Designing Nonmarket Accounts for the United States: Interim Report

Panel to Study the Design of Nonmarket Accounts, Katharine G. Abraham and Christopher Mackie, Editors, National Research Council

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Committee on National Statistics

Division of Behavioral and Social Sciences and Education

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PANEL TO STUDY THE DESIGN OF NONMARKET ACCOUNTS

KATHARINE G. ABRAHAM *(Chair)*, Joint Program in Survey Methodology, University of Maryland
DORA COSTA, Department of Economics, Massachusetts Institute of Technology
DAVID CUTLER, Department of Economics, Harvard University
NANCY FOLBRE, Department of Economics, University of Massachusetts, Amherst
BARBARA FRAUMENI, Bureau of Economic Analysis, U.S. Department of Commerce, Washington, DC
ROBERT E. HALL, Hoover Institution, Stanford University
DANIEL S. HAMERMESH, Department of Economics, University of Texas, Austin
ALAN KREUGER, Woodrow Wilson School, Princeton University
ROBERT MICHAEL, Harris School of Public Policy, University of Chicago
HENRY M. PESKIN, Edgevale Associates, Nellysford, VA
MATTHEW D. SHAPIRO, Department of Economics, University of Michigan
BURTON A. WEISBROD, Department of Economics, Northwestern University

CHRISTOPHER MACKIE, *Study Director*
MARISA GERSTEIN, *Research Assistant*
MICHAEL J. SIRI, *Project Assistant*

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ANDREW A. WHITE, *Director*

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The report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Research Council (NRC). The purpose of this independent review is to provide candid and critical comments that will assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We thank the following individuals for their participation in the review of this report: Joni Hersch, Harvard Law School; James Hines, Business School, University of Michigan; Joel Horowitz, Department of Economics, Northwestern University; J. Steven Landefeld, Bureau of Economic Analysis, U.S. Department of Commerce; and Frank Stafford, Institute for Social Research, University of Michigan

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the content of the report, nor did they see the final draft of the report before its release. The review of this report was overseen by Robert Pollak, Olin School of Business, Washington University, St. Louis. Appointed by the National Research Council, he was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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Executive Summary

National income and product accounts are, for many countries, the most important measures of overall economic activity. Key benchmarks derived from these accounts—most notably gross domestic product—along with other economic data such as price and employment statistics, are widely viewed as indicators of how well a nation is doing.

Nevertheless, since their first construction for the United States by Simon Kuznets, concerns have been voiced that the accounts are incomplete and misleading because they omit nonmarket activities—unpaid and volunteer work, leisure pursuits, most investment in human capital, and many others—that affect the population's well-being. Moreover, data from the accounts can only provide a partial measure of the sources of growth in the economy. Since their inception, researchers interested in explaining economic growth have supplemented the national accounts with estimates of the contributions of research and development, natural resources, and investments in human capital. These concerns, and the need to supplement national accounting data, reflect the reality that economic and social welfare do not stop at the market's border, but extend to many nonmarket activities. Failure to account for these activities may significantly distort policy makers' sense of economic trends and the desirability of potential policy interventions.

The Panel to Study the Design of Nonmarket Accounts was charged with evaluating current approaches, examining data requirements, determining priorities for areas of coverage, and suggesting further research to strengthen the knowledge base about nonmarket accounting. This interim report identifies the key and often controversial issues in nonmarket accounting and offers some initial insights about these issues.

An overarching issue that must be addressed is the question of scope for nonmarket accounts—where in the range of economic-related activities to draw the border of inclusion. The panel has focused much of its attention to date on household production, human capital and education, and health. Each of these areas is associated with output that is both quantitatively important and likely to have changed in relative importance over time. These are also areas in which work is ongoing, data are developing, and that involve conceptual issues that are key to nonmarket accounting generally.

It is impossible to create a framework for developing nonmarket accounts without a statement of the measurement objective. Should the primary intent of the accounts be to provide a measure of national output or of national welfare (or some compromise)? Both are important economic concepts and very difficult to separate from one another. An experimental set of accounts could be expanded under either guiding principle, although the expansion would surely be much broader and ambitious if the goal is to provide an accurate indicator of welfare trends. For example, it seems clear that the value of household production should be included in an expanded account, even if the goal is limited to fuller accounting of national output. However, household leisure may not qualify as output, narrowly defined, though it certainly affects well-being. Additionally, how goods and services are categorized—as "intermediate" or "final," consumption or investment, and input or output—may be affected by the measurement objective.

Another key issue is how best to value inputs and outputs, once identified, in the absence of market prices. Valuation typically involves finding market substitutes for the nonmarketed inputs or outputs in question; given the distance from the market of some utility-generating activities, however, this approach is not always possible.

The panel is also considering how the experimental nonmarket accounts might be designed to work as compatibly as possible with the current core accounts, the merits of which have been validated from a long history of use. The panel concludes that, when possible, the conceptual framework to be applied in accounting for nonmarket activity should parallel the framework used in the existing national accounts. This argues for pursuing an approach that maintains a double-entry (input/output) structure; uses dollar values as a metric; seeks to value outputs at their marginal value (the market price) rather than their total value; and derives these marginal values from analogous, observable market transactions. Yet adhering to this framework makes it more difficult to construct accounts and, in some cases, may not produce the most policy-relevant data. The panel argues that, for some cases, concerns of practical use may outweigh those relating to consistency with the core accounts.

The panel is also charged with examining and making recommendations with respect to key data that are needed to develop augmented accounts. Because this issue is linked to unresolved framework questions, the panel is not yet ready to make detailed recommendations about data needs for specific accounts. The report does comment on the Bureau of Labor Statistics' soon-to-be-released American Time Use Survey which, in the view of the panel, represents a huge step forward in measuring time inputs in the production of health, household goods, and human capital. The single most important information required for nonmarket accounts is data on how the population spends its time; like its market analog, the most pervasive input in nonmarket production is time.

1
Introduction

POLICY AND TECHNICAL CONTEXT

National economic accounts—with the national income and product accounts being the most prominent in the United States—provide a framework for the systematic organization of economic data describing the nation's economic condition. Governments around the world have found these accounts indispensable for purposes relating to the analysis and design of economic policies and for gauging the success of these policies.

While national accounts have a long history, their widespread use by governments is a comparatively recent phenomenon, resulting from the policy demands engendered by the Great Depression and by World War II. As their use in government has grown, the general public has become more familiar with the accounts, especially certain aggregate totals drawn from the accounts such as the Gross Domestic Product (GDP). These benchmarks, along with other economic data such as price and employment statistics, are widely looked on as indicators of how well a nation is doing.

Along with the growth in popularity has been a growth in criticism of the accounts—due less to their use as a data framework and more to their (mis)use as an indicator of national well-being. Since their first construction for the United States by Simon Kuznets in the 1930s, there have been concerns that the accounts are incomplete and misleading because they omit such nonmarket activity as unpaid work, volunteer activities, the value of leisure time, and most investment in human capital. Additionally, data from the accounts provide only a partial measure of the size and sources of growth in the economy. Since their inception, researchers concerned with explaining economic growth have supplemented the national accounts with estimates of the contributions of

natural resources, research and development, and investments in human capital. These concerns reflect the reality that economic and social welfare, and even productive output, does not stop at the market's border, but extends to many nonmarket activities.

The traditional national accounts include primarily the output of marketed goods and services—that is, goods and services that are bought and sold in market transactions. Notwithstanding the importance of the traditional accounts, limiting them to transactions that take place in the marketplace may distort certain accounting aggregates as measures of economic activity and, certainly, of well-being. For example, nannies' services figure in GDP, while parents' services do 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 (Nordhaus, 2002).

In developing guidelines for an expanded accounting system, questions immediately arise concerning its scope, the classification of variables, and data coverage. First, one must consider what is meant by an "expanded" or "augmented" system. Augmented accounts are designed to measure human economic activity that takes place outside the marketplace and beyond the coverage of the core national accounts—to measure more fully what consumers currently enjoy in the way of goods and services and the accumulation of capital, of all kinds, that permits the future production of goods and services. Although many different approaches have been taken, one would ideally like to set the analytical boundaries of augmented economic accounts so as to measure as much economic activity as is feasible, regardless of whether it takes place inside or outside the marketplace. This is only a guiding principle, however, and determining the exact set of activities that should fall within the purview of a national accounting framework is far from obvious.

When goods and services are not bought and sold in markets, it is generally not possible to use conventional approaches to measure their value. Stocks of some natural resources, such as oil and gas, are priced in markets. But for many other environmental services—such as the value of clean air—and for much nonmarket economic activity—such as unpaid time spent exercising or teaching a child—valuation is more difficult. In addition, data covering nonmarket activities are not well developed, in part because there is no agreed-on valuation methodology. Also at issue are how to organize satellite accounts for nonmarket activity and how (and whether) to integrate them into the conventional national accounts.

Most recently, attention has focused on extending the accounts to include natural resources and the environment. The issues involved in environmental accounts were reviewed in a recent report, *Nature's Numbers* (National Research Council, 1999). In addition to its analysis of environmental accounts, that panel recommended adopting a program for developing a comprehensive set of near-market and nonmarket accounts:

> The panel concludes that developing a set of comprehensive nonmarket economic accounts is a high priority for the nation. Developing nonmarket accounts to address such concerns as environmental impacts, the value of nonmarket natural resources, the value of nonmarket work, the value of investments in human capital, and the uses of people's time would illuminate a wide variety of issues concerning the economic state of the nation [National Research Council, 1999, p. 3].

While *Nature's Numbers* examined many of the issues involved in environmental accounting, the construction of many other components of nonmarket accounts has not been thoroughly studied. Issues involved in valuation and pricing—along with measuring the quantities of goods, services, and assets—are imperfectly understood for a wide range of areas, including unpaid household work, volunteer activities, health status and life expectancy, and investment in education, wealth, and the environment.

No one with an understanding of the national economic accounts ever believed that they could fully capture all these, and other elements, that affect societal well-being. While there is much agreement in the scholarly community about these limitations, there is disagreement about what should be done about them. This disagreement likely stems from different perceptions about appropriate uses of, and objectives of, the accounting system.

The panel concludes that, for a number of sectors of activity, nonmarket accounts can be developed that will generate meaningful and useful data to inform policy and to advance research. Within the panel, there is a range of opinion about (1) how urgent it is that these accounts be developed, (2) the magnitude of potentially measurable nonmarket output, and (3) the extent to which supplemental accounts can be designed to integrate with the core accounts. Regarding the last point, it is perfectly consistent and logical (even for a proponent of expanded accounts) to argue that the purpose of the core national accounts is to provide a picture of aggregate market activity.

