The Color of Money—Is It Green Enough?

Reviewed by Brian Mannix

NATURE'S NUMBERS: Expanding the National Economic Accounts to Include the Environment
by William D. Nordhaus and Edward C. Kokkelenberg (editors)
262 pp. Washington, D.C.: National Academy Press, 1999

Last year, the National Academy of Science's National Research Council (NRC) published *Nature's Numbers*, a review of so-called green accounting methods for the National Income and Product Accounts. This book-length study is the report of NRC's Panel on Integrated Environmental and Economic Accounting. It endorses ongoing efforts, both in the United States and abroad, to supplement the standard measures of economic activity with measures of environmental health, services, and inventories. The annual gross domestic product (GDP) would be adjusted downward, for example, to account for the depletion of oil reservoirs, the cutting of forests, or the pollution of lakes. It would be adjusted upward to account for the creation of wetlands, the reduction in smog, or the recovery of bald eagles.

A SECOND CHANCE?

THE COMMERCE DEPARTMENT'S BUREAU of Economic Analysis began developing such accounting methods in 1992; in 1994, Congress terminated the project by restricting its funding. The NRC study recommends that this funding be restored, noting that the United States is now lagging behind other countries in developing green accounts.

The study argues that green accounting methods are "solidly grounded in mainstream economic analysis" (p. 2). Although this panel of economists calls the development of green accounts "an essential investment for the nation," its true preferences are revealed when it considers a possible tradeoff: "The Panel emphasizes, however, that environmental accounts must not come at the expense of maintaining and improving the current core national accounts, which are a precious national asset" (p. 9).

So, now we know that, in the Washington budget game, "precious national assets" have a higher priority than "essential investments for the nation." And both, of course, preempt whatever mundane plans taxpayers might have had for this money.

WHENCE GREEN ACCOUNTING?

THE IMPETUS FOR GREEN ACCOUNTING comes, in part, from observations about the harvesting of rainforests in developing countries. If a small tropical country decides to cut its virgin forests far more quickly than they can recover, standard accounting procedures will show a large increase in GDP. Even disregarding any environmental damage, however, we know that such an increase cannot be sustained. Indeed, in some cases, nations that appeared to be getting richer on paper were, in fact, making themselves demonstrably poorer. Some economists looked for ways to revise the GDP accounting methods to reflect this underlying reality.

Such a project is highly problematic, however laudable the intentions behind it. The NRC study reviews in great detail the problems of measurement and consistency that would need to be overcome. The first problem is that, once we have decided to include nonmarket assets in the accounts, there are innumerable candidates to be considered. If we include the value of environmental resources, why not the value of intellectual capital? Of technology in the public domain? Of education? Of public recreation? Of private,… um, recreation? In the words of the report, "The dilemma is similar to that faced by the little boy who said, 'I know how to spell banana, but I don't know where to stop'" (p. 23).

The second problem is that, even if we somehow manage to inventory the quantity of environmental resources, how can we assign a value to them? The standard procedure is to value all goods in the GDP at their market price, but many environmental resources are enjoyed at a price of zero. Economists practicing benefit-cost analysis have come up with a variety of techniques (of debatable validity and accuracy) to estimate the social value of environmental resources. But these techniques are applied to discrete microdecisions about a relatively small transaction or rule; none of them is up to the task of imputing a value to all of nature. What income shall we attribute to the sun?

A BETTER WAY

THE NRC PANEL RECOGNIZES THE PROBlems but views them as opportunities to request government funding for much more economic research in the effort to solve them. These are more than just

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technical difficulties to be overcome, however. The idea of a green GDP suffers from deeper conceptual problems. The National Economic Accounts are a measure of economic activity, but they are not a measure of national wealth and welfare, even when one considers only purely market transactions.

When I rent a videotape for $3, for example, it creates a double entry: $3 of revenue for the shop and $3 of expenditure for me. The National Economic Accounts maintain an overall balance so that, when everything is totaled, National Product equals National Income. But if you view these numbers as a measure of national welfare, you get the impression that the whole economy is a wash—we might just as well not have bothered!

