WELFARE ECONOMICS AND SUSTAINABLE DEVELOPMENT

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Contents

Summary

Though the exact meaning of sustainable development is somewhat vague and is subject to different interpretations, it is nevertheless meaningful and useful.

It is easy to see that, in general, welfare maximization does not necessarily imply sustainable development, and sustainable development does not necessarily imply welfare maximization. However, it is argued that, for most practically relevant cases, welfare maximization requires sustainable development; sustainable development is necessary though not sufficient for welfare maximization. It is only weak sustainability (which calls for the maintenance of total capital which includes both natural and man-made capital) that is needed, at least at the conceptual level, rather than strong sustainability (which calls for the maintenance of specific items of resource or at least the maintenance of natural capital).

In most cases, any sensible form of welfare maximization requires that we should not only ensure sustainable development but should do more than ensuring minimal sustainability and do more for the future generations, just as (but not because) the previous generations have done for us. Together with uncertainty and irreversibility, this makes a position somewhat between weak sustainability and strong sustainability sensible.

Though sustainable development is apparently a problem of intertemporal equity between the current and future generations, the root cause of the problem is not due to the failure to care for the future generations but due to the failure to tackle the problems of the external environmental costs of production and consumption. Correcting for this failure on the most blatant forms of disruption is the most important task now. This failure is in turn due to the lack of effective ownership of the global natural capital, including the oceans and the atmosphere, and hence the absence of effective charges on the use and damages to the global natural capital. The problem is related to the global public good nature of global environmental protection, making each national government having little incentive to contribute to it unilaterally.

A proposed method to solve the problems of global sustainable development is for the United Nations (UN) to declare ownership of the hitherto unowned global natural capital and charge all nations for the damages to the global environment, or the depreciation of the global natural capital. To achieve the required international agreement to make the above proposal adopted, the UN needs sharper teeth.

One way to increase the power of the UN is for the World Trade Organization (WTO) to co-operate with it. Countries too stubborn to come to the international agreement would be penalized with high tariffs and other economic sanctions. These penalties should be saved as the last resort to make international agreement possible, and hence are unlikely to be actually used against many countries. The costs of less free trade would be minimal.

Another cause of the threat to sustainable development is the excessive production and consumption by the rich, and in rich countries, that do not really contribute to happiness or welfare. They are pursued due to the rivalry between consumers that is mutually offsetting at the social level, and due to the materialistic bias of excessive consumerism

partly caused by our accumulation instinct and partly by commercial advertising. This makes the conventionally measured economic growth possibly welfare-reducing through the environmental disruption of production and consumption, unless environmental disruption could be, and is, charged at low administrative costs. It also means that, even if the costs of public spending including on environmental protection are high in monetary terms, they are not in welfare terms. As welfare is ultimate and money is not, this is a strong case for more welfare-improving public spending particularly for sustainable development.

Net national product should be revised to account for the depreciation of natural capital. Consuming within such a green NNP is then a good indicator of sustainability.

Possible conflict between richer countries who want more environmental protection and the poorer countries who put more emphasis on economic development may be resolved by having the efficient level of global environmental quality (in accordance to aggregate marginal valuation), but with the costs of providing it charged, either by using the Lindahl method in accordance to the marginal valuation of each country or in accordance to the level of GNP. This could perhaps be made progressive by exempting the very poor and making the rich countries pay proportionately more. However, if the proposal of the UN charging each country for environmental damages is adopted, even if the UN pays for the external benefits of forests of member countries, excess revenues are likely to be available for the abatement of disruption.

International trade and investment tend to increase the returns to capital and lower wages in rich countries and the reverse is true in poorer countries. This is an important factor explaining the anti-globalization movement in the West. This movement has some moral justification from the viewpoint of the richer countries, but the reverse may be true looked at from the global level, as globalization reduces income inequality at the global level. However, exclusive concerns with free trade may be inappropriate. If safeguards are in place to avoid being used as a pretext for introducing sectional inefficient protectionism, environmental countervailing tariffs (against 'low-cost' imports that cause large environmental costs globally) may improve efficiency in international trade as well as serving to encourage more environmental protection.