The panel's final report will make recommendations about the potential scope of any system of nonmarket accounts, provide guidance as to how specific accounts might be designed, and address questions about the underlying conceptual framework. In this interim report, the panel identifies the key, and often controversial, issues in nonmarket accounting; provide some initial insights about these issues; and indicate what topic areas and types of activities should be priorities for work on nonmarket accounts.

PANEL'S WORK

Panel Charge and Work Plan

The charge to the panel is as follows:

> The Committee on National Statistics (CNSTAT) will establish a panel to examine the design of nonmarket accounts that would parallel the market-based national income and product accounts. The panel will review current approaches, examine data requirements and limitations, determine the priorities for developing nonmarket accounts, and suggest further research to strengthen the knowledge base about nonmarket accounting. The panel will consist of about 12 specialists in national income accounting and in the major methodological areas to be covered by nonmarket accounts—areas such as valuation, measuring nonmarket flows and assets, and nonmarket data.

The panel was charged to meet periodically over a 2-year period.

The panel's charge includes four specific tasks:

- to review efforts to develop nonmarket accounts developed by government agencies as well as by private organizations and scholars, including theoretical as well as empirical studies and actual implementation of nonmarket accounting frameworks.
- to make specific recommendations on the framework and sectors for developing nonmarket accounts and determine a set of priorities with respect to developing or phasing nonmarket accounts.
- to examine and make recommendations with respect to key data that are needed to develop nonmarket accounts, considering such efforts as BLS's time-use survey.
- to investigate and make recommendations for methodological research on nonmarket accounts in the areas of statistics, economics, psychology, survey research, and related disciplines.

Activities to Date

The panel has held four meetings. At its first meeting, members were briefed by the project's initiators, Martin Collier of the Glaser Foundation and William Nordhaus of Yale University. Collier discussed the background leading up to the Glaser Foundation's interest in economic measurement. Nordhaus discussed his work in the area, as well as the work of a previous CNSTAT study, which he chaired, that resulted in *Nature's Numbers*, and he offered his perspectives on the topic. Steve Landefeld of the Bureau of Economic Analysis (BEA) presented information on the nonmarket accounting efforts at BEA and abroad.

The panel's second meeting included a small public workshop, with two sessions designed to inform the members on key issues related to nonmarket accounting. In the first session, on time-use surveys, Diane Herz of the Bureau of Labor Statistics (BLS) provided an overview that agency's and other time-use surveys, and Steven Landefeld of BEA discussed how time-use data might best be used in the construction of satellite accounts. Thomas Juster, of the Institute for Social Research at the University of Michigan, commented on conceptual and measurement issues in time-use surveys; Robert Pollak, of the Olin School of Business at Washington University in St. Louis, and Robert Michael, of the Graduate School of Public Policy at the University of Chicago, discussed the theory of time allocation, approaches to estimating associated behavioral relationships, household technology, and the limits of time-use data.

The second session, on alternative accounting and indicator frameworks, began with a discussion of the Jorgenson system of national accounting. Peter Harper, of the Australian Bureau of Statistics, discussed ongoing work on experimental nonmarket accounts in Australia, and Sue Holloway, of National Statistics-UK, provided a detailed overview of the new Household Satellite Account in the United Kingdom. Christopher Mackie, of the CNSTAT staff, provided a summary assessment of social indicators, focusing on the Genuine Progress Indicator.

The panel's third meeting was a closed session devoted to refining the scope of its work. At the fourth meeting, the panel received an update from Dan Melnick, of the Yale Program on Nonmarket Accounting, and other activities of the program. His

presentation focused on projects designed to assess and improve the value of BLS's American Time Use Survey to researchers working on nonmarket accounting.

The panel will have two or three additional meetings in 2003; its final report is expected to be completed and published in 2004.

PREVIEWING THE FINAL REPORT

One of the main objectives of the panel's final report will be to provide practical recommendations on the measurement of nonmarket activity in a variety of areas the panel has identified as important. Each chapter in the final report will begin with a discussion of an identified issue area, considering its importance and the sense in which it constitutes an area of nonmarket activity. As noted throughout this report, in many of the areas the panel has chosen to explore, market activity coexists with nonmarket activity. Students pay tuition to attend universities (a market transaction), but there is no market transaction that captures directly the value of the time they devote to this endeavor. Nonprofit organizations may hire employees (a market transaction), but the wage these employees receive may well not reflect the value their time would be assigned if devoted to for-profit endeavors, and the value of the time contributed by unpaid volunteers is nowhere reflected.

Central to each chapter will be a discussion of the conceptual issues related to the measurement of nonmarket activity in the area it covers. Each chapter will discuss how one might measure input quantities—both market and nonmarket—and the resulting nonmarket output quantities. The transformation of inputs into outputs presupposes, of course, a production technology, and in a number of the chapters this technology will also be discussed.

Another matter that will figure prominently in each chapter is how to attach values to specified quantities of nonmarket inputs and outputs. The panel's approach, in essence, is to seek prices that can be assigned to the identified quantities. In some cases, a satisfactory price measure or measures can be identified; in other cases, available information may be unsatisfactory, either because of deficiencies in its conceptual foundations or because it is insufficiently precise to be useful in the implementation of an accounting scheme. Each chapter will devote substantial attention to the discussion of whether and how satisfactory price measures might be developed. In many cases, researchers have already developed input or output valuations of the sort the panel contemplates.

On the basis of these topic-by-topic evaluations, the panel will recommend which areas should be considered as high priorities for the development of nonmarket accounts and which areas should be considered as lower priorities. Finally, for those areas in which the panel believes further work holds promise, the individual chapters will include recommendations about the ideal data for the intended purpose and steps that might be taken toward the production of such ideal data—or at least better data—for the United States. These recommendations concerning specific steps to improve the data available for measurement of these important areas are, we believe, likely to be among the report's major contributions.

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Objectives, Scope, and Priorities

IMPORTANCE OF ACCOUNTING FOR NONMARKET ACTIVITY

Researchers and policy makers have long recognized the importance of the national economic accounts as a useful data system. Professional economists, among others, have also been well aware of the accounts' inadequacies in providing meaningful measures of economic and social performance. Additionally, it has been recognized that improved accounts are essential for increasing the accuracy of productivity, price and real output statistics—particularly in difficult-to-measure areas such as health and education.

These observations notwithstanding, large and well-funded research efforts to address inadequacies in the national accounts have been relatively few. One such effort was the Measurement of Economic and Social Performance project at the National Bureau of Economic Research, from 1972 to 1977, funded by the National Science Foundation. First under the direction of F. Thomas Juster and, later, Richard Ruggles, the project carried out research on a number of specific limitations in the conventional economic accounting system.[1] Topics studied included the system's lack of usefulness for describing income distribution among households and between geographical regions; its failure to account for many production and investment activities taking place in households; its treatment of many "intermediate" and investment activities as if they were "final" consumption activities; and its overly simplistic accounting for the complex fabric of federal, state, and local governmental activities.

[1]Other project members included John Kendrick, Robert Eisner, Robert Lipsey, John Quigley, Michael Gort, Milton Moss, Nancy Ruggles, and Henry Peskin.

Another area inadequately handled in the national accounts involves the services generated by the natural environment—both the negative contribution of pollution and environmental deterioration, and the positive contribution of these services to well-being when conditions are improved. Air and water quality, for example, are linked to the productive capacity of a society, broadly defined, but the national accounts do not adequately measure the value of investment or disinvestment in these assets. Expenditures to improve air or water quality are counted as contributing to national output (provided such outlays are counted as final demand expenditures), but they are valued at the cost of the inputs used rather than as the value of the output produced. And, if a business increases its production, the value of that production is measured, but there is no offset in the accounts to reflect any adverse effect that the production process may have on nearby streams or on ambient air quality.

Environmental accounts have been developed at the Bureau of Economic Analysis (BEA) and elsewhere in order to better reflect, relative to the National Income and Product Accounts (NIPAs), interactions between the market economy and the natural environment. And such efforts as the System of Integrated Environment and Economic Accounting (SEEA) and the Environmental and Natural Resources Accounting Project (ENRAP) have in fact been used—by the Environmental Protection Agency, the U.S. Department of Agriculture, the state of California, and others—to develop data for various estimation and policy development purposes. Even developing countries as Indonesia and the Philippines have used environmental accounts to help set policy priorities. In these cases, the interest was less with the accounts per se, and more with obtaining comprehensive data. The accounting system permitted the generation of consistent data sets at relatively low costs.

More generally, the omission of many nonmarket activities from the national accounts may significantly distort policymakers' sense of economic trends. A fuller accounting of national production might lead, for example, to different conclusions regarding the level of output today relative to some earlier period, or in the United States compared with another nation. This deficiency—that the NIPAs fail to consider the full complement of inputs and outputs, specifically those that are non-marketed—would be less important if marketed inputs and outputs were independent of non-marketed inputs and outputs, but they are not.

To take one frequently cited example, failing to account for the output produced within households may lead to misleading comparisons of economy-wide production, as conventionally measured. The female labor force participation rate in the United States has grown enormously since the early part of the 20th century. To the extent that the entry of women into paid employment has reduced the effort women devote to household production, the long-term trend in output, as measured by gross domestic product (GDP), may exaggerate the true growth in national output.[2] Similarly, the lesser relative importance of home production in the United States as compared to many developing countries may exaggerate its national output relative to theirs. Perhaps less well

[2]A complete answer to the question of how the growth in female labor force participation has affected the true growth in national output would depend not only on the shares of women performing market work versus unpaid household work, but also on the relative productivity of each sector. As is discussed later in the chapter, this argues for the importance of including outputs in addition to inputs in the design of any potential nonmarket accounts.

recognized, there may be similar problems with the measurement of national output over the business cycle. If people who lose their jobs during cyclical downturns take advantage of their absence from paid employment to increase the effort they devote to home production, the short-term decline in national output may be somewhat dampened relative to that measured by GDP.

Knowing more about the level and distribution of nonmarket activity may also change perceptions of the extent of economic inequality among U.S. households and how that has changed over time. This, in turn, may affect where welfare and poverty lines are drawn (Michael, 1996). Policy interventions that have positive effects on marketed outputs could have offsetting negative effects on nonmarketed outputs which, if they had been properly anticipated on the basis of more complete historical data, could have affected policy choices.

