Greening the GDP

Is It Desirable? Is It Feasible?

Joel Darmstadter

Eight years ago, the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce started exploring the issues involved in adjusting the Gross Domestic Product (GDP) to include activities associated with the environment and natural resources. Congress subsequently suspended BEA's work, pending an independent review by the National Research Council's (NRC) Committee on National Statistics. That process is now complete and the committee's findings are presented in a new book, *Nature's Numbers: Expanding the National Economic Accounts to Include the Environment*.

RFF Senior Fellow Joel Darmstadter offers his assessment of the committee's work and the broader historical issues associated with measuring the impact of environmental and natural resource activities. Separately, Yale economist William Nordhaus, who chaired the NRC Committee on National Statistics, discusses the report's implications.

In recent years, environmental activists, as well as a number of mainstream economists, have voiced dismay about the limitations of the gross domestic product (GDP) and related social-accounting aggregates as reliable measures of national economic performance and thereby as a legitimate basis for important policy decisions. This criticism has focused in particular on the extent to which measured GDP fails to reflect two important phenomena: the depletion of natural resources as well as damage to the ambient environment.

Why, critics ask, do we make allowances in our national accounts for the depreciation of structures and industrial equipment but not for the depletion of petroleum lifted from reservoirs? Why include damage to and losses from physical capital but not for the deterioration of an urban airshed? Hence, the call for an adjusted, "green" GDP—or more precisely, NNP (net national product)—that would rectify these measurement weaknesses. It is worth noting, however, that, being primarily a measure of the country's output of marketed goods and services, GDP has long been recognized to have certain—virtually unavoidable—flaws. GDP is no guarantor of human happiness or, by itself, an entirely reliable key to human welfare. For example, the fact that two countries with comparable levels of per capita GDP can have strikingly different degrees of inequality raises profound

A Terminological Clarification

The issue of incorporating green accounts in the nation's national-income-and-product accounts (NIPA) can be clarified by reference to a few basic relationships. More than 60 years ago, Prof. John Hicks, who later won the Nobel prize in economics, pointed out that a rising level of gross national product (GNP) (the difference between GNP and GDP need not detain us here) does not ensure that new investment in a country's private and public infrastructure compensates for the depreciation of such physical capital. In other words, GNP or GDP could continue growing (at least for a while) even while the physical capital, on which future prosperity depended, was wearing out. Hence, a precondition for at least maintaining prevailing levels of economic activity was constancy in the value of net national product (NNP), which equals gross output minus depreciation or, as NIPA labels it, "capital consumption allowances."

Critics of conventional NIPA measurement practices recognize the constant NNP condition as a necessary, but insufficient, basis for sustained levels of economic activity, since it fails to account for changes in the stock of environmental and natural resource assets. It is at this point where the seemingly dry question of NIPA measurement conventions links up with the deeper, more emotionally charged issue of society's prospects for a sustainable future.

ethical issues regarding human well-being. It is also the case that certain nonmarket activities, such as household work by family members or crops grown and consumed on farms, understate national output. (Attempts to "impute" market values to some of these activities have progressed both here and abroad.) And when persons voluntarily opt for leisure in preference to paid work, they most likely enjoy increased welfare while contributing to diminished market output.

The economics profession has hardly shrugged off such vexing conceptual and measurement problems. A landmark 1973 paper by Yale economists William Nordhaus and James Tobin sought to compare recorded output with a range of indicators designed to capture trends reflecting assumed changes in human welfare. Their preferred measure of economic welfare (MEW) per capita showed a long-term growth rate markedly below that of per capita NNP. At the same time, they observed that "progress indicated by conventional national accounts is not just a myth that evaporates when a welfare-oriented measure is substituted." And that judgement, I believe, remains valid today; one cannot lightly dismiss the extent to which existing national account aggregates, with all their defects, correlate well with a number of important indicators reflecting quality of life.

In spite of this long-standing awareness of such measurement issues, and attempts to grapple with them here and internationally, it is fair to say that the somewhat unique dilemma posed by use of natural resources and environmental "services" is of much more recent origin—at least with respect to quantification. The most ambitious effort to address these issues was a proposed multiyear initiative by the U.S. Department of Commerce's Bureau of Economic Analysis (BEA), which was launched with an initial, highly tentative set of findings (limited to selected mineral commodities) issued in 1994.

For reasons that have never been made entirely clear, this effort became politically unwelcome in Congress, which quickly enjoined BEA from pursuing its long-range plan, pending an independent assessment of the possibilities and problems associated with such social accounting reforms. (See Joy E. Hecht, "Environmental Accounting: Where Are We Now, Where Are We Heading," *Resources* 135, Spring 1999.) A distinguished NRC panel, chaired by Nordhaus and entrusted with that assessment task, has now produced the result of its deliberations, *Nature's Numbers: Expanding the National Economic Accounts to Include the Environment* (National Academy of Sciences Press, 1999).