A benefit-cost analysis that is designed to measure welfare changes takes a very different view of the same transaction. If I got $10 worth of enjoyment from the video, what counts is the $7 difference between what I paid and what I might have been willing to pay. The $3 that appears in the National Economic Accounts is netted out of the benefit-cost analysis; only the $7 "consumer surplus" is of interest to the welfare economist. Yet, the consumer surplus does not appear at all in the GDP!

Thus, the omission of environmental and other nonmarket goods and services from the National Economic Accounts is not an example of inconsistency; indeed, it is perfectly consistent with the way the accounts treat marketed goods and services—consumer surplus is ignored, and only the monetary exchange is recorded.

This omission means that the National Economic Accounts are limited; they show only the marginal value of a subset of national consumption. They cannot be used as a measure of total wealth or welfare, nor can they be used as a reliable yardstick to judge the value of government policy decisions. On the other hand, the accounts are rigorously constructed, they deal with observable things, and they can be used for comparisons across time and geography. National Economic Accounts are useful in the same way that keeping tabs on the functioning of an automobile is useful. It is important to track gas consumption, mileage, maintenance, wear, and so forth. But none of this will tell you whether the vehicle is taking you where you really want to go.

Research into the value of environmental resources should certainly continue. But this research is best treated by the methods of welfare economics and benefit-cost analysis, and it should be kept quite apart from the collection of economic statistics on market exchange. Better yet, a systematic effort to privatize environmental resources would bring more of them within the scope of observable market transactions, which would have far more beneficial effects than can ever be achieved by tinkering with the National Economic Accounts. ■

How Much Do We Care about the Deep Future?

Reviewed by Brian Mannix

DISCOUNTING AND INTERGENERATIONAL EQUITY

by Paul R. Portney and John P. Weyant (editors)

186 pp. Washington, D.C.

Resources for the Future, 1999

BENEFIT-COST ANALYSIS, THE standard tool for evaluating government investments, is 100 years old this year. Its origins can be traced to the Rivers and Harbors Act of 1900, which required the Army Corps of Engineers to calculate the economic benefits of its harbor-dredging projects.

Over the years, a central point of controversy in benefit-cost analysis has been the choice of a discount rate—the effective rate of return that a government project is expected to earn to be considered worthwhile. Because the costs of a Corps project are front-loaded, while the benefits can last for many years (particularly in the case of a dam), the Corps favored using a low discount rate—sometimes 2 percent. That made the present value of a project with many years of benefits seem much larger than the project's costs.

Environmentalists, who often opposed new dams, were among those who objected to the low discount rate. They pointed out that private investments needed to pass a much higher threshold to attract funding.

Environmentalists took the opposite position when the government began proposing environmental projects—particularly expensive regulatory programs—with high up-front costs but long-term environmental benefits. Environmentalists then argued in favor of low, even zero, discount rates.

CONSENSUS...FOR A WHILE

A SUBSTANTIAL LITERATURE DEVELOPED on the economic theory of discounting, in an attempt to resolve the perennial disputes that arose. A milestone was reached in 1982 with the publication of a book that came out of a conference held in 1977 by Resources for the Future (RFF), a Washington think tank. That book—*Discounting for Time and Risk in Energy Policy* (Baltimore: Johns Hopkins University Press)—became known as the "Lind" book not only because of Robert Lind's editorship but also because of his contributions to the theory and his masterful summary chapter that laid out the consensus of participants.

Economists have believed since the publication of the Lind book that the right way to evaluate a government investment or regulation is to account separately for time, for risk, and for the effects of taxation. A relatively low, risk-free discount rate, say, 4 percent (although there is still plenty of room for argument about the precise number) accounts for the time value of deferred consumption. A separate calculation of expected values is the best way to account for risk and uncertainty about future benefits and costs. And benefits and costs that increase or decrease private capital should be weighted by, say, a

Brian Mannix's biography appears with the preceding review.

been left for us. But that seems a petty complaint when the supply of proved reserves today is 15 times what it was in the middle of the twentieth century.

Even more significant is the intangible wealth that we have inherited from our ancestors: the knowledge of what oil is, how to find and extract and refine it, how to make an internal-combustion engine and a turbine, and how to make plastic. A large component of the wealth that each generation passes to the next is embodied in technology, and most of that is in the public domain (*not* the public sector).

