Partha Dasgupta

ECONOMICS

A Very Short Introduction

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OXFORD
UNIVERSITY PRESS
www.oup.com
www.oup.co.uk/vsi

ISBN 978-0-19-285345-5
9 780192 853455
£7.99 RRP $11.95 USA

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GDP and the productive base

What we have just conducted are but a pair of finger exercises. Nevertheless, they have shown us how natural capital can be introduced in microeconomic reasoning. Let us see if it can be included in macroeconomic reasoning.

A famous 1987 report by an international commission (widely known as the Brundtland Commission Report) defined *sustainable development* as '. . . development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. In this reckoning, sustainable development requires that relative to their populations each generation should bequeath to its successor at least as large a *productive base* as it had itself inherited. Notice that the requirement is derived from a relatively weak notion of intergenerational justice. Sustainable development demands that future generations have no less of the means to meet their needs than we do ourselves; it demands

nothing more. But how is a generation to judge whether it is leaving behind an adequate productive base for its successor?

It is easy to see why focusing on GDP won't do. An economy's productive base is its stock of capital assets and institutions (Chapter 1). By capital assets, we now mean not only manufactured capital, human capital, and knowledge – which is what we limited ourselves to in Chapter 1 – but also natural capital. We will presently discover what to look for in order to check whether an economy's productive base is expanding or contracting. It is evident, though, that an economy's productive base will shrink if its stock of capital assets depreciates and its institutions aren't able to improve sufficiently to compensate for that depreciation. GDP is an acronym for *gross* domestic product. The word 'gross' means that GDP ignores the depreciation of capital assets. It is certainly possible for a country's productive base to grow while its GDP increases (this will be confirmed when we come to study Table 2), which is no doubt a path of economic development we all would like to follow; but it is also possible for a country's productive base to *shrink* during a period when GDP grows (this also will be confirmed when we come to study Table 2). The problem is that no one would notice the shrinking if everyone's eyes were riveted on GDP. If the productive base continues to shrink, economic growth will sooner or later stop and reverse sign. The standard of living will then decline, but no one would have suspected that a fall was in store. So, growth in GDP per head can encourage us to think that all is well, when it isn't. Similarly, it is possible for a country's Human Development Index (HDI; Chapter 1) to increase even while its productive base shrinks (Table 2). This means that HDI too can mislead.

Market prices as signals of resource scarcity

You could counter that a fixation on GDP or HDI shouldn't prevent anyone from looking up prices. You could even argue that if natural resources really were becoming more scarce, their prices would have risen, and that would have signalled that all is not well. But if prices are to reveal scarcities, markets must function well (Chapter 4). For many natural resources, markets not only don't function well, they don't even exist (we called them 'missing markets' earlier). In some cases, they don't exist because relevant economic interactions take place over large distances, making the costs of negotiation too high (for example, the effects of upland deforestation on downstream farming and fishing activities); in other cases, they don't exist because the interactions are separated by large temporal distances (for example, the effect of carbon emission on climate in the distant future, in a world where forward markets don't exist because future generations are not present today to negotiate with us). Then there are cases (the atmosphere, aquifers, the open seas) where the migratory nature of the resource keeps markets from existing – they are open access resources (Chapter 2); while in others, ill-specified or unprotected property rights prevent markets from being formed (mangroves and coral reefs), or make them function wrongly even when they do form (those who are displaced by deforestation aren't compensated). Earlier, we called the side-effects of human activities that are undertaken without mutual agreement, 'externalities'. Our dealings with Nature are full of externalities. The examples suggest that the externalities involving the environment are mostly negative, implying that the private costs of using natural resources are less than their social costs. Being underpriced, the environment is over-exploited. In such a situation, the economy could enjoy growth in real GDP and improvements in HDI for a long spell even while its productive base shrinks. As proposals for estimating the social scarcity prices of natural resources remain contentious, economic accountants ignore them and governments remain wary of taxing their use.

The environment: is it a luxury or necessity?

It isn't uncommon to regard the environment as a luxury good, as in the thought expressed in a prominent newspaper that 'economic growth is good for the environment because countries need to put poverty behind them in order to care'. But in Desta's world the

environment is an essential factor of production. When wetlands, inland and coastal fisheries, woodlands, forests, ponds, and grazing fields are damaged (owing to agricultural encroachment, nitrogen overload, urban extensions, the construction of large dams, resource usurpation by the state, or whatever), it is the rural poor who suffer most. Frequently, there are no alternative sources of livelihood for them. In contrast, for rich eco-tourists or importers of primary products, there is something else, often somewhere else; which means that there are alternatives. Degradation of ecosystems is like the depreciation of roads, buildings, and machinery – but with two big differences: (i) it is frequently irreversible (or at best the system takes a long time to recover), and (ii) ecosystems can collapse abruptly, without much prior warning. Imagine what would happen to a city's inhabitants if the infrastructure connecting it to the outside world was to break down without notice. Vanishing water holes, deteriorating grazing fields, barren slopes, and wasting mangroves are spatially confined instances of corresponding breakdowns among the rural poor in Desta's world. The analysis in Chapter 2 can now be invoked to explain how an abrupt ecological collapse – such as the one that has been experienced in recent years in the Horn of Africa and the Darfur region of Sudan – can trigger a rapid socio-economic decline.

