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Proposals for New Frameworks for the Measurement of Economic and Social Performance

A Framework for the Measurement of Economic and Social Performance

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INTRODUCTION

THE present system of U.S. national income and product accounts has, in recent years, been subjected to mounting criticism relating to conceptual framework, what is included and excluded from measured final output and income, the adequacy with which the accounts carry out their intended purposes, and whether they can and should be more specifically designed to measure changes in economic welfare. The criticism has been as diverse in its sources as in its content: social accountants have pointed to deficiencies in the capital accounts, in the treatment of household economic activity, and in the treatment of consumption provided directly by business enterprises; [1] those in the forefront of the ecology movement, including a number of physical scientists, have issued scathing and often ill-informed critical comment about the degree to which the present accounts overstate the gain in real income because of the way in which environmental deterioration and the unwanted byproducts of economic

NOTE: With minor changes in language, the text of this paper is identical to the draft discussed at the Princeton conference, thus enabling the reader to see what the discussants were reacting to rather than what I might have written with the benefit of the discussion. A few clarifying footnotes have been added, and these are identified by asterisks.

In addition, I have appended several supplementary notes to the paper, and have prepared a brief reply to George Jaszi's comments. The supplementary notes are designed to clarify issues which were raised at the conference and which were not discussed adequately in the original paper.

[1] See N. Ruggles and R. Ruggles, *The Design of Economic Accounts*, New York, NBER, 1970; J. W. Kendrick, "The Treatment of Intangible Resources as Capital," paper presented to the Twelfth General Conference of the International Association for Research in Income and Wealth, Ronneby, Sweden, September 1971; F. T. Juster, *Household Capital Formation and Financing, 1897–1962*, New York, NBER, 1966; R. Eisner, "Measurement and Analysis of National Income (Non-income Income)" in NBER, *51st Annual Report*, New York, 1971, pp. 79–80.

activity are handled; and even the "man in the street," as represented by the popular literature produced by journalists and other writers, has been sufficiently aroused to add an occasional voice to the chorus.

Although a fair amount of the more extreme critical comment is based either on misinformation or superficial analysis of what the accounts do and do not measure, a cogent argument can be made for the view that the present set of national accounts provides an increasingly deficient representation of the substantive economic activities taking place within the system, and that many of these deficiencies are capable of being remedied by using available data within a broadened framework of what might best be termed Economic and Social Accounts. The fact that this conference was held is itself a clear indication of discontent with the existing system of accounts, as well as a reflection of recent conceptual and empirical developments that could form the basis for a restructuring of the system.

In examining the relation between a system of social accounts and the measurement of economic and social performance, the question of what constitute feasible objectives of an accounting system must be kept in mind. We want the accounts to record changes in the material wellbeing of the community. That evidently means that the accounts must register changes in the flow of goods and services going through the market mechanism, where the bulk of economic activity takes place, but it does not preclude the accounts from registering nonmarket activity to the extent that it bears directly and measurably on material wellbeing. In addition, we want the accounts to say something about the efficiency with which flows of goods and services accomplish their economic objectives, that is, whether the community is doing better or worse as reflected by what the economic and social system is accomplishing and not by recording effort or costs that represent inputs into the system. That is a thorny and complicated question, and a good bit of attention is devoted to it in the paper.

Finally, economists generally have no desire to turn the accounts into some sort of happiness index, in which one's ability to get along with one's wife or children, or to find an appropriate mate, or to realize the more fundamental philosophical purposes of human existence constitute potential measures of performance. These may well be more important considerations than mere material goods and services, but they are not within the purview of the economist or the social accountant. Thus the system of social accounts is inherently limited in what it does and ought to try and measure, but within these limits there are wide differences of

view as to what activities should be included and what measurements can or should be made.