If government policy in 1900 had been designed to save oil for us today, can we imagine that such a policy would have made us better off? Any such policy would almost certainly have caused collateral damage by delaying the development of technology—a far more valuable resource than a small increase in the physical stock of oil.

TIME TO THINK AGAIN

A SIMILAR ANALYSIS SURELY APPLIES TO governmental restraints on greenhouse gas emissions. Even if the hoped-for benefits materialize—a big "if"—there certainly will be a range of undesirable effects as well. Price and allocation controls on oil in the 1970s caused tremendous inefficiencies in the U.S. economy.

Government controls on greenhouse gases would yield similar inefficiencies. And the effects of government controls are likely to be far worse in other countries, where central planning and public corruption would be encouraged. Free-market and free-trade institutions would be compromised, and the cooler citizens of 100 years hence might find that they have much to regret.

Given the difficulty we have in reconciling policies that differentially affect the three or four generations now living (and voting), it seems awfully presumptuous to meddle patronizingly in the affairs of generations yet unborn.

Despite the current controversy over the moral import of discounting, the best policy is to continue to discount as we have been doing—but to stop and think hard if ever we are confronted with a policy issue that truly affects the fate of the planet. ■

Debunking Path Dependence

Reviewed by Richard L. Gordon

WINNERS, LOSERS & MICROSOFT: Competition and Antitrust in High Technology

by Stan J. Liebowitz and Stephen E. Margolis

288 pp. Oakland, Cal.

The Independent Institute, 1999

IN 1985, ECONOMIST PAUL A. DAVID argued that that an inventor named August Dvorak had devised a typewriter keyboard better than the standard QWERTY arrangement. Based on that example, he contended that products that maximize consumer benefits relative to costs do not necessarily dominate markets. David argued, instead, for "path dependence." According to that theory, the QWERTY keyboard is used not because it is objectively the best but because it was first.

A decade ago, the April issue of the *Journal of Law and Economics* arrived with a lead article intriguingly entitled "The Fable of the Keys" (reprinted as Chapter 2 of this book). Liebowitz and Margolis wrote "The Fable of the Keys" because they felt that the evidence cited by David in his attack on QWERTY was flimsy and wondered whether it would stand close scrutiny (p. 20).

The authors pursued the history of QWERTY and concluded that David was wrong about its inferiority. David relied on assertions that a U.S. Navy report—which he had not seen—proved the superiority of the Dvorak layout. The authors sought and found the original report. It proved to be methodologically unsound, and Dvorak wrote it. The authors found other studies that differed from the one written by Dvorak. They found, moreover, that QWERTY was the product of competition among rival typewriter manufacturers to provide better keyboard layouts.

As the authors point out (p. 20), the title "The Fable of the Keys" alludes to another myth of market failure that had been disproved by facts. The allusion is to "The Fable of the Bees," the title of Stephen Cheung's 1973 article. Cheung showed that private transactions did compensate for benefits to apple orchards from pollination by bees.

In "The Fable of the Keys," Liebowitz and Margolis argued that they had added to the contributions of Cheung and also of Ronald Coase who showed that contrary to a standard example private groups successfully built and operated lighthouses. Nevertheless, as with lighthouses and bees, the QWERTY myth lived on. It tacitly became the applications barrier to entry that is the heart of the government's case against Microsoft.

The authors therefore went on to examine more cases and to develop further the underlying theoretical case against path dependence. *Winners, Losers & Microsoft* is the fruit of their efforts.

THE THEORETICAL CASE AGAINST PATH DEPENDENCE

THE AUTHORS DEVOTE THREE CHAPTERS to theory. The first of those chapters argues that the necessary conditions for path dependence and its associated suboptimal outcomes are unlimited economies of scale and an absence of foresight by market participants (p. 57). (The spuriousness of those assumptions is self-evident.) As the authors argue (pp. 57-58), the economic definition of technical superiority—a higher payoff—creates an incentive for the owner of a superior technology to seek market superiority. There is foresight at work.

