. (There is a tradition in literature going back to Sophocles asserting that 'not to be born is best'.) But if we accept the argument that we cannot say that a person is better off than if he had never been born (or conceived), we destroy any claims of future generations on our concern.

Is there not a contradiction in maintaining that there is no case for a positive discount rate and that there is no case for assuming the

[6]Brian Barry, 'Justice between generations', in P.M.S. Hacker and J. Raz, eds, *Law, Morality and Society*, essays in honour of H.L.A. Hart, Oxford, 1977.
[7]Beckerman, *op cit*, Ref 2.
[8]Parfit, *op cit*, Ref 3.
[9]Beckerman, *op cit*, Ref 2.

desirability of the existence of future generations? Can we argue simultaneously that the enjoyment of future generations should count the same as our enjoyment, and that their existence is not desirable? I think the contradiction is only apparent. The argument is that if future generations exist, their enjoyment should not be discounted, but there is no case for the perpetuation of the human race.

Parfit suggests an example.[10] Let us assume that we choose a policy with benefits to us that leads to a catastrophe after two centuries. Had we chosen a safe policy and sacrificed these benefits, the catastrophe would have been avoided. But the people who are harmed by the dangerous policy are different people from those who would have existed had we chosen the safe policy. The timing of the meeting of parents, and of the conception is different, and therefore different people are born into the world. According to Parfit, the dangerous policy is not worse for anyone who ever lives.

Various attempts have been made to escape this conclusion. For example, we might 'look in the opposite direction'.[11] Our duties are not to future generations, but to our ancestors, who laboured to make us better off, but not only us: subsequent generations as well. This view fits the views that we are only trustees of the environment which we inherit, and should hand it on in at least as good a condition as the one in which we received it. But the value of the traditions handed on to us by our ancestors has to be independently assessed. Some of the heritage has been bad, and has to be rejected, like slavery or imperialism. So 'looking in the opposite direction' for a moral justification may add strength to duties independently regarded as valid, but it does not provide a basis for our responsibilities.

One way out of the repugnant conclusion that there is no basis for our responsibilities to future generations is to say that particular persons not being made worse off by our actions is not the only reason why these actions can be morally condemned. Assume our action produces the result that the population of people, though themselves not worse off, is worse off than an alternative, hypothetical population of the same number, who would have enjoyed greater benefits had we abstained from our action. Derek Parfit and Douglas MacLean have argued that our action may then be regarded as wrong, even although nobody is made worse off by it.[12,13] Sidney Holt appears to argue along similar lines when he writes that '. . . to the extent that humanity, past, present and future, is perceived as one with the rest of nature – or, at least, with the living world, the biosphere – so discussion of the rights of animals is inseparable from the discussion of the rights of humanity'.[14] Others, on the other hand, think that a policy that makes nobody worse off cannot be morally wrong, even if the fate of people who might have lived, but never did, would have been improved by a different policy.

Even if there were no reason in terms of people's interests for accepting responsibility for the fate of future generations, there may be other reasons. Brian Barry ends his article on 'Justice between generations' by saying that '. . . if I try to analyse the source of my own strong conviction that we should be wrong to take risks with the continuation of human life, I find that it does not lie in any sense of injury to the interests of people who will not get born but rather in a sense of its cosmic impertinence – that we should be grossly abusing our position by taking it upon ourselves to put a term on human life and possibilities'.[15] In spite of the logical difficulty of justifying the

[10]Parfit, *op cit*, Ref 3.
[11]Douglas MacLean, 'A moral requirement of energy policies', in Douglas MacLean and Peter G. Brown, eds, *Energy and the Future*, Maryland Studies in Public Philosophy, Rowman and Littlefield, NJ, USA, 1983, p 187.
[12]Parfit, *op cit*, Ref 3.
[13]MacLean, *op cit*, Ref 11.
[14]Holt, *op cit*, Ref 1, p 2.
[15]Barry, *op cit*, Ref 6.

continuation of the human race, we shall in the following accept Brian Barry's view and assert instinctively or genetically or on the basis of a new, extended ethics, not based on benefits and harm to the interests of people, the desirability to perpetuate it.

Some specific problems

Sometimes the concern for social justice among contemporaries and between generations is presented as a conflict: why be concerned with future generations when we have so many poor and so much inequality among us now? Trade unionists and the unemployed advocate large projects such as hydroelectric dams and call the ecological opponents 'gentlemen's kids'. The ecologists blame industrialists for greed and causing future ecological disasters.

But there is no such conflict. In principle, having decided upon how much we owe to future generations, the remainder can be distributed in as egalitarian a manner to the present generation as we wish. Any anti-poverty strategy must have a temporal dimension, and it would be as wrong to remove all poverty now by aggravating poverty later, as it would be to starve ourselves in order to provide plenty for the future. Indeed, since it is the present high-income consumers who use up most exhaustible resources, justice requires that compensation be paid both to low-income consumers and to future generations.