A system of economic and social accounts must be designed to serve the needs of at least two broad groups of actual or potential users. One is the scientific community, including economists and other social scientists as well. Social scientists need a system of accounts which illuminates the problem they are investigating. The objectives, broadly speaking, are to describe, understand, explain, and ultimately predict significant economic and social phenomena. The accounts have long been used for this purpose by economists with an interest in the macroeconomic problems of cyclical fluctuations in output, employment, and prices, and in the macroeconomic problems of economic growth. For reasons discussed in more detail below, I would argue that the present accounts are better adapted to analysis of cyclical problems than real economic growth problems.

A second important group of users are those concerned with the formulation of public policy. To identify and establish the quantitative significance of social and economic problems and priorities, policy makers need, among other types of information, a set or sets of accounts which describe the significant dimensions of the system for which they are responsible. Also, a system of comprehensive performance measures is clearly indispensable both for any evaluation of changes in policy and for the analysis of policy alternatives.

In an important sense, it is probably true that the demand of policy makers for economic and social performance accounting systems is really derived from the demands of social scientists. Without the aid of the latter in building and testing models with behavioral content and demonstrated predictive value, little effective use can be made of the system by policy makers. Thus, the major policy uses of the present accounts have been for the range of problems where social scientists have found the accounts most useful, that is, for the analysis of macroeconomic problems of cyclical variability in output, employment, and prices. To see this, one need only ask how much of our present rather substantial (though still far from satisfactory, as witness the last several years) progress in understanding and forecasting economic aggregates would have been possible without the present set of National Income and Product Accounts.

The Present Accounts: Background and Framework

The present U.S. economic accounts have their roots in the conceptual and empirical work undertaken in the early part of the century by King and culminating in the much more fully articulated system devised by

Kuznets,[2] along with the conceptual modification and extensive operational work done by Gilbert, Jaszi, and their associates at the Office of Business Economics during the 1940's and continuing up to the present.[3] The current version of the Accounts is, except for the treatment of government, basically consistent with the Kuznets framework developed in the 1930's. Of course, there have been a great many changes in methods and sources of measurement, and some rather more modest changes in the conceptual treatment of various types of both actual and imputed transactions. In addition, the analysis of National Accounts aggregates has, during recent decades, tended to focus much more on gross rather than net output concepts, which represents a marked departure from the emphasis found in Kuznets. But that is largely a consequence of the kind of uses to which accounts have been put rather than any change in conceptual treatment; the more net measures of economic output still continue, and are still used by those concerned with economic growth.

The boundary line for activities considered to be economic in the present system of accounts, and considered as resulting in a flow of output and income, can be broadly characterized as being drawn to include virtually all market activities and to exclude virtually all nonmarket ones. This boundary results from the distinctions in the accounts between the activities of business enterprises and those of households. When a product or service leaves the enterprise sector and comes into the possession of a household unit, neither its durability, its requirements for complementary inputs of time and other goods owned by the household in producing satisfactions, nor its substitutability for goods or services provided within the household itself are considered to be of interest to the social accountant. The only exception to this generalization is the treatment of owner-occupied housing, where the account adopts the convenient fiction of supposing that households are really small firms

[2] See W. I. King, *The National Income and Its Purchasing Power,* New York, NBER, 1930; and S. Kuznets, *National Income and Its Composition, 1919–1938,* New York, NBER, 1941; Kuznets, *National Product in Wartime,* New York, NBER, 1945; Kuznets, *National Product Since 1869,* New York, NBER, 1946; and Kuznets, *National Income: A Summary of Findings,* New York, NBER, 1946.

[3] See M. Gilbert, "Statistical Sources and Methods in National Accounts Estimates and the Problem of Reliability," in *International Association for Research in Income and Wealth,* Series III, 1951; G. Jaszi, "The Conceptual Basis of the Accounts: A Re-examination" in *A Critique of the United States Income and Product Accounts:* Studies in Income and Wealth, Vol. 22, Princeton University Press for NBER, 1958; and G. Jaszi, "The Statistical Foundations of the Gross National Product," *Review of Economics and Statistics* Vol. 38, 1956, pp. 205–214.

selling the services of housing to themselves at values commensurate with that of housing rented in the market.