The second theory chapter deals with externalities. Liebowitz and Margolis show that where costs are increasing the owner of a technology can and will profit from promoting efficiency. The authors then turn to the flaws of Brian Arthur's assumption (in *Increasing Returns and Path Dependence in the Economy*) of unlimited economies of scale. Arthur seems to have committed the classic error of confusing technical

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progress with scale economies. (Only pure scale economies can produce natural monopoly.) Further, in the realm of computer technology, the assumption of unlimited economies of scale may apply to the reproduction of software but not to other factors of production.

The final theory chapter develops a model of how consumer preferences and their interaction in the marketplace affect choices among technologies. The authors explore the consequences of alternative assumptions. Ultimately, they demonstrate that because the owner of a superior technology has an incentive to attract customers, the temporary dominance of a competing technology can be overcome.

Liebowitz and Margolis are overly polite is dealing with the fundamental problem of the path-dependence model: its reliance on a long chain of improbable assumptions to prove that markets can sustain bad choices. "The Fable of the Keys" was good enough for me, and the theory case was won there, on page 58 of Liebowitz and Margolis's book. Although the further theoretical discussion was interesting, my advice would be to quit when you are convinced. There is no help for those who are unwilling to accept so fully developed a case.

EMPIRICAL EVIDENCE TO BUTTRESS THE THEORY

CASE STUDIES COMPRISE THE BULK OF the book and make interesting reading. Liebowitz and Margolis start with previously reported work showing that neither the Sony beta format for video tape recorders nor the Apple operating system was markedly superior to its rivals as others had argued.

The Beta format, it turns out, had no advantage. VHS had the same performance and greater capacity.

The Macintosh operating system, when introduced, so strained available computer capacity that PCs using DOS were faster. As computers caught up, Microsoft went on to Windows, a reasonable approximation of the Macintosh operating system. Here the authors may be too kind to Apple. Its operating system always has been easier to use, but the Macintosh was not superior to PCs in every respect: Apple seemed to seek a price premium and the company was so badly adrift that its survival was in doubt.

The authors then treat the metric system, MITI, and FORTRAN. The metric system does not produce great advantages. MITI was fallible. FORTRAN was less durable than contended.

Liebowitz and Margolis also extensively examine the principal application programs used on desktop computers. Here, the same pattern emerges: leadership radically changes as better programs emerge, and the best program wins. The authors successively review Windows, office suites, spreadsheets, word processors, personal finance, desktop publishing, web browsers, and online services. They show the tendency of programs to lose market share when their performance lagged that of rivals; that is, market share tends to correspond to magazine review ratings.

CURRENT RELEVANCE

IN A CONCLUDING APPENDIX, LIEBOWITZ and Margolis draw on their analysis to argue that the case against Microsoft is unfounded and that Microsoft owes its success to technical superiority.

For example, Microsoft is strongest in the oldest (and largest) categories of programs: word processing and integrated spreadsheets. The originators of such programs disappeared long ago. Microsoft competed against other newcomers and won because it persisted in improving its products. ■

Superfund: The High Cost of Environmental Alarmism

Reviewed by Michael Gough

CALCULATING RISKS: The Spatial and Political Dimensions of Hazardous Waste Policy

by James T. Hamilton and W. Kip Viscusi

326 pp. Cambridge, Mass.
The MIT Press, 1999

THERE IS NO SHORTAGE OF PEOPLE willing to take credit for Superfund. Al Gore's election campaign website (*www.algore2000.com/agenda/issue_environ.html*) modestly cites "his leadership in the House to pass the original Superfund legislation." Lois Gibbs is less restrained and takes full credit as "the Mother of Superfund." (See the review of her book, *Dying from Dioxin*, in *Regulation* 19 [no. 2]: 78.)

Gibbs led the effort to blame chemicals that escaped from a waste dump at Love Canal as the cause of birth defects, poor health in children, and cancer and other terrible diseases in adults. The fact that no credible scientific study could validate Gibbs's claims did not keep Congress from enthusiastically embracing her story.

Congress passed Superfund—more formally, the Comprehensive Environmental Response, Compensation, and Recovery Act (CERCLA) in 1980—it made companies that had deposited wastes in waste dumps responsible for cleaning up those dumps if the dumps were judged to create a health hazard. And there seem to be hazards aplenty: more than 36,000 waste dumps appear on one or another list of concerns.