The conventional accounts also neglect significant amounts of nonmarket investment, such as the increases in human capital that result from education and job experience. There are a number of reasons why producing satellite accounts for human capital and formal education would be of use for the research and policy communities. First, because human capital, and particularly K-12 education, is such a large component of the capital stock, separate human capital accounts would add information that would be helpful for interpreting investment, capital, and ultimately economic growth as measured by the traditional accounts. Second, the education sector is large and important in its own right. Spending on education accounts for a substantial share of both state and local government budgets, and private educational services are a $30 billion dollar a year industry. Understanding trends in output and productivity growth in the education sector therefore is of interest. Third, the opportunity cost of students' time is an important aspect of investment in human capital, and is missed in the traditional national income accounts. The value of time students spend in school is a nonmarket input, the value of which likely dwarfs the expenditures on marketed inputs associated with the educational process. Further, the accounts do not measure the value of additions to the stock of human capital produced by educational investments, even though that value is probably larger than the combined value of all measured investments in physical capital.

It is also worth keeping in mind that the national economic accounts serve multiple purposes. For example, health accounts could be designed to measure health improvements, in which case they would need to keep track of a wide range of factors, including things like diet and the environment. Optimally, expenditures and outcomes would be tracked so that changes in well-being associated with different actions could be monitored; in turn, expenditures (both private and public) could be effectively managed to achieve desired outcomes. Additionally, some version of health sector accounts needs to be designed in the best way to deflate expenditures for productivity measurement and real GDP. Currently, it is difficult to even determine if medical prices are rising or falling, since output quality is poorly monitored for the sector. How various uses of the accounts are weighted, in terms of importance, will affect decisions about what types of account to construct.

SCOPE OF AUGMENTED ACCOUNTS

An overarching question for nonmarket account design is scope—where in the range of economic-related activities to draw the border of inclusion. This question raises

others: Should the expanded accounts be constructed as satellites or integrated with the core accounts? Should the objective be primarily a welfare measure or an output measure (and to what extent are the two really detachable)? We return to these questions below, but first address the question of which goods—near market, public, intangible assets, etc.—are to be included in an extended (initially experimental) set of accounts.

The scope and coverage of national accounting systems has been changing since the initial efforts by William Petty to estimate England's national income in 1665.[3] By modern standards, Petty's accounts, albeit based on fragmentary data, were fairly wide in scope, covering, besides purchases in the market, imputed values for household production (Kendrick: 285). Far more narrow were the concepts of the French physiocrats, who believed that only agriculture produced a true net product, or the concepts of Adam Smith and Karl Marx, who believed that the only measure of a country's productive capacity was in its ability to produce material goods, that is, excluding services.

However, beginning with the writings of Alfred Marshall (1920) and A. C. Pigou (1920), the modern trend, in terms of a conceptual objective, has been to widen the coverage of national accounts to include all activities that generate "utility" or welfare, including activities that are not reflected in market transactions. Yet it is a matter of some dispute as to how far this trend should go. Issues of scope—coverage as well as classification—have been at the center of much of the modern debate concerning the adequacy of national accounting systems. In the remainder of this section, we offer some preliminary thoughts on where the boundary should be, beginning with a discussion of what is already included in the core accounts.

Nonmarket Coverage in the National Accounts

Pigou wrote that national accounts should include elements that reflect economic welfare and that can "be brought directly or indirectly into relation with the measuring rod of money" (Pigou, 1920, p. 11). He emphasized that the word "can" might mean anything from "can easily" to "can with mild straining" to "can with violent straining." National accounting practice in most countries leans far more toward those elements that "can easily" be measured in money terms than those that can be measured only with "violent straining."

For a variety of historical reasons, partly philosophical but more fundamentally practical, the national accounts produced by BEA generally exclude activities that do not involve a market transaction or produce a marketed output. There are exceptions—the most quantitatively notable is the imputation for the rental value of owner-occupied housing. That this imputation is based on assumptions that are approximately as crude as those for, say, valuing the time spent cleaning a house at the price a cleaning service would charge suggests that the delineation is not purely the byproduct of practical considerations.

Imputations are made for other nonpriced, nonmarketed entities. In the U.S. system of accounts, these include wages and salaries paid in kind, food and fuel consumed on farms, and the services provided by banks, insurance companies, and other

[3]The historical development of national income accounts has been surveyed by Kendrick (1970).

financial intermediaries that are not reflected in explicit service charges.[4] In addition to these items, which are (except for owner-occupied housing) relatively small in magnitude in the accounts of industrialized nations but may be large in the accounts of less developed economies, imputations are made for the services of capital and of the government. For example, in the U.S. accounts, an explicit adjustment is made to reported depreciation so that capital consumption allowances more closely reflect true economic depreciation. And national accounting systems have historically valued the services of government in terms of the costs of providing those services, though this is changing.[5]

These estimates clearly involve a process of valuing services that are not traded in well-defined markets. While rental markets do exist for many capital items, the value of the services of owned capital is not directly observable. Similarly, the value of freely provided governmental services to those consuming them is also not directly observable, although the cost of providing the services is.

One key characteristic of the nonmarketed items that are covered in conventional accounting systems is that their consumption is very closely related to the sales and purchases of marketed goods and services, making the estimation reasonably straightforward. For some nonmarket items, the imputation process is far more difficult, although these distinctions are a matter of degree. If "imputations procedures" always refers to data that are not directly observable, then it is clearly the case that the development of nearly all national accounting data, whether market, near market, or nonmarket, involves some degree of imputation.

Output Versus Welfare Measurement Goals

It is impossible to lay out a case for the appropriate scope of nonmarket accounts without specifying the measurement objective. Perhaps the most fundamental issue is whether the primary intent of the accounts is to provide a measure of national output or national welfare. A defense of either goal requires dealing with the thorny nature of how these two concepts—output and welfare—interrelate. The two cannot be disentangled completely. For example, defining "the output of interest" surely implies, in some sense, "the output that contributes to well-being." However, some goods that are welfare producing are not considered "output" in any conventional (accounting) way.

Some of the nonmarket activities currently unaccounted for can be categorized as output in a fairly narrowly defined way; for others, it is conceptually fuzzier. It seems clear that the value of household production should be included in an expanded account, even if the goal is limited to fuller accounting of national output. In contrast, tracking changes in the amount of time available for leisure or sleep may not be appropriate in such an account, though these factors certainly affect well-being (and, at extremes, productivity). These complications notwithstanding, a set of experimental accounts could

[4]The imputations for banking services are somewhat different than for the others in this list. In banking, there are observable market transactions that provide an estimate of the nominal value of banking output. However, imputations are necessary to associate that nominal output with the provision of particular kinds of services and to balance the double-entry account.

[5]In the United States, services for government also include depreciation. BEA is in the initial research stages of a project to measure government output independent of input expenditure.

be expanded under either guiding principle, although the expansion would surely be much broader and ambitious if the goal is to provide an accurate indicator of welfare trends.[6]

The idea of an augmented account working in an integrated way to track changes in welfare implies tinkering with the core accounts (at least as they would be used in the augmented version). Furthermore, it is not just a matter of where to draw the line; in some cases, the phrasing of the accounting objective may lead to opposite practices. For example, in measuring "output," one would likely want to include the value of parents' time transporting kids to school and other activities. The market value of hiring a driver might be used to place a value on this time (though there are alternatives, discussed below). As the amount of time driving goes up, so to does the value of this component of household production. Yet, as driving time increases, parents' welfare may actually decrease, as time is taken away from leisure and other utility-generating activities.

If the goal is to measure change in welfare as accurately as possible, the "intermediate" and "final" categorizations of many goods and services would need to be reassessed—as is done, for example, in the system of Nordhaus and Tobin (1972), in which certain "defensive expenditures" are subtracted from output totals. It might make sense to subtract such expenditures as crime prevention (e.g., home security or police protection) or even pollution cleanup because there is an underlying utility-based rationale for doing so. Often these expenditures are not intended to increase welfare; instead, they are intended to minimize welfare-damaging activities (activities that are not adequately measured in economic accounts).

Additionally, some goods that are welfare producing but not considered "output" in an accounting sense may interact with other nonmarket activities that are. For instance, leisure interacts with education—education leads to higher productivity and income; however, it may also be pursued because it yields more future leisure or to a more fulfilling kind of leisure. All this means that the distinction between an output account and a welfare account is not clear-cut and may, at best, provide only a guiding principle.

Alternatively, the accounting objective might be to measure income and output as fully as possible, with each account entry reflecting some aspect of economic well-being (see Nordhaus, 2002, p. 2). This assertion does not imply that the accounts or some portion thereof should necessarily "measure" human welfare. The fact that a nonmarket, welfare-affecting entity such as clean air may lack a market price and thus lack a natural money measure does not mean that it is conceptually dissimilar from more marketed elements that reflect economic welfare.

Restricting the coverage of the accounts in this manner does mean the exclusion of many factors that influence general welfare. For example, an account so defined will ignore changes in societal norms and values or trends in the connectedness of communities, except to the extent that such things affect elements that are or can be measured in money terms. In addition, while the destruction of environmental capital, such as natural forests or a particular plant species can be accounted for, the accounting will reflect only those environmental services perceived lost to present generations. In

[6]There is also the problem of determining whose welfare: there is no theoretic apparatus for aggregating welfare or establishing a "representative citizen."

principle, those in present generations can be queried or their behavior observed in ways that would permit placing a monetary value on such losses. Because the future cannot be observed, the value of lost opportunities to future generations would not be accounted for unless such future losses are also perceived to be losses to present generations.

One operational approach might be to make an item eligible for inclusion if it is possible to conceive of some procedure that would reveal the monetary value current generations place on it. Under this definition, a good like leisure would probably be considered in scope. Even such a seemingly noneconomic entity as "family disintegration" could enter the accounting structure if one could conceive of a method that revealed what society would be willing to pay to prevent such disintegration. Since our abilities to conceive of such procedures have increased in the years since Becker's seminal work on marriage and the family (e.g., Becker 1973, 1974), the boundary between those entries that are proper candidates for inclusion or exclusion as determined by that rule will undoubtedly change over time.

In contrast, one could preserve more of the "output-based" methodology. Such a decision would probably eliminate the leisure example above from the scope of coverage (either on its own or as part of a household account). The position would be justified by stating that the measurement goal should be a full accounting of national output, market and nonmarket, and not of happiness or well-being, the latter being a much more futuristic goal.

The output-emphasized position can be defended along practical measurement lines as well. Such activities as household production of education or cleaning services have market analogues and are (relative to leisure) more closely aligned with what is currently viewed as output in the accounts. Because improving output (and corresponding input) measures is a prerequisite to any of these visions for an expanded set of accounts, this is where the panel is directing most of its energies. However, the panel's final report will also assess prospects for progress for accounts characterized by a range of measurement objectives.

In sum, even if the goals for a set of augmented accounts are limited primarily to measurement of output—with home production probably being the clearest example—there is still plenty of work to do. Also, the range of activities that seem most amenable to convincing measurement involve input and output valuation methods that resemble those used in the current accounts. Moving toward a welfare measure implies harder work, especially in such areas as health and the environment, and also further deconstruction of current components of the National Income and Product Accounts (as used for the expanded account).