Sustainable development: theory and evidence

Economic development is sustainable if, relative to its population, a society's productive base doesn't shrink. How can one tell whether economic development has been sustainable? We have noted that neither GDP nor HDI will tell us. So what index would do the job? A society's productive base is its institutions and capital assets. As we are interested in estimating the change in an economy's productive base over a period of time, we need to know how to combine the changes that take place in its capital stocks and in its institutions. Let us keep institutions aside for the moment and concentrate on capital assets.

Intuitively, it is clear that we have to do more than just keep a score of capital assets (so many additional pieces of machinery and equipment; so many more miles of roads; so many fewer square miles of forest cover; and so forth). An economy's productive base declines if the decumulation of assets is not compensated by the accumulation of other assets. Contrarywise, the productive base expands if the decumulation of assets *is* (more than) compensated by the accumulation of other assets. The ability of an asset to compensate for the decline in some other asset depends on technological knowledge (for example, double glazing can substitute for central heating up to a point, but only up to a point) and on the quantities of assets the economy happens to have in stock (for example, the protection trees provide against soil erosion depends on the existing grass cover). Clearly, though, capital assets differ in their ability to compensate for one another. Those abilities are the *values* we would wish to impute to assets. We need to have estimates of those abilities. This is where an asset's *social productivity* becomes an item of interest. By an asset's social productivity, we mean the net increase in *social well-being* that would be enjoyed if an additional unit of that asset were made available to the economy, other things being equal. Putting it another way, the social productivity of an asset is the capitalized value of the flow of services an extra unit of it would provide society. An asset's value is simply its quantity multiplied by its social productivity.

As we are trying to make operational sense of the concept of *sustainable* development, we must include in the term 'social well-being' not only the well-being of those who are present, but also of those who will be here in the future. There are ethical theories that go beyond a purely anthropocentric view of Nature, by insisting that certain aspects of Nature have intrinsic value. The concept of social well-being I am appealing to here includes intrinsic values in its net if required. However, an ethical theory on its own won't be enough to determine the social productivities of capital assets, because there would be nothing for the theory to act upon. We need

descriptions of states of affairs too. To add a unit of a capital asset to an economy is to perturb that economy. In order to estimate the contribution of that additional unit to social well-being, we need a description of the state of affairs both before and after the addition has been made. In short, measuring the social productivities of capital assets involves both evaluation and description.

Imagine now that you have adopted a conception of social well-being (by adding the well-beings of all persons) and that you have an economic scenario of the future in mind (business as usual). In principle you can now estimate the social productivity of every capital asset. You can do that by estimating the contribution to social well-being (that's the evaluative part of the exercise) an additional unit of each capital asset would make, *other things being equal* (that's the descriptive part of the exercise). Economists call social productivities of capital assets their *shadow prices*, to distinguish them from prices that are observed in the market. Although shadow prices pertain to commodities generally, not only to capital assets, we focus on capital assets here.

Shadow prices reflect the social scarcities of capital assets. In the world as we know it, estimating shadow prices is a formidable problem. There are ethical values we hold that are probably impossible to commensurate when they come up against other values that we also hold. This doesn't mean ethical values don't impose bounds on shadow prices; they do. Which is why the language of shadow prices is essential if we wish to avoid making sombre pronouncements about sustainable development that amount to saying nothing. Most methods that are currently deployed to estimate the shadow prices of ecosystem services are crude, but deploying them is a lot better than doing nothing to value them.

The value of an economy's stock of capital assets, measured in terms of their shadow prices, is its *inclusive wealth*. The term 'inclusive' serves to remind us not only that natural capital has been included on the list of assets, but also that externalities have been taken into account in valuing the assets. Inclusive wealth is the sum of the values of all capital assets. It is a number – expressed, say, in international dollars.

We can summarize by saying that an economy's inclusive wealth plus institutions constitute its productive base. If we now wish to determine whether a country's economic development has been sustainable over a period of time, we have to estimate the changes that took place over that period in its inclusive wealth and its institutions – relative to population of course. In Chapter 1 we noted that changes in knowledge and institutions over time are reflected in changes in total factor productivity. So we break up the procedure for estimating changes in an economy's productive base relative to population during any period of time into five stages.

First, estimate the value of changes in the amounts and compositions of manufactured capital, human capital, and natural capital – which we will call *inclusive investment*. (If inclusive investment is found to be positive, we may conclude that manufactured capital, human capital, and natural capital, taken together, grew over the period.) Second, estimate the change in total factor productivity. Third, transform the two figures in a way that enables us to calculate the effects of the two sets of changes on the productive base. Fourth, combine the two resulting estimates into a single number that can be taken to reflect the change that took place in the economy's productive base. Fifth, make a correction for demographic changes to arrive at an estimate for the change that took place in the economy's productive base relative to population.

I have so worded the five steps that they apply to a study of the past. But, of course, the five steps can be applied with equal validity to forecasts of the future. The procedure outlined here is essential for anyone who wants to know whether the economic pathways we are currently pursuing can be expected to lead to sustainable development.