How significant is the NRC report as an analysis of, and brief for, a green GDP and related improvements in the nation's national-income-and-product account (NIPA) system? (See the box on this page for a description of basic GDP terminology.) In my judgment, the volume deserves to be viewed as an outstanding contribution to this complex subject, one that should give combatants in this frequently passionate debate pause for some thoughtful reflection.

While evaluation of BEA's accounting explorations constitutes a significant part of the panel's report, *Nature's Numbers* also provides an up-to-date review of both the conceptual underpinnings of resource and environmental accounts as well as the methodological and empirical challenges in their estimation.

The three principal elements of environmental and resource

accounts are nonrenewable assets, renewables, and environmental quality. Of these, it is the first whose estimation would appear to be the most tractable and whose exclusion from conventional accounting systems is least logical and excusable. After all, numerous activities involving subsoil mineral assets are already reflected in market transactions. For example, revenues from crude oil production, and investment in and depreciation of tangible physical assets, like drilling rigs and gathering lines, are part of the existing account structure. Why not, therefore, include the depletion of (or accretion to) the oil in the ground, the availability of which may be vital to sustaining the economic well-being of future generations?

Challenge of Choosing Appropriate Tools

As the NRC report observes, however, valuing changes in subsoil assets presents formidable challenges, even though it is a lot less complicated than the diminution of national wealth attributable to, say, the value of impaired visibility due to power-plant emissions. The major problem relates to the array of choices regarding the appropriate price to apply to the additions to, subtractions from, or revaluation of resources in the ground. Another challenge has to do with the choice of quantities by which such prices are multiplied. After all, while there may be a consensus as to the 10- or 20-year "on-the-shelf" inventory of proved oil or gas reserves, there may be much disagreement and uncertainty as to the extent of resources beyond proved reserves and the technological conditions under which assets shift from one to the other category.

No wonder that when it comes to green accounting, ranges of possible values—rather than the point estimates one finds in the conventional GDP accounts—are an inherent necessity in resource and environmental accounts. Thus, the report takes note of BEA's estimate of the value of subsoil mineral additions in 1987; these vary between 0.4% and 1.4% of that year's GDP.

Undoubtedly, the range of estimates designed to measure the value of changes in environmental quality would be wider still. Again, in the case of reduced visibility, measurement techniques that attempt to express such change in terms of imputed market values—for example, by using contingent valuation, hedonic pricing, and travel-cost methodologies—are now much more robust than several decades ago. They are far from universally accepted, however, and surely warrant emphatic caveats as one contemplates incorporating the estimates in the standard NIPA system. (See the box on this page regarding GDP treatment of pollution control expenditures.) Moreover, there is bound to be an irreducible set of negative environmental and social impacts that, while clearly adverse to social welfare, is not amenable to the dollar metric used to measure economic activity.

To the NRC committee, these problems are neither surprising nor a reason to throw in the towel on further development of resource and environmental accounting systems. On the contrary, the panel appears wholeheartedly to support the benefits to society of efforts to gauge the extent—however approximate—to which conventionally measured GDP is either a serviceable or misleading proxy of overall economic and environmental health.

Pollution Control Expenditures and GDP

A tangential issue in the green accounting debate has to do with those environmental control or improvement expenditures, such as utility scrubbers, that do enter the GDP accounts, and constitute about 2% of the GDP. It is legitimate to question whether or not such investments adequately offset the value of the damage they are meant to avert. To the extent that they do not, conventionally measured net national product (NNP) would exceed a "true" estimate, provided one can ascribe a marketlike equivalent to such damage. Some people may judge such damage to be beyond quantitative reckoning, believing their welfare to have been "incalculably" diminished. But as pointed out earlier in this essay, GDP, whether conventionally measured or subject to a green adjustment, cannot purport to reflect all aspects of changes in human welfare.

A largely irrelevant issue that sometimes arises in discussions of GDP and its shortcomings is a challenge to the inclusion of items like pollution-abatement spending in the first place. The challenge rests on the contention that, like other so-called "defensive" expenditures, such as dental checkups and oil changes, it does not add to material well-being but merely keeps it from getting worse. If some ombudsman of people's utility functions could establish the boundary between defensive and nondefensive outlays, perhaps this conundrum could be resolved. But don't hold your breath!