A second important boundary relates to the treatment of capital formation. The only capital assets recognized as having the capacity to yield future services consist of tangible structures and equipment owned by business enterprises, including the fictional owner-occupied housing owned by the "household" enterprise. All other forms of investment, whether they be tangible assets owned by households and governments, intangible capital assets (knowledge acquired through research and development outlays) owned by business firms or governments, or increases in the stock of skills and knowledge embodied in humans and acquired through investment in some form of education or training, are considered to be current consumption flows if they are included in the accounts at all.

These boundaries, especially the first, are not of course fully observed even in the present accounts. It has been useful to estimate implicit prices for various kinds of activities which clearly represent market-type activity even if no actual market transaction takes place. Cases in point are the treatment of food consumed on farms by the owner, and the value of financial services rendered by banks in situations where legal prohibitions prevent a market price from emerging of its own accord. But a basic premise of the present accounts is that valuation of activities that lack explicit market prices is justifiable only in cases where a simple, objective, and easily identified basis for the valuation is available.[4]

To understand the framework of our present accounts, it is helpful to recall the economic background during the period of their development. The system was formulated during the 1930's and 1940's, when the main forces affecting the level and movement of economic activity were initially cyclical, subsequently the national defense effort. During major cyclical swings in the level of economic activity, focusing on market output produced a measure whose welfare implications were probably very similar to those that would have resulted from focusing on a much broader range of activities. And during a major war, the emphasis was naturally on productive capacity for military output, for which a measure like GNP is well suited—better suited, for example, than a measure like

[4] As pointed out many years ago by Kuznets, the presence of an apparently comparable valuation base does not necessarily solve the problem: for example, farm families probably consume more food of the type they grow themselves than if they sold the crop and purchased food in the open market—in effect, food consumed by farm families is overvalued.

NNP. In consequence, given the catastrophic decline in market activity during the Great Depression and the subsequent recovery when World War II erupted, many of the welfare-oriented conceptual problems gradually came to be regarded as of little practical or analytical importance, even though these problems had undergone extensive discussion during the formative period of the account. Hence, the account came de facto to be largely a reflection of economic "activity," regardless of the purposes to which the activity was directed.

The National Income and Product Accounts of the U.S. are thus basically designed to provide an efficient measure of cyclical changes in total activity. In such a framework, the focus is on flows of inputs and outputs; stocks of assets are important only insofar as they cause cyclical movements in the related flows. A similar rationale can be adduced for the concentration in the accounts on the amount of time allocated to market activities: if cyclical variability is the major concern, the critical labor-time variable is the amount of market employment and unemployment, not the amount of time people choose to allocate to nonmarket activities, leisure, etc. Hence, the allocation of labor-time has always been viewed as a simple flow of inputs yielding market income, with no attention paid to the fact that time allocated to the market is only one of many possible uses.

Given this background, it was natural for the emphasis to be on a system of accounts designed to trace variations in output, employment, and productivity in the market sector, where performance during the 1930's had been so unsatisfactory. Moreover, it was entirely reasonable to equate changes in output thus measured with changes in economic and social welfare, since changes in the one dominated changes in the other. But during the past few decades, both empirical and analytical developments suggest that the present framework needs to be modified, perhaps substantially so, if it is to provide a satisfactory basis for gauging either performance or material wellbeing.

Recent Empirical and Analytical Developments

The degree to which a set of economic accounts serves both the scientific and policy needs of potential users depends in part on the nature of the problems that have the highest priority. As argued above, the present accounts are basically designed to be effective in the analysis of cyclical variability in the market sector—a purpose which they serve reasonably well. But recent developments have tended to generate a different set of priorities and opportunities.