PRIORITIES FOR EXPANDED MEASUREMENT: KEY NONMARKET AREAS

The panel's final report will discuss a number of areas that should be considered for inclusion in a set of augmented accounts that would reflect more fully and more directly a range of nonmarket activities, including measurement of:

- household production and effect on the stock of human capital;
- investments in education and the resulting stock of human capital;
- investments in health and the resulting stock of health capital;
- selected activities of the nonprofit and government sectors;

- investments in the flow of new knowledge and the productive capacity thereby created; and
- social and environmental assets.

This identification of areas in which supplemental accounts might usefully be developed reflects several considerations. Each is associated with output that is both quantitatively significant and likely to have changed in relative importance over time.[7] The panel is also studying areas in which work is ongoing and data are developing and that involve conceptual issues relevant to nonmarket accounting more generally. The areas covered are also broadly illustrative of the range of issues one might expect to encounter in the creation of a complete set of nonmarket accounts. The panel is also working on cross-cutting issues that do not fall neatly into these sector-oriented chapters: Time use, for example, is a key concept tied to data issues on which the panel is focusing; specific activities, such as volunteerism, also apply to more than one of the identified sectors.

This list of areas is fairly comprehensive, but at least one clear candidate for inclusion has been left off. Some efforts to measure the value of nonmarket activities have assigned a value to leisure time (e.g. Nordhaus and Tobin). Though it is discussed in this report, the panel has tentatively decided not make leisure a priority for a number of reasons. The new American Time Use Survey (ATUS) will provide useful estimates of the amount of time individuals devote to leisure, and changes in those amounts would admittedly be very important in a measure of well-being (and it is probably possible to assign a value to it based on what individuals are willing to pay for it). Leisure, however, does not contribute to the value of goods and services produced; unlike time withdrawn from nonmarket production, time withdrawn from leisure is unlikely to entail foregone output, or to require the purchase of a substitute. The panel thinks it pragmatic to first consider expansion for experimental accounts in areas more closely resembling those in the core accounts. The panel would like to prioritize work that addresses deficiencies in "output" measurement, more narrowly defined, which implies setting a boundary of areas where prices in principle can be derived from market comparisons.[8]

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[7]The relative magnitude of a nonmarket variable is most relevant when the accounting goal is to produce a "better" GDP. However, even if the estimated effect on GDP is relatively small, it may still be very important for policy purposes. For instance, nonmarket environmental costs and benefits may be highly relevant to the Environmental Protection Agency when they are trying to develop regulations consistent with congressional objectives. If expanded environmental accounts can suggest policy targeting that can save billions of dollars, the developmental costs of such accounts will be worthwhile.

[8]Another area the panel considered that might satisfy these criteria is the underground economy, which includes illegal and other activities generating unreported income. These activities have close market equivalents and may be quantitatively important—and probably overlap with potential entries in proposed household accounts. However, the panel decided that underground activity was too large a topic to cover here. Additionally, most activity in the underground economy involves market transactions, albeit illegal ones, and is therefore, in some sense, outside the scope of the panel's charge. We note that estimates of the illegal economy are made elsewhere (e.g., Feige, 1997).

As noted on the list, the panel considers the nonprofit and government sectors to be areas of concern, given their size in the economy. An essential characteristic of these sectors is the extent to which they produce public-good outputs. Most of these outputs can be cross-classified in other sectors, such as health and education; as such, it is not clear what, if any, parts of these activities should be partitioned off in a separately designated nonprofit account.[9] Additionally, while the panel would categorize accounting for natural resources and the environment as a top priority, it will likely spend less time on it as many of the key issues were addressed in *Nature's Numbers* (National Research Council, 1999).

The connectedness of many of the nonmarket "sectors" makes clear-cut classification of activities impossible. For instance, there is blurriness between household production and other sectors. Additions to the stock of human capital may flow not only from investment that occurs in the formal educational sector, but also from investments that occur in the home (e.g., studying or reading to a child) and thus might be considered a form of home production. Similarly, improved health may result from better medical care, better education that contributes to better individual decisions about diet and exercise, or improved air and water quality, among other possible contributing factors. The full set of inputs to improved health outcomes cannot be precisely identified, and some of these inputs also may contribute to other desirable outputs.

The panel sees no realistic alternative to considering the different areas of nonmarket activity separately, but nonetheless recognizes the need to delineate the interactions and complementarities among these different areas as the development of supplemental nonmarket accounts proceeds. It may make sense to organize these accounts based, in part, on the methodological complexity. For example, the panel has discussed the idea of a limited scope household account, which would only include such activities as consumer services (e.g., laundry or meal preparation, basic child care) that result in output that can be relatively easily compared to market-based alternatives. This approach would leave more difficult-to-value activities (e.g., studying or exercising) that might be classified as investment to be dealt with elsewhere, perhaps in the human capital or certain health accounts. In these areas, constructing an account requires decomposing a much more complex production function, and valuation of both inputs and outputs is harder. For example, exercise may be an input in human capital formation (and health), but it may also have a consumption component. Degree-of-difficulty considerations might also suggest a more narrowly defined education account, limited to time spent on formal education tasks, with many inputs taken as given.

Measurement in many of these areas, even the conceptually simpler ones, will be difficult. An important part of the panel's work involves evaluating promising measurement approaches and determining if they could be implemented, wholly or in

[9]BEA will introduce a separate accounting for nonprofit institutions serving households as part of its benchmark revision of the NIPAs for 2003. Meade et al. (2003) describe the new treatment in the accounts. Additionally, the Johns Hopkins Center for Civil Society Studies, working with the United Nations Statistics Division, has produced a new *Handbook on Nonprofit Institutions in the System of National Accounts*. The handbook, which was approved for distribution in March 2002, recommends that national statistical agencies develop a satellite account on the nonprofit sector that , among other things, estimates the value of volunteer labor used by these organizations.

part, using existing or planned data sources. Developing recommendations about new data that might be helpful and how they might be collected is also an important part of the panel's work.

3
A Conceptual Framework

It is the view of the panel that, as a general matter, the conceptual framework to be applied in accounting for nonmarket activity ideally should parallel that used in the existing national accounts. Using the national accounts as the starting point offers two basic advantages: national accounts have been scrutinized, reflecting extensive research and policy use for many decades; and the underlying principles are well tested, and practice shows they can be implemented. Additionally, many of the methodological questions about the augmented accounts have analogues and therefore answers in the national accounts (Nordhaus, 2002, p. 3).

The national accounts have proven extraordinarily useful as a vehicle for monitoring and studying the evolution of the economy. They have the intentional restriction, of course, that they do not systematically incorporate nonmarket activity.[1] It is this restriction that this panel is charged with addressing. But given the heavy reliance of policymakers and others on the existing accounts, we believe that any supplemental accounts that are developed will be most useful if the information they contain is as consistent as possible with the information in the core accounts.

What specifically does this imply? In endorsing the framework used in the existing national accounts, the panel is arguing for an approach that uses dollar values as a metric; seeks to value outputs at their marginal rather than their total value; and derives these marginal values wherever possible from observable market transactions. Each of

[1]Though, as discussed above, the Bureau of Economic Analysis (BEA) does measure services of owner-occupied housing, food consumed on farms, and certain financial services of banks and insurance companies. BEA also measures governmental services, though they are currently measured at cost and, thus from our point of view, incompletely. BEA is currently working to improve its method of measuring government services--see Fraumeni and Okubo (2002), which discusses measurement of full government services from capital.

these points is discussed below. Moreover, insofar as is feasible, the panel advocates adaptation of the double-entry structure of the core accounts for use in any supplemental accounts that may be developed. One implication of this last position is that every effort should be made to value outputs independently of inputs. The panel recognizes, however, that implementing such a structure for measuring nonmarket outputs will pose significant challenges, and that methodological compromises may be required during intermediate steps of the accounts' development.

INTEGRATING CORE AND SATELLITE ACCOUNTS—OR NOT

Ideally, an experimental set of expanded accounts would integrate market and nonmarket components. From this perspective, the System of National Accounts (SNA) may offer some lessons.[2] Though it does not endorse nonmarket accounts, a major feature of SNA is that it is a multi-element set of accounts linking production income, consumption, accumulation, and wealth.[3] Both the SNA and the National Income and Product Accounts (NIPA) allow for the possibility of satellite accounts; for example, in the early 1990s, BEA developed the Integrated Environmental and Economic Satellite Accounts which could be integrated with the NIPA accounts.[4] This integrated feature has become a stated goal of the U.S. accounts and would, if feasible, also be a desirable element in augmented nonmarket accounts (Nordhaus, 2002, p. 4).

A less ambitious, simpler alternative—and perhaps necessary first step—might be to construct free-standing accounts for individual nonmarket components. Under this alternative, the core accounts would remain much as they are, and the satellite accounts would provide alternative perspectives on selected areas of activity—such as household production, human capital, and health. The shortcomings of this "interim solution" are obvious: Given the overlap of nonmarket areas, with each other and with market areas already captured in the national accounts, a system that fails to integrate core plus satellite accounts would produce numbers that do not add up to a meaningful total and would be inconsistent with current practices at BEA—the virtues of which have already been enumerated.

One advantage of the nonintegrated approach, relative to a fully integrated one, is that it might allow experimental accounts to be produced much more quickly. However, for various nonmarket areas, experimental work might follow heterogeneous approaches—particularly with regard to valuation methods. The nonintegrated approach would also allow work in each area to proceed at its own pace as data and concepts evolve, without seriously disturbing the existing accounts. This seems to be the thinking behind the new satellite household production account in the United Kingdom, for instance.[5]

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[2]SNA guidelines were prepared by the Inter-Secretariat Working Group on National Accounts, a joint effort by the International Monetary Fund, the European Union, the Organization for Economic Co-operation and Development, the United Nations, and the World Bank. The effort was mandated by the Statistical Commission of the United Nations to oversee international coordination in the development of national accounts

[3]Another research project under way at BEA would create wealth accounts by integrating the Flow of Fund Accounts with the National Income and Product Accounts.

[4]Congress directed BEA to suspend this work in 1994.

[5]For a description of this account, see http://www.statistics.gov.uk/statbase/Product.asp?vlnk=9338 [4 April 2002].

The more general question that the panel must consider is whether nonmarket accounts should be allowed to expand only in terms of the boundary of economic activity covered or also in terms of methodology. One attractive feature of working under an "experimental" umbrella is the flexibility that it can give to explore different layers of accounting approaches, which may not all be consistent with those underlying NIPA, but may yield interesting results. It might be possible, also, to tailor nonintegrated satellite accounts more specifically for the uses to which they are most often put. For example, environmental accountants might choose to include consumer surplus values for some purposes, while researchers working on household production accounts might prefer valuations at the margin. We address this consumer surplus question below.