There is no question about the cost of Superfund. It cost $20 billion between 1981 and 1992, and another $7 billion is committed to continuing cleanup projects.

What has all that money bought? James T. Hamilton, an associate professor of public policy at Duke University, and W. Kip Viscusi, a professor of law and the director of the Empirical Legal Studies Program at Harvard University, provide some answers. The analytical centerpiece of their book *Calculating Risks* is an examination of the chemical risks, exposed popula-

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tions, and costs at 150 Superfund sites.

EPA'S ROLE AND METHODS

WHEN THE ENVIRONMENTAL PROTECTION Agency (EPA) completes its investigation of the risks at a site, it signs a Record of Decision (ROD) and decides on remediation actions. From 267 RODs signed in 1991-92, Hamilton and Viscusi selected 150 for which chemical analysis and risk assessment data were available in EPA's regional offices. (EPA's willing cooperation in providing those data stands in marked contrast to in blocking access to data about the supposed health effects from air pollution. See "The Case for Public Access to Federally Funded Research Data," Cato Policy Analysis 366.)

Using EPA's methods of estimating risks, Hamilton and Viscusi calculate that the 150 Superfund studies for which data were available will yield 731 cases of cancer in the next 30 years, in the absence of any cleanup. Hamilton and Viscusi also show that there is less than a 1-percent probability that anyone will ever be exposed to the concentrations that EPA routinely assumes in assessing cancer risks. When more realistic exposures are entered into the calculations, the number of expected cancer cases drops by two-thirds.

Even assuming EPA's exaggerated risks, only 10 of the 150 sites are expected to have one or more cancer cases in the next 30 years. In terms of cancer prevention, cleanup at the other 140 sites yields no benefits. Hamilton and Viscusi point out that current analyses at Superfund sites are inadequate to determine if there is cause for concern about threats to health or the environment.

Hamilton and Viscusi limit themselves to an analysis of EPA's exposure estimates and do not question EPA's judgments about toxicity, considering that beyond the scope of their work. Yet, 652 of the 731 cancer cases calculated by EPA's methods are expected at one California site contaminated by polychlorinated biphenyls (PCBs). Given the results for the largest population of PCB-exposed workers ever studied, which show that PCBs have not caused cancer in humans, the 652 expected cancer cases may be overestimated by 652. (See "Mortality in Male and Female Capacitor Workers Exposed to Polychlorinated Biphenyls," by Renate D. Kimbrough, Martha L. Doemland, and Maurice E. LeVois, in *Journal of Occupational and Environmental Health* 41 [1999]: 161.)

SILLY ASSUMPTIONS AND "PERMANENT REMEDIES"

IN ANY CASE, THE PCBS AT THE CALIfornia site are under a paved parking lot. Only if people remove the asphalt and build houses or playgrounds on the site will there be any exposure at all. Such improbable scenarios are common in EPA's risk assessments. In half of all cases, for example, EPA assumes that people will build houses on Superfund sites—evidently cutting through fences, digging up contaminated soil, plunging into waste lagoons, and ignoring all kinds of warnings in the process.

Hamilton and Viscusi's scholarly credentials seem to prevent them from passing judgment on such assumptions. This reviewer feels no such constraint: EPA makes silly assumptions about peoples' behavior.

Congress shares the blame for wasting billions of dollars. In 1986, unhappy with what was perceived to be lax enforcement of CERCLA, Congress passed the Superfund Amendments and Reauthorization Act (SARA). SARA mandates that EPA select "permanent remedies."

Fencing off or paving over a contaminated area is not permanent; thus, the paved parking lot is not judged sufficient protection against buried PCBs. Digging up the contaminated soil and incinerating it is a preferred permanent remedy.

Hamilton and Viscusi note that governments don't necessarily adhere to permanent remedies when they bear the costs. The city of Boston is building a convention center over a former junkyard, heavily contaminated with PCBs, after capping it with soil and paving.

COST IS NO OBJECT?