A specific obstacle to exercising our responsibility to future generations arises from an institutional lag, or deficiency. Let us suppose that national governments have assumed responsibility for future generations and, as a result, have adopted policies to conserve exhaustible raw materials and avoid excessive pollution. This assumption is not quite unrealistic, for many governments have in fact adopted such policies. Indeed, it could be argued that it is precisely one of the functions of government to take on these responsibilities through public action, because any one individual, however eager he was on achieving the objective, could not give force to his desires in the absence of coordination or even enforcement of other individuals. It is what economists call a public good.

Having achieved the right policies at the national level, the danger arises that the damage will be exported. Resources outside the national boundaries will then be excessively exploited and the air and water beyond the frontiers will be happily polluted. It is likely that these forms of transnational damage would be even greater than if the national government had taken no action. The growing dispersal of acid rain outside national frontiers as a result of high chimney stacks, imposed to avoid national pollution, and the danger of the extinction of whales are examples.

The greater concern shown for future generations inside the national boundaries has led to a situation in which the same concern outside these boundaries is reduced. The reason for this is that we do not have a world government, a global authority, that would enact the appropriate rules. Even if each nation state were, individually, concerned about the future of the world community, and not only about future generations inside its borders, it would not be able to give effect to this. The result is a prisoner's dilemma in which each nation is made worse off by the impact of the actions of others. There are also difficulties in getting coordinated action on the part of a group of nation states. For each state

will hope to benefit from the actions of others, were these to show global concerns, without itself contributing to the costs and restraints. It is the free rider problem, superimposed upon the prisoner's dilemma. The solution lies in a surrender of national sovereignty to a supranational authority with power to impose laws and regulations that safeguard the interests of future generations of the global community.[16]

What kinds of moral obligations to future generations may arise? If an action now has no consequences affecting future generations, or entirely beneficial ones, no problem arises. But there are two kinds of other actions. First, actions which benefit us may have harmful consequences for future generations and, second, actions which impose a sacrifice on us may have beneficial consequences. In addition to these choices, there may be actions, whether beneficial or harmful to us, that have different impacts on different future generations, beneficial to some, harmful to others.

It should, however, be noted that in many cases actions that impose an apparent sacrifice turn out, on closer inspection, to be profitable, so that the conflict can be avoided. A company called 3M established a programme that is called 3P, which stands for 'Pollution prevention pays'.[17] Once product and process innovation are included in the analysis, it turns out that there are many unexplored and unexploited profit opportunities that manifest themselves in reponse to the challenge of pollution control. If the costs of these innovations are less than the new profits to be earned, the whole operation turns out to be economical even from the firm's point of view. In this case no conflict between present and future interests arises.

Let us take as the first illustration the exploitation of exhaustible and irreplaceable natural resources, such as the fossil fuels, mineral reserves, ocean fisheries and tropical forests. It is quite possible for the reductions in these nature-given resources to exceed the accumulation of man-made capital. If this is so, we are using up capital that we have inherited and leaving future generations worse off. Even if there is a net addition to the sum of natural and man-made capital, not making full allowances for the exploitation of natural resources in our national income accounts would lead to overstatements of the amount we leave to future generations.

Let us take as another illustration the dangers to future generations that arise from nuclear power. First, there are the technical dangers of accidents in the extreme case of a core melt in a reactor. But there is also great uncertainty about the dangerous effects, some possibly genetic, and over a long period, of milder exposure to radiation.

Second, there is the danger that material may be stolen from a plant and used for the fabrication of nuclear bombs. A proliferation of such bombs, particularly in the hands of terrorists or other extremists who would not hesitate to use them, constitutes a considerable danger.

Third, there is the danger of sabotage at the plant by enemies or opponents of certain policies. Fourth, there is the danger of an attack in war or civil war on the plant and the consequential release of radiation. Fifth, there is the problem of nuclear waste disposal. Such waste has a very long half life and risks continue for hundreds of years, while all the benefits accrue to the present generation.

A very serious, not much discussed sixth risk to future generations arises from the need to protect the plant against terrorists, saboteurs and enemies. The guards that police these stations have to be armed and

[16] See Peter Inglott, 'The rights of future generations: some socio-political considerations', UNESCO paper, unpublished.
[17] Joseph T. Ling, vice-president, environmental engineering and pollution control, 'Pollution prevention does pay', 3M Company, USA. *Industry and Environment*, Vol 7, No 2, United Nations Environment Programme, 17 rue Marguerite, 75017 Paris.

given a high degree of discretion with regard to the use of their weapons. Armed private armies are a new phenomenon in democracies and constitute a threat to our civil liberties. It may well be that this social and political threat is more serious than the technical risks of breeder reactors.

The crash of an airliner in which 40 people are killed makes headline news, but the death of 40 motor car accident victims in different places does not. Spatially concentrated death from a nuclear accident or sabotage is judged worse than random or dispersed death. This reinforces the argument that risks of a disaster befalling, simultaneously, groups of people are worse than risks in which the same number of victims are distributed over time.

To this must be added another element: death caused by the actions of others is judged worse than that caused by our own acceptance of risks. We accept the same risks caused by our rock climbing or driving motor cars that we would not accept if they were inflicted on us involuntarily. And risks from nuclear power are among those that are 'downstream'. Future generations are both powerless and vulnerable.