An interim approach could produce very useful data for research and policy purposes, while avoiding several difficult design and data issues. Perhaps the most obvious obstacle to producing a fully integrated account is the nonparallel level of maturity of underlying data and concepts currently available for accounting in various nonmarket areas. Because of dissimilar conventions in valuation methods and accounting objectives, it is currently impossible to construct an integrated set of nonmarket accounts. The literature on household production emphasizes imputations of values for productive inputs. For many areas of household production, little has been done to define, much less measure, output, though work (e.g., Ironmonger) is proceeding on this front. In health and environmental areas, good data on expenditures exist for many inputs, and researchers are attempting to quantify outcomes and output (and, sometimes, consumer surplus values are included).

Integrating nonmarket and core accounts would also require revision to the current framework (though nothing precludes concurrent calculation of the standard accounts in the traditional way). For example, shifting selected capital and consumption goods currently included in the "market" sector into the household sector might make sense conceptually. However, creating an alternative national account that includes a broadly inclusive household satellite would require some shifting of the way goods and services are categorized. Satellite accounts do allow for flexibility: one can add to and rearrange the structure of the existing accounts to show what an expanded, redesigned, and integrated account would look like (see, for example, Landefeld and McCulla, 2000).

Economic logic—and specifically the idea that there is a household production function—suggests that household capital and raw materials should be treated as intermediate rather than final consumption. Money spent on food, cleaning supplies, and household appliances all are counted as part of personal (final) consumption but are also inputs to household production. Similar examples arise in the health, education, and environmental cases. But, in most cases the panel is exploring, the accounts do not reflect the full range of inputs used in the production of the output of interest. And in no case is the value of the resulting output, whether goods and services produced for current consumption or the creation of a productive asset, measured fully and independently of the value of the inputs used in its production.

THE INPUTS/OUTPUTS PUZZLE

Virtues of the Double-Entry Bookkeeping Approach

One of the strengths of the core accounts is the double-entry bookkeeping used in their construction. Independent estimates of total (marketed) output are developed on the

basis of the dollar value of output sales, on one hand, and the dollar value of payments to factors of production, on the other. At least in principle, these two sums should be equal. If the output estimated using product-side data differs significantly from the output estimated using income-side data, it is a signal that something has gone awry.

Things are more complicated in the nonmarket context. Absent market transactions, one cannot simply add up money spent on goods and services and money flowing to factors of production to yield product-side and income-side estimates of the value of output. And in contrast to the market environment, there is no strong reason to believe that inputs will be allocated to equate value marginal products across different uses. An estimate of the output from a nonmarket activity based on the value of the inputs employed in that activity may either overstate or understate the output's true value. In a competitive market, one can expect that an inefficient firm—a firm at which the value of the resources employed exceeds the value of the output produced—eventually will be driven out of business. An inefficient household, however, may continue to exist so long as its members remain alive. Valuing such a household's output using information on input quantities and prices thus could overstate the value of its output. On the other hand, capital market constraints, such as might arise from lenders' reluctance to finance the production of assets that cannot be marketed and therefore cannot readily serve as loan collateral, may lead to underinvestment in certain nonmarket activities. Capital market constraints may, for example, lead to underinvestment in education which, in turn, would imply that the marginal value of time devoted to education may exceed the marginal value of comparable time devoted to other uses. Valuing educational output based on the costs of the inputs employed thus could lead to a figure far below the true value of the asset produced.

Though the sum of the values of the inputs used to produce a nonmarket output may provide a poor estimate of the value of that output, this has commonly been the practice for measuring some areas of nonmarket production. It is, for example, by far the most common approach in the literature on the value of government services or of home production (see National Research Council, 1998, on the former, and Holloway et al., 2002, on the latter). If they can be accurately measured as they relate to production, input-based output valuations are a clear improvement over ignoring nonmarket activity altogether. Only with an independent measure of the value of nonmarket output, however, can one hope to address many of the questions for which nonmarket accounts could be most valuable.

Additionally, for some accounts, it may be reasonable to lift the requirement that input and output sides must balance—it is certainly possible to envision certain nonmarket activities leading to a "social profit."[6] In contrast to the core market accounts, double-entry bookkeeping in the sense of trying to reconcile sums of output-based values and input-based values for the nonmarket accounts may be a fruitless exercise.[7] The

[6]If possible, it would be informative to explicitly estimate "operating surplus" or "social profit." For example, in household production, one could deduct the imputed labor, capital, and intermediate input costs from the separately imputed value of laundry, decks built, etc. The operating surplus (or loss) could provide a signal of external benefits/costs or of measurement problems. From a public policy viewpoint, such estimates could be used to allocate of resources. This social profit issue is also related to whether or not one is interested in total or marginal values of output, which is a separate and controversial question (discussed below).

[7]Indeed, it is frequently a difficult exercise even in the market accounts; there are certainly many areas for which input and output estimates are not independently derived.

panel nonetheless believes it to be worthwhile to preserve, at least as a goal, a double-entry structure for these accounts. Having independent estimates of the value of the output produced and the value (at market or quasimarket prices) of the inputs used in production allows one to identify shortfalls or surpluses in the returns to those inputs in different nonmarket activities. Independent measurement of the value of the output produced, as distinct from the inputs employed in production, is also essential to analyses of productivity and economic efficiency.

Ideally, then, both inputs and outputs to nonmarket production would be tracked. It is clear, though, that for some areas (e.g., household production), input and output measurement will not develop in tandem. Advances in the collection of time-use data will move work forward in terms of identifying and measuring productive inputs, and it might even provide information about outputs.

In sum, the panel believes there to be a strong argument for adapting the double-entry bookkeeping that characterizes the existing national accounts for use in any supplemental accounts relating to nonmarket activity, even though such double-entry bookkeeping generally will not serve the exactly same role in the supplemental accounts as it does in the core accounts.

Monetary versus Nonmonetary Units of Measurement

One question that has been debated in the nonmarket accounting literature, particularly abroad, is whether the development of supplemental accounts should be structured around the reporting of physical measurements (or other quantity indicators) or whether the goal should be to report input and output values denominated in monetary units. This question has obvious links to the question of whether supplemental accounts should be designed as a system of multiple indicators for the areas they cover or whether they should be designed to include a summary measure of output for each area.

In the market sector, monetary aggregates generally are the most accessible measures of the level of activity—dollar values of sales, dollars paid as wages and salaries, and so on—and measuring quantities often is more difficult. By definition, however, nonmarket activity does not involve monetary transactions. This means that data on monetary aggregates that form the building blocks for traditional national income accounting are simply not available. Instead, available data may consist of physical or other quantity indicators of the level of activity, such as hours of time devoted to home production, student-years of education provided, or ambient concentrations of various air pollutants.

On one side are those who argue strongly that no nonarbitrary way exists for assigning monetary values to a heterogeneous set of nonmarket inputs or outputs, and that any such assignment unavoidably will reflect value judgments that are inappropriate for a statistical agency (see, e.g., van de Ven et al., 1999, p. 8). The counterposition holds that, without an attempt to assign monetary values to the quantity indicators that are the basic unit of measurement for nonmarket outputs, it will be difficult for policymakers to digest and use the information. Policymakers will want to assign monetary values: rather than pretending this will not happen, it is incumbent on specialists to provide the best possible methods for the inevitable calculations. Another argument for attempting to assign monetary values to quantity indicators is that the effort filters out indicators that may be of minor economic importance. One problem with purely physical accounting systems is

that, useful as they may be for some research topics, they tend to be encyclopedic and difficult to comprehend.

It is the panel's view that, to the maximum extent possible, nonmarket inputs and outputs should be valued in dollar terms. The usefulness of this conclusion depends on the extent and accuracy with which monetary values can ultimately be assigned to the inputs and outputs in question. In order that such assignments be as objective as possible, the panel favors basing these valuations wherever possible on information derived from the terms of observable market transactions or their analogues. And, even when it is difficult to base valuations on market transactions, it is important that valuation methods be, in principle, reproducible by independent observers. This judgment notwithstanding, the panel recognizes the difficulty of finding clear market substitutes for certain goods and services and of estimating the ways in which market values may deviate from social welfare because of externalities and other market imperfections. The panel will likely place higher priority on areas of nonmarket accounting for which valuation can draw from market comparisons.

Classifying Goods and Services

As noted above, a key feature of the underlying framework of the national accounts is that the aggregated cost of inputs can be checked against the aggregated price of outputs. In some cases this classification is relatively clear-cut (steel input into an automobile output); in other cases (textbooks), it is not. Several efforts to modify or otherwise expand the national accounts have originated from the belief that supposed misclassifications in the present accounts give a false impression of economic activity. For example, several commentators have argued that at least some portion of governmental activity should be properly treated as an input to business (e.g., protection and inspection services) rather than an output of the economy, as is current practice.[8] Similarly, commuting costs and other work-related consumer expenditures could be viewed as purchasing inputs to productive activity rather than as purchsing output. Even if there is agreement that a particular entry does contribute to the economy's final output, ample room exists for debate about whether the output is more properly classified as investment than as consumption. Researchers at BEA have recognized this issue and changed the way they classify some things: for instance, BEA (and the SNAs) now recognize computer software as investment rather than as an intermediate expense.

As with market accounts, goods and services must be systematically classified in order for a double-entry approach to work and to make the accounts useful for certain types of analyses (e.g., productivity and efficiency). Classification is not always easy in market-oriented activities (consider banking, for example), much less nonmarket ones. Defining and measuring output is perhaps the central issue in economic measurement, not just nonmarket accounting and, as such, represents the most important research area in the field.

[8]These views, as well as the general issues of classification, are discussed in Conference on Research in Income and Wealth (1958).

A related question is how to count public goods and externalities in nonmarket accountts.[9] Some externalities are captured, often indirectly, in the core accounts—as in the example of pollution generated by an industrial firm leading to a reduction in agricultural production. Conceptually, externalities should also be included in nonmarket accounts, as such factors affect that which we are trying to measure, whether it is described as output or welfare. Externalities often flow across the market-nonmarket border, however, creating difficult measurement and data issues. It may be necessary for appropriate accounting of environmental externalities to remove from consumption certain purchases of goods whose only purpose is to defend against such externalities. As desirable as this may appear (after all, why should such defensive outlays be added to the body of more desired goods and services?), to do so raises troublesome problems regarding the classification of "final" as opposed to intermediate input goods.[10] The problem is that nearly all "final" expenditures can be interpreted as "defending" against something and thus be reclassified as inputs. As Jaszi wrote, ". . . food expenditures defend against cold and rain, . . . medical expenditures defend against sickness, and religious outlays against the fires of hell." (Jaszi, 1973, p.). Indeed, one could imagine a simple economy without investment or governmental activity in which labor is viewed as the "output" of the household sector and consumption the "input." Under such a view, there would be no final expenditures, no consolidated account, and none of the usual, well-known account aggregates such as gross domestic product (GDP). Similarly, in a more complex economy if all "final" expenditures were interpreted as "defending" against something, there would be no GDP.