CLEANING UP SUPERFUND SITES WILL not prevent many cases of cancer, but how much will it cost? Hamilton and Viscusi calculate that it would cost $2.2 billion to clean up the 150 sites they studied, if done as mandated by EPA. They suggest some changes that would reduce the cost without significantly increasing risks to health. (As I have discussed, there seems to be little risk to health, anyway.)

Congress requires that "applicable or relevant and appropriate requirements" (ARARs) from other environmental laws be applied to cleanups. That increases costs by imposing stricter standards than required to reduce cancer risks to the levels acceptable under Superfund policies. The elimination of ARARs would reduce the total cost of the cleanup to $2 billion. The simple expedient of fencing Superfund sites (largely precluded by SARA) would further reduces the cost to $1.6 billion.

In any event, Superfund cleanups are not cost-effective. According to Hamilton and Viscusi, it can cost as much as $7.2 billion to avert a single case of cancer. That is far in excess of the value of $5 million or so placed by EPA (and most analyses) on a life saved. Hamilton and Viscusi, for example, analyze the effects on house prices of proximity to Superfund sites and other pollution sources in Grand Rapids, Michigan. They find that residents, when informed of the risks, place a

In any event, Superfund cleanups are not cost-effective. According to Hamilton and Viscusi, it can cost as much as $7.2 billion to avert a single case of cancer.

value of about $5 million on a human life. (In contrast to the burgeoning literature about the inability of the public to respond appropriately to information about risks, the citizens of Grand Rapids came up with the same answer as the experts—indicating, again, that people are smarter than they are given credit for being.)

Hamilton and Viscusi advocate the use of cost-benefit analysis (CBA) in an effort to bring rationality to Superfund. They suggest proceeding with cleanups costing less than $5 million. For more expensive cleanups they suggest two possible limits on expenditures: $5 million for each cancer averted (to reflect the average value placed on a human life) or $100 million for each cancer averted (because the Office of Management and Budget has never turned down a regulation that "saves" a life for $100 million or less).

If cleanup costs were capped at $5 million for each cancer averted, the 150 Superfund sites studied by Hamilton and Viscusi could be cleaned up for less than $100 million, instead of $2 billion. If cleanup costs were capped at $100 million for each cancer averted, the 150 sites could be cleaned up for about $500 million.

Recall that EPA would spend $2 billion to prevent 731 cases of cancer. By contrast, capping expenditures at $5 million for each cancer prevented would prevent between 670 and 705 cases; capping expenditures at $100 million for each cancer prevented would prevent between 710 and 726 cases. Eliminating the last little bit of risk is very expensive. Hamilton and Viscusi calculate that 95 percent of Superfund expenditures are directed at the last 0.5 percent of the risk.

Remarkably, the use of CBA would increase protection for minorities. Currently, wealthier, better-educated, and more politically influential populations demand and get the more extensive cleanups. Poorer populations with higher percentages of minorities are not treated as well. They would be better off with the use of CBA because the sites that fall under the $5 and $100 million caps for each life saved have higher percentages of minorities.

SELECTIVE READING

THE READER WHO WANTS A FIRM grounding in the benefits and costs of Superfund can read the first and last (ninth) chapters of the book. Chapters 2 through 8 provide the underpinnings for the other chapters, and some redundancy runs through them. Although the redundancy is a minor annoyance to someone who reads the book straight through, it makes it possible to read just one chapter without reference to other chapters—a useful feature for professors and students.

Readers who want to slaver over partial differential equations of the type that pepper so much of the microeconomics literature will enjoy Chapter 6, the analysis of pollution sources on housing prices. Two appendices provide analytical details.

WHO BENEFITS?

I DOUBT THAT MR. GORE WILL PAY ANY heed to this book. Ms Gibbs will reject it out-of-hand. But citizens who are interested in understanding just how little has been bought by the expenditure of billions of dollars under the Superfund banner will find *Calculating Risks* to be informative and illuminating. Politicians with claims to regulatory reform should seize on the book's analysis to show just how much good can be done for a lot less money. Those who represent minority populations may be surprised to find how the authors' analysis can help their constituents.

Mr. Gore, Ms Gibbs, and their ilk can take all the credit they want for Superfund. But it is bothersome that the rest of us have to pay for it. ■