Of the empirical developments that have resulted in changed priorities, one can note the marked reduction in the amount of cyclical variability manifested by the economic system.[5] Since the end of World War II, there has been a persistent tendency for periods of economic recession and underutilization of resources to be milder than before.[6] The change appears due in part to changes in the structural characteristics of the economy (toward the production of relatively stable services and away from the production of relatively unstable goods),[7] and in part to the impact of specific policies designed to mitigate the effect of economic declines and to prevent their cumulating into periods of serious recession or depression. It may also be true that the better over-all performance on the cyclical side is in part a consequence of the present set of economic accounts themselves, which have provided an indispensable data base from which models of cyclical behavior have been constructed—models which may have played no small role in the formulation of policies designed to moderate periods of economic decline and extend periods of expansion. That question is unclear, and I do no more than note the possibility.

The structural shift toward services and away from goods is not only true of the economy over-all but also of the capital formation sector of the economy. Since the end of World War II there has been a dramatic rise in outlays for research and development on the part of both corporations and governments, as well as a relatively rapid rise in resources devoted to investment in humans as measured by schooling outlays, and those changes have highlighted the inadequacy of the pres-

[5] *It has been objected that the current concern with inflation and unemployment problems is evidence that there really has not been any shift in priorities away from cyclical problems. In the sense of relative concern with different types of problems, I think the shift is real: after all, concern with urban and environmental problems did not disappear during the recent recession, but simply took up a lower visibility than before. But concern with cyclical problems is itself clearly a cyclical variable, regardless of the severity of a current cyclical episode.

On the other hand, I think it probably is correct that our standards of tolerance for recessions may have lessened almost as much as our ability to modify their economic and social consequences. If so, declining cyclical variability may not result in a lower social priority being accorded to cyclical problems.

[6] See S. Fabricant, "The 'Recession' of 1969–1970," in *The Business Cycle Today,* Fiftieth Anniversary Colloquium I, New York, NBER, 1972; and Fabricant, "Recent Economic Changes and the Agenda of Business-Cycle Research," in *National Bureau Report 8, Supplement,* New York, May 1971. See also Juster, *Household Capital Formation.*

[7] See V. Fuchs, *The Service Economy,* New York, NBER, 1969; and Fuchs, ed., *Production and Productivity in the Service Industries,* Studies in Income and Wealth 34, New York. NBER, 1969.

ent capital accounts for analysis of economic growth.[8] Capital in the form of knowledge or human skills is just as much capital in the production function sense as machinery and structures, and the growing quantitative import of capital in these intangible forms provides a compelling reason to undertake a major modification in the capital accounts structure of the present system.

Also on the structural side, the rapid growth in female labor-force participation over the last several decades has reemphasized the fact that our accounts measure solely activity in the marketplace and not in the household.[9] During periods when the proportions of market and home work remain relatively constant, it makes little difference to growth rates of real income and output whether activity within the household is systematically incorporated into the accounts or not, but this is clearly not the case when the proportions are changing systematically.

Another and somewhat different empirical change concerns the rapid growth of output in sectors, especially services, where existing output measures are seriously deficient because they are essentially measures of inputs and not outputs. With the service sector now comprising roughly half of constant dollar total output and service industry employment comprising well over half of total employment, we can no longer be satisfied with a measurement which says that output grows at the same rate as employment with an arbitrary (usually zero) assumption about productivity growth. Understandably, there is a growing demand for direct measures of changes in the quantity of output in these areas.

Finally, we should note the relatively recent change in apparent social priorities toward a concern with environmental and ecological problems, which are generally interpreted as reflecting negative external byproducts of the way in which our economic and social system is

[8] See below, "Implementing the Proposed Framework," where Kendrick's data and findings are discussed. Also see T. W. Schultz' initial article "Capital Formation by Education," *Journal of Political Economy*, Vol. 68, 1960, and his most recent book, *Investment in Human Capital: The Role of Education and of Research*, New York, The Free Press, 1971. Also see G. Hanoch, "An Economic Analysis of Earnings and Schooling," *Journal of Human Resources*, Vol. II, No. 3, Summer 1967; and *Education, Income, and Human Capital*, Studies in Income and Wealth 35, New York, NBER, 1970.