Jaszi's observation serves to highlight the extent of the problem—that there is no clear conceptual distinction between intermediate and final consumption from the standpoint of all potential uses—but it does not provide a clear solution.[11] In view of the above arguments, it clearly is not useful to declare all consumption as "intermediate." But simply following tradition and its often arbitrary distinctions (e.g., a refrigerator installed in a home is a consumption good; installed in a supermarket, it is an investment good) is particularly unsatisfactory in the effort to expand the accounts to include coverage of nonmarket externalities.

One possible approach, for the environment example, might be to exclude from consumption totals those outlays whose purpose is to defend against environmental damage. In practice, however, it may not be possible to make this adjustment since it is

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[9]A public good is a commodity or service whose benefits are not depleted by an additional user and for which it is difficult or impossible to exclude a person from its benefits, independent of whether or not they are willing to pay for it (e.g., national defense). An externality is an activity that either damages or creates an incidental benefit to others with no corresponding compensation paid by those who engage in the activity (e.g., a firm pollutes a river it does not own but that is used by others).

[10]These problems are eloquently raised by George Jaszi (1973) in his comments on Juster (1973).

[11]In contrast, the NIPA does have "rules" that are relatively objective and do not involve item by item "choosing:" (1) All expenditures in markets "count" (as gross output, intermediate output, or value added in the industry accounts, or if they are final in the NIPA accounts). If market agents purchase the goods and services, the market values that they place on those goods (and make no judgments about externalities, base states, etc) are accepted. (2) All purchased goods and services are treated as final expenditures if they are purchased by consumers or government, as are all investment goods (capital goods that typically last more than a year) purchased by business. All exports are treated as final, as are imports, which are subtracted to avoid double counting.

often difficult to determine the ultimate purpose of any particular consumption item. A crucial problem is jointness of purpose: an air conditioner may defend against air pollution, but it also cools the home.

Measuring Quantities

Dollar values are relatively easy to obtain for the market inputs to nonmarket production. If one wants quantity indexes for these market inputs, they can be constructed by using appropriate price indexes as deflators for the nominal expenditure data. In contrast, for both nonmarket inputs and nonmarket outputs, quantity measurement will often be a necessary first step in the development of monetary valuations.

Even in the case of market inputs, complications arise. Purchases of capital equipment by households, for example, are treated in the core accounts as purchases for final consumption. But measuring the inputs to household production requires a measure of the stock of consumer durables. To create such a stock estimate, one must combine information on spending for such items over time with information on the useful life of dishwashers, refrigerators, vacuum cleaners, washing machines, and other capital equipment used in home production. Although there are practical difficulties that complicate estimation of the stock of capital equipment used in home production, the basic approach is well developed.[12]

An especially important nonmarket input on which, until very recently, quantity data have been lacking is the time devoted to nonmarket production. Fortunately, the American Time Use Survey (ATUS), launched at the start of 2003 by the Bureau of Labor Statistics, should go a long way towards filling this gap.[13]

The ease with which the quantity of nonmarket outputs can be measured varies widely. Relatively good data are available, for example, on the educational attainment of the working-age population, which provide a starting point for quantifying the output of the educational sector. Changes in mortality rates are similarly well documented and may provide a basis for quantifying changes in the health status of the population. In other cases, considerable creativity may be required to measure the quantities of nonmarket outputs, and doing an adequate job ultimately may require the collection of new data. Tracking air quality would require better measures of the pollutants to which the public is exposed and of the costs they impose. To track the output (narrowly defined) of the household sector, for example, one would need data on such things as meals prepared or loads of laundry washed and dried.[14] But at least in principle, it is possible to see how this task might be approached.

For much nonmarket activity, measuring the output side accurately is a bit more speculative. Data and methodological advances will continue to improve measurement of

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[12]This is a case for which the BEA already maintains the desired data series, albeit not as a part of the core accounts.

[13]The ATUS is described in some detail on the BLS website: http://www.bls.gov/tus/home.htm [7 April 2003].

[14]More thought needs to be given to what productivity measures mean when they are based on market substitute valuations. In the absence of direct measures of the output of nonmarket activities, one might impute them from observed market activities; but in such cases, productivity measures for nonmarket activities may simply recover the imputation scheme.

nonmarket outputs. For household production, one approach might be to state assumptions for the underlying production functions that allow the value of this output to be assigned to capital, raw materials, and labor.[15] Assuming any linear homogenous production function with constant returns to scale—a Cobb-Douglas production function would be an example—the cost of household capital and raw materials used up can be subtracted from the value of output, and the remainder of the value assigned to labor. Taking the example of laundry, a labor input-based method tallies the number of hours devoted to laundry and multiplies these by a market-determined wage, either the cost of hiring a domestic servant to do laundry or the opportunity cost or predicted market wage of the person doing the laundry (these methods are discussed in the next section). An output-based method calculates the total amount of laundry done, estimates what it would cost to have it done commercially, and assigns that value to the household. This value is assumed to be the product of household capital (a washing machine and dryer), raw materials (electricity, soap) and labor hours.

The output-based component of the accounts recognizes the importance of technology, which the input-based approach does not. A simple example illustrates the problem: household 1 has a washing machine and dryer and spends 1 hour doing laundry; household 2 does not have a washer and dryer and requires 2 hours. A time input-based calculation would conclude that, in comparison with household 1, household 2 produces twice as much output in the form of laundry services, which is incorrect. The output-based calculation recognizes that the nonmarket work time is more productive when combined with greater household capital, which is more consistent with the assumptions typically made regarding valuation of market output.

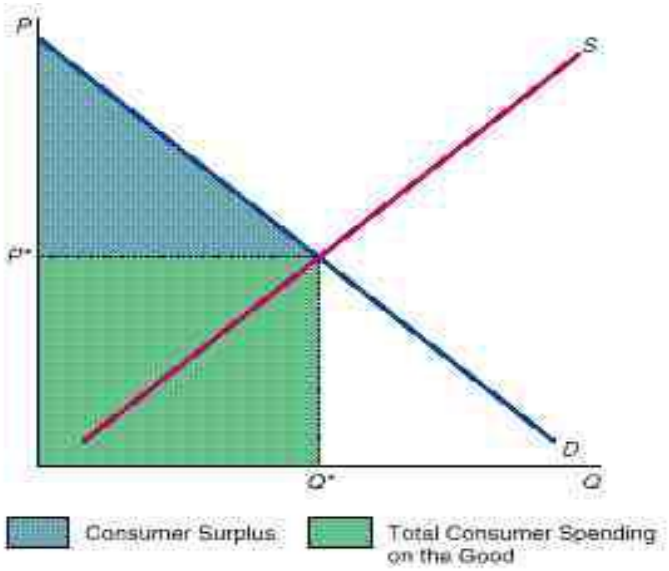
Marginal Versus Total Valuations

Attaching dollar values to nonmarket inputs and outputs, as the panel favors, leads to additional questions. Key among them is the issue of whether output valuation should always reflect marginal valuations or whether total valuations might sometimes be defensible.

In the case of a product or service sold in a competitive market, the price is set at a value that equates the cost of producing and the value of consuming the marginal unit of output. In a standard supply-and-demand diagram, shown in Figure 3-1, a value of p^* is assigned to each of the Q^* units of output, for a total market valuation represented by the dark-shaded rectangle. The total value to the consuming public of these Q^* units of output, however, is the larger, total shaded, area. The difference between these two areas, the blue triangle, is the consumer surplus associated with the consumption of Q^* units of the product or service in question at a price p^*.

[15]There may also be a consumptive (welfare-enhancing) component that is joint with the production of market substitutes by the household. For example, someone may enjoy the activity of painting a deck or mowing the lawn.

FIGURE 3-1



The panel proposes that, insofar as possible, output should be valued on the basis of the value of the last (marginal) unit of output produced. In other words, valuing nonmarket output should be based on the market price at which it could be sold, were it possible to develop a market for the output in question. This preference particularly applies to any accounts that are ultimately intended to be a component of a new version of GDP that more broadly captures nonmarket activity. This proposal is tentative: the panel may reconsider if it finds areas in which pushing too hard in this direction creates unacceptable measurement errors or has little policy value. As noted above, the panel may be willing to sacrifice some consistency and the ability to integrate some sectors, especially in the early stage of developing nonmarket accounts, if so doing produces useful results for policy.

One reason for preferring a marginal valuation approach—which means excluding the consumer surplus associated with output—is that it would make the resulting satellite accounts more comparable with the core national accounts, and more amenable to a double-entry accounting framework, the advantages of which have been noted. Additionally, allowing for inclusion of consumer surplus also raises what Nordhaus (2002, p.15) calls the "zero problem," illustrated by the following example:

> . . . if we introduce the consumer surplus of water consumption, then we need to integrate the marginal surpluses between some "zero" level and current output. . . . Is it literally zero water (in which case consumer surplus is essentially infinite)? Or is the level in pre-industrial times? If the latter, should pre-industrial times relate to the 1700s, when water in the U.S. was plentiful? Or to the time when humans first crossed the Siberian peninsula, when ice cubes were plentiful but water was scarce? Moreover, if we pursue consumer surplus in too many areas with relatively low "zeroes," we will undoubtedly find ourselves with multiple infinities of output and income.

The case for marginal valuation is not open and shut, however, and the panel acknowledges the tradeoffs inherent in this choice. While total value estimates would

introduce a harsh inconsistency to the accounting framework, they can be extremely useful for policy analysis. For many applications, such as assessing the economic efficiency of potential policies, it may be the total value—or the change in the total value—of a nonmarket output that one would like to know. Cost-benefit analyses of increased subsidies to higher education or increased pollution control expenditure, for example, rest on an estimate of the total return the increased spending would produce. For these purposes, one does not want estimates devoid of consumer (or producer) surplus.[16] Similarly, one can envision a version of the health accounts designed to capture consumer surplus. In other sectors, such as national defense, which is now valued at cost, it may not even be possible to calculate a meaningful marginal value.