At the same time, the NRC committee made clear its view that this more rounded picture should take the form of periodic "satellite" accounts rather than being commingled with the GDP accounts, as presently calculated. Especially for shorter-term policy guidance, the existing GDP account structure must remain the system of choice. Perhaps in time, some components of resource and environmental accounts can be so integrated, just as—following a period of lengthy analysis and vetting—price indices have been modified to reflect emerging trends and new insights into technological change and new product development. But even under the best of circumstances, it is unrealistic to suppose that the existing annual time-series measures of economic performance can ever be augmented to track resource and environmental trends with the same frequency. The NRC committee states its views quite unambiguously:

"[E]xtending the [NIPA accounts] to include assets and production activities associated with natural resources and the environment is an important goal. Environmental and natural resource accounts would provide useful data on resource trends and help governments, businesses, and individuals better plan their economic activities and investments. The rationale for augmented accounts is solidly grounded in mainstream economic analysis …[however,] environmental accounts must not come at the expense of maintaining and improving the current core national accounts, which are a precious national asset."

Perhaps the best way to encapsulate the value of the NRC study is to say that, for some time to come, the conceptual and philosophical aspects of accounting reforms have been firmly laid down and are not likely to be significantly enhanced by further scholarly discourse. The direction should now shift toward quantification (where feasible) and to Congress, that body's charge for an even-handed exploration of the difficult issues at hand having been conscientiously and admirably met.

Joel Darmstadter is a senior fellow in RFF's Energy and Natural Resources Division. He thanks Winston Harrington for helpful comments on an earlier version of this article.

Future Directions for Environmental and Augmented National Accounts

William D. Nordhaus

The national income and product accounts (NIPA) are the most important measures of overall economic activity for a nation. Nevertheless, there have been ongoing concerns that the accounts are incomplete and misleading because they omit nonmarket activity such as unpaid work, the value of leisure time, and most investment in human capital. Most recently, attention has focused on extending the accounts to include natural resources and the environment.

Intensive work on environmental accounting began in the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce in 1992. BEA published the first official U. S. environmental accounts, known as the Integrated Environmental and Economic Satellite Accounts, in 1994. Shortly thereafter, for reasons that were never clear, Congress directed the Commerce Department to suspend further work in this area and to obtain an external review of environmental accounting. A National Research Council committee was charged with examining the objectivity and application of integrated environmental and economic accounting. That report, *Nature's Numbers*, was published last summer by the National Academy of Sciences.

Over the last quarter century, we have become increasingly aware of the interactions between human societies and the natural environment in which they thrive and upon which they depend. Scholars at Resources for the Future and other organizations have made great contributions to our understanding about resource scarcity, local and national environmental degradation, and global environmental issues.

The combination of increased awareness of the environment and recognition of the primitive state of much of the nation's environmental data has led to a widespread desire to supplement U.S. national economic accounts to include the services of natural resources and the environment. The idea of including environmental assets and services in the national economic accounts is part of a larger movement to develop broader social and environmental indicators. This movement reflects the reality that economic and social welfare does not stop at the market's border, but extends to many nonmarket activities.

The traditional national accounts primarily include the final output of marketed goods and services—namely, goods and services that are bought and sold in market transactions. Notwithstanding the importance of the traditional accounts, it has long been recognized that limiting them to market transactions distorts the accounts as a measure of economic activity and well-being. There is a vast and rapidly evolving array of near-market goods and services—ones that are similar to marketed goods but that are omitted from traditional accounts. This boundary distorts our measures of economic activity. Services provided by nannies are reckoned as part of the gross domestic product, while the services of mommies and daddies are not; the value of swimming in a commercial swimming pool is captured by GDP, while the value of swimming in the Atlantic Ocean is not.

Augmented national economic accounts are designed to provide better measures of genuine national output—what consumers currently enjoy in the way of goods and services, and the accumulation of capital, of all kinds, which will permit the future production of goods and services. Although many different approaches have been taken, the guiding principle in augmented economic accounts is to measure as much of economic activity as is feasible, regardless of whether it takes place inside or outside the marketplace.

Extending the accounts is not just an academic exercise. Better natural-resource and environmental accounts can provide valuable information on the interaction between the environment and the economy, help determine whether the nation is using its stocks of natural resources and environmental assets in an unsustainable manner, and provide data on the implications of different regulations, taxes, and consumption patterns. We seek better measures for scorekeeping (to devise better measures of national saving and investment or broader measures of economic well-being. But the data in augmented accounts are also useful for resource management) to help the nation better manage its subsoil assets, public lands, and precious environmental heritage.

After a thorough review, the NRC committee urged the adoption of an ambitious program for developing a comprehensive set of near-market and nonmarket accounts. In addition to developing environmental and natural resource accounts, significant extensions would include the value of: home production and unpaid work, research and development capital, nonmarket time of the population, and informal and home education. In a wealthy country like the United States, providing information on the structure and interactions of the economy and the environment is an essential function of government. It deserves a serious research effort by the federal government and private research organizations.

William D. Nordhaus is the A. Whitney Griswold Professor of Economics at Yale University, New Haven, Conn. He recently chaired a National Research Council Panel that produced the report *Nature's Numbers: Expanding the National Economic Accounts to Include the Environment* (National Academy of Sciences Press, 1999).