[9] See J. Mincer, "Labor Force Participation of Married Women," in *Aspects of Labor Economics*, New York, NBER, 1962; W. Bowen and T. A. Finegan, *The Economics of Labor Force Participation*, Princeton, N.J., Princeton University Press, 1969; G. S. Becker, "A Theory of Time Allocation," *Economic Journal*, September 1965; and R. Gronau, "The Measurement of Output of the Nonmarket Sector," in this volume.

organized. The mounting concern with environmental and ecological problems probably reflects the highly nonlinear nature of the economic and social loss function from these externalities, coupled with the relatively high income elasticity of the supply of negative byproducts in industrialized societies as well as a high income elasticity of the demand for ecology per se.

Byproduct wastes and disamenities have always been part of the process of economic growth and development. But water, air, noise, etc., pollution have certain nonlinear characteristics which clearly relate to the economic costs of the process as well as to the process itself. Thus, for example, as noted in Denison's recent SCB article,[10] a trivial amount of air pollution will not even be noticed, a moderate amount will cause minor inconvenience and negligible welfare loss, while a substantial amount will cause major inconvenience and impose very high welfare costs. Thus, both the visibility and the costs of environmental deterioration are nonlinear, and we have apparently passed over the visibility threshold in a number of areas although not necessarily to the point of imposing significant economic costs. And lastly, environmental and ecological considerations seem to be of much greater concern to the relatively vocal and high income residents of suburban and exurban areas than to the less vocal and relatively low income residents of urban areas, despite the fact that the major impact of environmental deterioration is on the latter and not on the former. In short, residents of urban ghettos are likely to be much more concerned with employment opportunities and the educational system than with environmental problems, while the reverse is often true for residents of high income suburban areas.

Along with, and in part a consequence of, changes in observable economic phenomena has been a series of theoretical developments that provide both the framework and the justification for expanding the scope and content of the accounts. Foremost among these changes in our understanding of economic phenomena is the burgeoning field of human capital analysis, focused on the costs of investment in schooling and the returns to that investment in the form of higher lifetime earnings in the market.[11] Most economists probably now agree that

[10] E. F. Denison, "Welfare Measurement and the GNP," in *Survey of Current Business*, January 1971.

[11] G. S. Becker, *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, New York, NBER, 1964; F. Thomas Juster, ed., *Education, Income, and Human Behavior*, Carnegie Commission on Higher

humans do undertake investment in their own skills, that these investments involve costs on both the private and the social side, and that such investments have economic consequences in the form of differentials in lifetime earnings streams. Whether schooling involves more than investment in skills is a more difficult question, certainly to quantify, but it does not have to be answered in order to incorporate some of the investment insights from human capital theory into economic and social accounts.

Moreover, the human capital investment analysis is now being extended well beyond the domain of formal schooling, in recognition of the fact that the acquisition of marketable skills is a process that takes place throughout the entire lifetime of the individual and not just while attending school.[12] Analysis of investment that takes the form of foregone earnings on the job, with the promise of future returns from a learning or training experience, suggests that a quantitatively important investment-in-learning component is involved in labor market decisions. And we are just beginning to make progress on the quantification of investment that takes the form of both preschool and during-school learning and training in the home.[13] This development has the prospect of providing, among other benefits, an explanation for the common empirical finding that rates of return to females from investment in formal schooling are much lower than those observed for males, and also of explicating one of the links in the intergenerational transmission of earnings.

A related but distinctly different theoretical development is in the economics of the household itself. It can be argued that one of the most cogent reasons for distinguishing between economic activity and "active life," as Kuznets termed it, was the existence of a well-defined framework for the analysis of business enterprise decisions within which output and income could be measured with objectivity and consistency. A similar theory of household decision making as it relates to the production of goods and services within the household did not exist when

Education, forthcoming; B. Chiswick, "Income Inequality and Schooling: A Cross-Sectional Study," New York, NBER, 1973, processed; J. Mincer, *Schooling, Experience, and Earnings,* New York, NBER, forthcoming; and T. W. Schultz, in *Human Resources,* Fiftieth Anniversary Colloquium VI, New York, NBER, 1972.