Charging for environmental damages and allowing trade in emission rights/quota help reduce environmental disruption at low costs, and should not be regarded as morally repugnant.

Damages and benefits occurring in the future should be properly discounted. Future dollars (consumption, incomes, wealth) should be discounted at the rate of interest, at least with optimal capital accumulation, but future utility and welfare should only be discounted (or really just 'uncertainty or probability adjusted') at the rate of uncertainty of their realization, a rate probably much less than 0.1 percent per annum. Such discounting (or probability adjustment) is consistent with treating the present and future generations equally.

A Methodological Note

As this theme is concerned with the welfare economics and policy issues of sustainable development, it is difficult to discuss from a purely scientific perspective. Many normative terms are used. For those who prefer a more positive interpretation usual in academic writings, they may regard all instances when we say "it is desirable," or "more appropriate," and so on, as meaning that the described action or recommended policy is judged likely to increase social welfare, where social welfare is defined to be a reasonable increasing function of individual welfares with equal weights for all. (For arguments in favor of maximization social welfare and the meanings of individual and social welfare, see Ng, 2000a.) Thus interpreted, the discussion may be taken to be largely positive, though many statements are still partly based on some subjective judgments of fact (not to be confused with value judgments proper). Further studies may hopefully reduce the need for such subjective judgments.

We have also been mainly concerned with welfare maximization in general and not dealt with some specific issues like justice and morals partly because of space, and partly because we believe that these are ultimately to facilitate welfare maximization, as argued in Ng (2000a).

1. Welfare Economics of Sustainable Development

1.1. Sustainable Development and Welfare Maximization: Are They Compatible?

The main issues discussed in this section are the concept and/or meaning of sustainable development and whether it is compatible with welfare maximization, together with some related conceptual issues.

It is easy to see that, in general, welfare maximization does not necessarily imply sustainable development and sustainable development does not necessarily imply welfare maximization. However, it is argued that, for most practically relevant cases, welfare maximization requires sustainable development; sustainable development is necessary though not sufficient for welfare maximization.

1.1.1. The Concept of Sustainable Development: Weak versus Strong Sustainability

Since the widespread interest on the issue of sustainable development in the last two decades or so, different concepts of sustainable development have been advanced and discussed. Currently, a widely accepted formulation of sustainable development is the one provided in the report of the World Commission on Environment and Development (1987) where sustainable development is defined as "Paths of human progress, which meet the needs and aspirations of the present generation without compromising the ability of future generations to meet their needs."

The fact that this formulation is widely acceptable is partly due to its vagueness (so that different persons may interpret it to suit their preferences) and partly due to its capturing of some sensible and essential part of the concept. This concerns the present versus the future generations and on not (unduly) compromising the ability of future generations to meet their objectives. Note that we have substituted "needs" by "objectives." In most general conceptions, "needs" is taken to be basic (including things like survival) and

does not include higher objectives like idiosyncratic self-fulfillment and luxurious enjoyment. It is usually more important that the basic needs of the present or future generations should be satisfied. However, if the present generation does not have to sacrifice much to allow future generations able to achieve objectives over and above basic needs, it seems desirable to do so. Thus, what is included under "needs" is one aspect of the vagueness of the above formulation of sustainable development.

Another aspect of vagueness is the extent to which the effect on the ability of future generations will be regarded as 'compromising'? Obviously, for non-renewable exhaustible resources, the consumption of any amount will leave future generations with less of them. Is this "compromising" their ability to meet their objectives? According to Solow (1974, 2000), this is not, provided that the present generation provides sufficient artificial capital to supplement the decrease in natural capital such that the total amount of capital does not decrease. This is known as weak sustainability. In contrast, strong sustainability calls for the maintenance of natural capital, or even specific items of natural resources, or quality of the environment. Most economists find weak sustainability more sensible than strong sustainability. In contrast, many ecologists and some environmental economists are in favor of strong sustainability (e.g. Daly, 1999; Neumayer, 1999; Faucheux et al., 1998, Pearce et al., 1990). In the following subsection, we argue that, at least at the conceptual level, weak sustainability is sufficient. The objection to weak sustainability is usually based on inadequate understanding of the relevant concept of maintaining total capital undiminished. However, in Section 1.1.2, we argue that something between weak sustainability and strong sustainability may make practical sense.