This line of reasoning does not mean that the national accounts (even an experimental version) is the appropriate place for developing "total value" data; and this has implications for discussion of the policy uses of satellite accounts. If one accepts that, at least as a long run goal, it is undesirable to introduce inframarginal valuations into the accounts, it becomes clear that nonmarket accounts are not a substitute for the data required in benefit-cost analyses. In initiating development of nonmarket accounts, however, there is a practical motive for flexible thinking. An emphasis on the "management" role of accounting data, at least in areas for which it is difficult to estimate marginal valuation, may allow for higher degrees of "impurity" in the accounting effort.[17] Given the cost of data development and the scarcity of resources for such purposes, any practical nonmarketing accounting effort will have to face compromises. For example, it may be almost impossible to generate marginal valuation estimates of pollution and environmental services. Virtually all the valuation techniques in the literature generate estimates that include consumer surplus. Acknowledging the management role implicitly demonstrates that the panel places value on the nonmarket accounting effort, as well as on the accounts themselves. Nonmarket accounting deserves support even if the likelihood of quickly generating a complete and consistent set of accounts appears slim.

Valuation in the Absence of Markets

In many cases (though not all) pricing the inputs to nonmarket production is an easier task than pricing the resulting output. Some inputs are marketed inputs; as already noted, it should be relatively straightforward to assign these a dollar value.

Valuing nonmarket inputs raises different issues. Consider, for example, the valuation of unpaid time devoted to nonmarket production. One possible approach is to value nonmarket time at the opportunity cost of the person performing the nonmarket activity. Alternatively, this time might be valued at market substitute prices—the wage that would be paid to a person hired to perform the task in question.

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[16] And, in such an analysis, one would probably also value the costs in terms of the consumer surplus lost from other private or public goods for which the tax receipts might have otherwise been used.

[17] The "management" purpose of nonmarket accounting involves transformation of the conventional systems in order to improve their usefulness as a tool for forecasting, analysis, and policy simulation. This stands in contrast to efforts designed to provide a better indicator of social performance than is currently provided by conventional economic indicators such as GDP. These approaches look to the economic accounts as a means of "scorekeeping"—allowing for the comparison of economic and social performance over time or between countries.

Appropriate choices may vary with circumstance. For some types of household activities, researchers have favored valuing the time devoted to production at the market wage that would be paid to someone hired to perform the work in question. In contrast, time devoted to investment in education generally has been valued at the opportunity cost of the person in whom the investment is being made. But there are many (thoughtfully rationalized) inconsistencies in the literature. For example, one might assume that the time of a college-educated person who chooses to prepare a meal rather than hiring the job out is no more valuable than the time spent by a high school drop for the same task; in this case, the market replacement valuation may be appropriate. In contrast, a parent with a college education may very likely do a better job of developing a child's verbal skills or helping with algebra homework; in this case, the opportunity cost approach could be justified. In either case, however, there is a market wage—whether the (actual or imputed) wage that could be earned by the person performing a nonmarket task or the wage paid to workers who perform similar tasks—to which one can appeal in valuing the time input.

Valuing nonmarket outputs often will be more difficult. A guiding principle might be to treat nonmarket goods and services as if they were produced and consumed in markets. Under this convention, the prices of nonmarket goods and services would be imputed; thus, the easiest cases would be those in which a nonmarket output has a clear market counterpart. Many youth sports organizations, for example, are operated largely by volunteers. Although a fee may be charged for participation in the activity, that fee cannot be viewed as a market price. But there are also private firms that offer opportunities for children to participate in similar recreational activities that do charge a market-determined price. Given information on the relevant output quantities—for example, numbers of children participating in a nonprofit youth sports organization's various recreational programs—the price charged for participating in similar activities offered by private firms could be used in valuing the nonprofit organization's output.

The problem, then, may be less acute for near-market goods, such as owner-occupied housing, home-grown produce, and house cleaning, that follow the "third party rule"—that someone else could produce the good or service just as well as the consuming unit (Nordhaus, 2002, p. 7). "Leisure" is an example of a good that does not follow the third party rule: no one can produce leisure for the person who consumes it. For such personal goods, estimating a value is extremely difficult and would be very controversial.

Even for the near-market cases, many goods exist for which the degree of replacement comparability—and, hence, substitutability—is not at all clear. More difficult yet are the cases for which a nonmarket good is an asset that has no direct market counterpart and is never sold. A possible approach in these cases may be to use market prices to value the stream of output produced by the asset over time and then to treat the present value of the returns as a measure of the asset's value. This approach has a clear grounding in the standard theory that underlies the valuation of marketable capital assets and is the approach taken, for example, by Fraumeni and Jorgenson (1989, 1992) in their work on the valuation of investments in human capital. They begin by calculating the increments to earnings associated with successive increments to education. The present value of the earnings increments, cumulated over a person's productive lifetime (and assuming that education enhances the value of market and nonmarket time equally), then is used as a measure of the value of the incremental investment in human capital.

An additional layer of complexity is introduced in the case of nonmarketed assets that yield a flow of nonmarketed services over time. Investments in health fall into this category, in that improved health increases not only expected years of labor market activity, and thus labor market earnings, but also the expected number of years available in which to enjoy all that makes life rewarding. Developing a market-based measure of the value of additional years of life that may flow from health care investments is more difficult than, for example, developing a market-based measure of the value of the earnings increment attributable to additional education. Labor market data have proven useful for this purpose. Specifically, the fact that different occupations are associated both with different risks of fatal injury and different relative wage rates has been exploited to derive estimates of the value of an additional year of life. Such measures are controversial. But, in comparison with conceivable alternatives, they have the advantage of being based on real-world decisions that yield observable market outcomes, and for that reason they have appeal.

Different approaches may be necessary for the case of nonmarket outputs that are public in nature, such as crime rates and air quality. Again, however, it may be possible to develop measures of the value of these outputs on the basis of market transactions. The levels of many, if not all, of these nonmarket outputs are likely to differ across localities. People presumably will be willing to pay more to live in communities with low crime rates and good air quality than in communities that lack these attributes. The value of such positive attributes are expected to be reflected in house prices. At least in principle, one could derive an estimate of the value of lower crime rates, better schools, or higher air quality from a hedonic model that relates house prices to these (and other) community characteristics.[18]

There are a number of areas for which market valuation, or even imputations based on nonmarket analogues, are simply unavailable and impossible to obtain. Examples of these might include some aspects of social capital, such as family stability; the affect of terrorism on the population's sense of well-being; or the "existence" and "legacy" values of national monuments, such as the Grand Canyon. In these cases, valuation must rely on weaker arguments. The panel urges that attention be directed first to those areas where the most defensible, market-based approaches to valuation are possible.

[18]Though this property-value approach has been widely used in the literature, the panel is not (at least at this time) advocating it for nonmarket accounting; there are widely acknowledged identification problems with such models. The severity of these problems depends on the data sets available.

4
Data Needs

At this point in the panel's work, it is too early to describe in detail the data needs for expanding the U.S. economic accounts to include nonmarket activities. The range of perceptions about the adequacy of conventional economic accounts results not only from different views on objectives and models, but also from different views concerning the costs of obtaining information. A number of economists admit to the deficiency of the conventional accounts but argue that data limitations preclude the possibility of making practical modifications.

The types and amount of data required depend on the proposed structure of the accounts. It is difficult to speculate on data needs without a sense of what the data system is supposed to accomplish and how various pieces of data can contribute to the objectives. An accounting structure that maintains a distinction between inputs and outputs can be costly in terms of the amount of data required. For instance, the U.N. System of Integrated Environmental and Economic Accounting (and its Bureau of Economic Analysis counterpart, the Integrated Environmental and Economic Satellite Accounts) does not make the input-output valuation distinction and, thus, requires much less data than some other nonmarket efforts that do.[1] Similarly, social indicators require much less data than a fully developed input-output (double-entry) set of accounts. Without this conceptual background, it is easy to end up with a hopelessly extensive laundry list of data "needs," without any realistic chance of implementation.

More conceptual thinking is needed in order to attain some balance between the often large incremental costs of data development and the value these data may make to

[1]Examples are the Environmental and Natural Resources Accounting Project (Philippines) and a set of U.S. accounts funded by the Environmental Protection Agency some years ago.

accounting objectives. For example, many people might agree that more timely, more complete, and more detailed information on time-use within the household is needed. But does this mean establishing huge longitudinal surveys with minute-by-minute electronic diaries covering every household member? Probably not. Something less ambitious and costly may do. But how much less ambitious? How much is needed over and above the time-use data that the Bureau of Labor Statistics (BLS) is already collecting?

Data requirements all crucially depend on assumptions embedded in the conceptual model. For example, conventional national accounting implicitly assumes that the value of government-supplied education equals its cost. For its nonmarket environmental accounting, the U.N. implicitly assumes that the value of environmental degradation equals the costs of restoring the environment to a pristine state. Without some theoretical underpinnings, it is not possible to determine whether these assumptions are "good enough."

The biggest factor affecting the need for new data is simply the availability of existing data. Even among accounts that use essentially the same theoretical framework, the data requirements (that is, the amount and type of additional data that must be assembled) may vary widely because of vastly different levels of current data and resources available for data collection.

The panel tentatively plans to determine data requirements in the following manner: (1) establish an accounting framework that meets useful nonmarket accounting objectives; (2) specify the general sorts of data consistent with realistic implementation of the framework; (3) survey existing data that may be available; (4) identify gaps and assess them as to their relative importance in precluding the accounting objectives, and (5) specify meaningful ways that the important gaps could be filled, either through new data collection or by developing suitable proxies based on theoretical considerations.

It is, at this time, appropriate to offer a few words about the BLS's soon-to-be-released time use data. Consensus is fairly widespread that the single most important information required for nonmarket accounts is data on how the population spends its time. Like its market analogue, the most pervasive input in nonmarket production is often time—both market and nonmarket.[2] This is particularly true in such areas as education, human capital development more generally, and home production. Data on market inputs, such as home and materials, exist, though the underlying production function indicating how these inputs are combined is not well understood; the big missing piece of data is for time, a not-always-marketed input.

The American Time Use Survey (ATUS), conducted by the BLS in 2003, will represent a huge step forward in assessing time devoted to household production and will make it possible to provide estimates of the value of household production similar to those currently provided by the Australian Bureau of Statistics and Statistics Canada. ATUS began in January, 2003, collecting time diaries every month from roughly 2,000 unrelated individuals who had completed their tenure in the Current Population Survey in the previous month. Each year this survey will generate the largest number of diaries of any time-budget study in the world. Most important, by putting time-budget surveys on a

[2]An exception is the production of government services, as well as inputs to nonmarket environmental capital (e.g., clean air and water, public beaches) that enter into all kinds of human welfare-producing activities related to goods, such as recreation and health.

continuing and regular basis, ATUS will allow the creation of a time series of time inputs into a consistently defined set of activities that can be used to construct quantity measures for satellite accounts. Indeed, it is only with the development of ATUS that the inclusion of household production in an on-going system of satellite accounts has become possible. While ATUS lacks some desirable features offered by the smaller, irregular time-budgets conducted in some other countries, its large sample size, its on-going character, the expected high quality of the data collected, and the categories into which the time allocations are placed make it well suited for the purposes envisioned by the panel.