As Solow (2000, pp. 134–5) puts it, "sustainability [is] a matter of distributional equity between the present and the future." It is generally agreed that the pursuit of the present generation should not impose excessive damages on the future generations. If, by reducing natural capital slightly, the present generation could benefit so much as to be able to leave more artificial capital to the future such that both the present and all future generations will be better off, it seems clearly desirable to do so. But this violates even the weak form of strong sustainability. Thus, few economists find strong sustainability appealing.

The objection to weak sustainability is usually based on the argument that weak sustainability assumes the substitutability between natural and man-made capital while in fact, they may be more complementary, and there may even exist critical levels of certain resources or environmental quality indices below which the very survival of the human world is in doubt. (cf. Hediger, 2000.) We wish to emphasize that the existence of such complementarities and critical levels does not invalidate the fact that weak sustainability makes more sense than strong sustainability, at least at the conceptual level. The easier it is to substitute artificial capital for natural capital, the easier it is to maintain total capital undiminished. In contrast, if the two types of capital are more complementary than substitutory, the more artificial capital has to be increased for any given reduction in natural capital. Provided that the correct measure of total capital is used, if artificial capital is increased sufficiently to at least offset the reduction in natural capital, the ability of future generations (as far as existing capital stock is concerned) to meet their objectives has not been diminished. Sustainable development may be said to

be satisfied. If the amount of natural capital or some crucial aspects/items of which are decreased below their critical levels such that no amount of increase in artificial capital can substitute for this reduction in natural capital, this means that the present generation has failed to satisfy sustainable development even in accordance to weak sustainability. The insistence of weak sustainability is sufficient to rule out such reduction in natural capital.

The failure to see the adequacy of weak sustainability may be due to the inadequate understanding of the proper measurement of the amount of total capital. Hicks (1946) discussed the concept of capital and income along the line of maintaining future consumption capability. Income was defined as "the maximum amount that could be spent without reducing real consumption in the future." It can be credited with some idea of sustainability. However, even prominent modern economists are sometimes not very clear on the implication of this for the compellingness of weak sustainability. For example some query the concept of weak sustainability along the following rhetoric: If all the forests are destroyed and an amount of man-made machines of similar total value is built, is it sustainable development? It is likely that, well before all the forests are destroyed, the ecology of the world will become so horrible that mankind and most animals may soon die. If so, no amount of artificial capital can substitute for the destruction of all the forests. The unit price of a hectare of forest is of finite value (say $x) and the world has a finite number of hectares of forests (say y). In this sense, the forests of the world have thus a finite total exchange value of $xy. However, this is different from the total valuation in the sense of the minimum amount of money or artificial capital that will fully offset the loss of all the forests that is likely to be infinite. If you pay someone US$10 per week, that person may be willing to reduce consumption of food by one gram per week. However, it is likely that no amount of money may be sufficient for a person to agree to go without food altogether. Thus, as the amount of food (or forests) is reduced, its marginal value increases. On the other hand, as the amount of artificial capital increases, its marginal value decreases. For small changes, we may use the prices prevailing at the moment for calculation. But for big changes, we must take into account the changes in the relevant marginal valuations or prices. If there exist critical values for some resources for the long-term survival of the whole bio-ecology, the marginal values of these resources will increase to very high levels as the critical values are approached from above. Thus, no amount of artificial capital (whose marginal value decreases as its amount is increased) may thus fully offset the catastrophic reduction in essential natural resources. Thus, provided that we take the correct concept of the total value of capital, the weak concept of sustainability is sufficient. (However, when we take into account the uncertainty on the "safe" levels of disruption and the related irreversibility, something between weak and strong sustainability may make sense, as discussed below.)

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