Yet, ATUS may not provide adequate information for understanding the nature of care work within the household, which often involves constraining responsibilities rather than direct activities. For instance, specific survey modules (e.g., regarding child care and elder care) may need to be designed that could complement the basic ATUS and help capture the more qualitative dimensions of both inputs and outputs of family care. Such modules would contribute to complementarities between the panel's efforts to assign a value of health outcomes and earnings-related human capital, both of which are strongly affected by inputs of household or family time.

In order to move toward the type of output valuation described in this report, researchers would need better organized data not only on household capital, but also on forms of market capital and public capital that have significant effects on the productivity of household time. Such data would need to cover, for example, not just the development of new consumer durable goods like microwave ovens, but also the impact of ATMs and price scanners on time devoted to money transactions and shopping, of broadband and satellites on household entertainment time, and of public investments (such as electricity, water, transportation). While such data exist, they are not organized in a clear or coherent, much less user-friendly way.

In addition to its obvious role in constructing a household production account, ATUS will also provide data essential to accounts covering other areas of nonmarket activity for which time is a key input—such as health, volunteer activities, and human capital. For purposes of health accounting, ATUS may be useful in generating improved estimates of family members' and patients' time in treatment and time exercising or sleeping. These inputs, along with such others as time reading to children or studying, will contribute to work on human capital. Because time use is the theme that links most of the nonmarket areas, an integrated account could be based on ATUS as a starting point; additional information to help measure outputs could possibly be added to future versions of this survey.

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Appendix
Biographical Sketches of Panel Members and Staff

Katharine G. Abraham (*Chair*) is currently professor of survey methodology and affiliate professor of economics at the University of Maryland. She was commissioner of the Bureau of Labor Statistics, from 1993 to 2001. She taught at the University of Maryland and the Sloan School of Management at the Massachusetts Institute of Technology and was a research associate at the Brookings Institution. She has been an associate editor of the *Quarterly Journal of Economics* and an assistant editor of the *Brookings Papers on Economic Activity*. She is a member of the American Economic Association, the National Association for Business Economics, the Industrial Relations Research Association, and the Committee on the Status of Women in the Economics Profession. She received her Ph.D. in economics from Harvard University in 1982. She received the Distinguished Achievement Citation from the Iowa State University Alumni Association in 2000.

Dora Costa, is the Ford Career Development associate professor of economics at the Massachusetts Institute of Technology and a research associate in the National Bureau of Economic Research's programs on the development of the American economy and on aging. She received her B.A. in economics and mathematics from the University of California, Berkeley in 1986 and her Ph.D. in economics from the University of Chicago in 1993. Her research focuses primarily on issues in labor economics, demography, and health, as interpreted over the long span of American economic history. Her work has covered a wide range of topics including: retirement, elderly living arrangements, determinants of older age mortality and morbidity, long-term trends in the health of the

population, and trends in the consumption of recreational goods. She is the author of numerous articles and a book, *The Evolution of Retirement: An American Economic History 1880-1990.*

David Cutler, is professor of economics at Harvard University, in the Economics Department and the Kennedy School of Government, and he is also research associate at the National Bureau of Economic Research. He received a B.A., summa cum laude, from Harvard College, and a Ph.D. in economics from at the Massachusetts Institute of Technology. His research is concentrated in health economics, including: measuring the health of the population and understanding how medical and nonmedical factors influence health. He is coeditor of the *Journal of Health Economics*, and associate editor of the *Journal of Public Economics* and the *Journal of Economic Perspectives*. He is an elected member of the Institute of Medicine. During 1993, he was on leave as senior staff economist at the Council of Economic Advisers and director of the National Economic Council. He has been a member of numerous commissions and advisory groups, including the Technical Panel on Social Security, and the Medicare Technical Advisory Panel.

Nancy Folbre, is a staff economist with the Center for Popular Economics. Her work focuses on the interface between feminist theory and political economy, with a particular interest in caring labor and other forms of nonmarket work. Her work overlaps the fields of economic history, development, and policy analysis, and touches on game-theoretic approaches to family decisionmaking. Her most recent academic book is *Who Pays for the Kids? Gender and the Structures of Constraint.* A recent recipient of a MacArthur Foundation Five-Year Fellowship, she also serves as cochair of the MacArthur Foundation Research Network on the Family and the Economy and is an associate editor *Feminist Economics.*

Barbara Fraumeni, is a professor of economics at Northeastern University, Boston. Her areas of interest are public economics, microeconomic theory, and industrial organization and regulation. She is currently on leave from Northeastern while serving as chief economist at the Bureau of Economic Analysis. She received her bachelor's degree from Wellesley College and her Ph.D. degree from Boston College.

Robert E. Hall, is an applied economist with interests in technology, competition, employment issues, and economic policy, in the aggregate economy and in particular markets. His current research focuses on levels of activity and stock-market valuations in market economies and on the economics of high technology, particularly the Internet. His books include *Digital Dealing: How e-Markets Are Transforming the Economy*, and *The Flat Tax* with Alvin Rabushka. He and Rabushka were recognized in *Money* magazine's Money Hall of Fame (1992) for their contributions to financial innovation over the past 20 years. He has advised a number of government agencies on national economic policy, including the Justice Department, the Treasury Department, and the Federal Reserve Board, and he served on the National Presidential Advisory Committee on Productivity. He also serves as director of the research program on economic fluctuations and growth of the National Bureau of Economic Research, and he chairs the Bureau's Committee on

Business Cycle Dating, which maintains the semiofficial chronology of the U.S. business cycle. Hall is a fellow of the American Academy of Arts and Sciences and the Econometric Society. He received his B.A. from the University of California at Berkeley in 1964 and his Ph.D. from the Massachusetts Institute of Technology in 1967.

Daniel S. Hamermesh, is Edward Everett Hale Centennial Professor of Economics at the University of Texas at Austin. He received his A.B. from the University of Chicago in 1965, and his Ph.D. from Yale in 1969. He has taught at Princeton and Michigan State and has held visiting professorships at universities in the United States, Europe, Australia, and Asia. He is a fellow of the Econometric Society, a research associate of the National Bureau of Economic Research and of the Institute for the Study of Labor, and past president of the Society of Labor Economists and of the Midwest Economics Association. He authored *Labor Demand, The Economics of Work and Pay,* and a wide array of articles in labor economics in the leading general and specialized economics journals. His research concentrates on labor demand, time use, and unusual applications of labor economics (to suicide, sleep and beauty).

Alan Krueger, is at The Woodrow Wilson School at Princeton University. His primary research and teaching interests are in the general areas of labor economics, education, industrial relations, and social insurance. He is the author of *Education Matters: A Selection of Essays on Education*, and the editor of the *Journal of Economic Perspectives.* His current research projects include a study of the effect of economic growth on employment and income of less skilled workers, an examination of the effect of education on economic growth across nations, a study of the relationship between school quality and student outcomes, and an analysis of the impact of technological change on the labor market. He writes a monthly column on economics *for The New York Times*. He is an elected a fellow of the Econometric Society and was awarded the Kershaw Prize by the Association for Public Policy and Management in 1997. He served as the chief economist of the U.S. Department of Labor in 1994-1995. He holds a Ph.D. from Harvard University.

Christopher Mackie, is a study director with the Committee on National Statistics (CNSTAT). In addition to working with this panel, he is studying data access and confidentiality, and he directed the Panel on Conceptual, Measurement, and Other Statistical Issues in Developing Cost-of-Living Indexes. Prior to joining CNSTAT, Mackie was a senior economist with SAG Corporation, where he conducted a variety of econometric studies in the areas of labor and personnel economics, primarily for federal agencies. He completed his Ph.D. in economics at the University of North Carolina and, while a graduate student, held teaching positions at the University of North Carolina, North Carolina State University, and Tulane University. He is the author of *Canonizing Economic Theory*.

Robert Michael, is the Eliakim Hastings Moore Distinguished Service Professor in the Irving B. Harris Graduate School of Public Policy Studies at the University of Chicago. Previously, he was director of the National Opinion Research Center (NORC) and director the West Coast office of the National Bureau of Economic Research. He also

previously taught at Stanford University and the University of California at Los Angeles. His research interest and publications cover family economics, including the causes of divorce, the reasons for the growth of one-person households, the impact of inflation on families, and the consequences of the rise in women's employment for the family, especially children; and expenditure patterns in the household, including the factors that determine parental spending on children in various types of households. He serves on the Boards of the Chapin Hall Center for Children and NORC and cochairs the Board of Visitors of Western Reserve Academy in Hudson, Ohio. He was elected a fellow of the American Association for the Advancement of Science in 1994.

Henry Peskin, is president of Edgevale Associates, a consulting company. He was formerly on the staffs of the National Bureau of Economic Research, the Urban Institute, and the Institute for Defense Analysis and, most recently, at Resources for the Future. With training in chemical engineering, an undergraduate degree in political science, and a graduate degree in economics, he has written extensively on methods to expand the national economic accounts in order to better measure resource and environmental degradation. As a consultant to the World Bank and the U.S. Agency for International Development, he has surveyed environmental accounting practices in industrialized countries and has advised developing countries on the design and implementation of environmental accounting systems.

Matthew Shapiro, is a professor of economics and senior research scientist at the Survey Research Center at the University of Michigan, and is also a research associate of the National Bureau of Economic Research. He received B.A. and M.A. degrees from Yale in 1979 and a Ph.D. from the Massachusetts Institute of Technology in 1984. He was coeditor of the *American Economic Review* and is a member of its board of editors. His general area of research is macroeconomics, and he has carried out projects on investment and capital utilization, business-cycle fluctuations, consumption and saving, financial markets, monetary policy, and time-series econometrics. Among his current research interests are assessing the degree and effects of the reallocation of productive capital across firms and industries, modeling saving, retirement, portfolio choices of households, and improving the quality of national economic statistics. During 1993-1994, he served as senior economist at the Council of Economic Advisers, and he is now a member of the Academic Advisory Panel of the Federal Reserve Bank of Chicago. He is a member of the National Research Council's Committee on National Statistics, the Federal Economic Statistics Advisory Committee, and the executive committee of the Conference on Research in Income and Wealth.

Burton Weisbrod, is a John Evans professor of economics at Northwestern University. His research focuses on two overlapping areas--determinants of technological change in medical care and the role of private nonprofit organizations relative to for-profit and government organizations. The latter topic often involves the health sector, in which the three types of organizations coexist and compete in such industries as hospitals and nursing homes. The central question is the ways in which organization behavior differs systematically among organizations.