[12] J. Mincer, "On the Job Training," *Journal of Political Economy, Supplement,* October 1961; and Mincer, *Schooling, Experience, and Earnings.*

[13] See, for example, A. Leibowitz, "Home and Market Work in the Life-Cycle of Women by Education," Ph.D. dissertation, Columbia University, 1971; and R. Hill and F. Stafford, "The Allocation of Time to Children and to Educational Opportunity," University of Michigan, 1971, mimeo.

the present accounts were formed, but it exists now in the theory of within-household allocation of goods and time developed by Becker, and the related theory of consumer demand for goods and services as a derived demand for particular combinations of performance characteristics developed by Lancaster.[14] The theory treats households as small firms producing a flow of utilities or satisfactions, with a production function whose arguments are the time of family members allocated to intrahousehold activities and the command over purchased goods and services reflected by the money income earned by family members via allocation of time to the market. Thus, household time enters explicitly into the production of goods and services, and is substitutable for the household's money income as reflected in the goods they can acquire. As a consequence, we now have an analytical framework in which the time of family members can be valued, although we are still a good way from being able to make quantitative value imputations for a specified set of activities. Nonetheless, it is one thing to argue for the inclusion of household activity in a social and economic accounts framework when no economic model for such activities has been developed but another to suggest the possibility of their systematic inclusion within a framework in which market-based valuations begin to be feasible.

I should note one important distinction between the economic activity of firms and households, which does have implications for the economic and social accounts treatment of the household. In a market system, firms can and do cease to exist if they fail to provide an adequate return to their owners because they have proved unable to compete in the market place. Families do not need to meet the same test.[15] The prices at which firms sell goods and services is clearly the appropriate price at which to value output. Inefficient firms, which can produce a given output only at higher costs than other firms, will not be

[14] Becker, *Human Capital;* Becker, "A Theory of the Allocation of Time," *Economic Journal,* Vol. 75, September 1965, pp. 493–517. See also Gronau, "Measurement of Output"; G. Ghez, "Life Cycle Consumption and the Price of Time," in Juster, ed., *Education, Income, and Human Behavior;* and a study by M. Landsberger, to be published by the National Bureau of Economic Research. For a somewhat different theoretical approach, see K. Lancaster, "A New Approach to Consumer Theory," *Journal of Political Economy,* April 1966.

[15] See the discussion in Wesley C. Mitchell, "The Backward Art of Spending Money," in his *The Backward Art of Spending Money and Other Essays,* New York, McGraw-Hill, 1937.

The parallel between households and small family enterprises should be noted. Proper social accounting would treat many family firms as showing losses instead of profits, because the alternative labor income for the proprietor is greater than the profits realized from the firm.

around for long because competition forces them to sell their output at the market-determined price and thus at a loss. But families can produce services at very different levels of costs and efficiency without being faced with a market constraint. Thus, the same product or service will have a different value for families who differ in their respective valuations of time or in the efficiency with which they utilize time and purchase goods.[16]

A third development has been the growth of methods for replacing input measures of economic activity with measures that come closer to being true output measures. I have in mind here both the growth of the PPB systems in some of the service industries, especially government, as well as the use of hedonic price indexes to measure quality change. The former has the capacity to develop activity measures which are at least a step closer to output measures than simply costing the inputs, as we now do.[17] Thus, although pages of computer printout or numbers of statistics issued do not really measure the contribution of the Commerce Department to final output, they are a lot closer to that measure than the sum of salary payments and computer rentals would be. Similarly, numbers of patients treated (successfully?) is a lot better measure of output in the medical industry than the cost of doctors, nurses, and X-ray equipment. While I do not think that we yet have an adequate basis for substituting estimated flows of output services for input costs in these and other areas, it may be possible to substitute indexes of output that are both independent of input costs and better proxies for what one would like to measure.

A somewhat similar development is the use of hedonic price indexes to measure output in sectors where quality change is pervasive and not uniquely associated with changes in costs. On the whole, our present system of accounts recognizes a change in quality only when it is associated with an identifiable difference in cost relative to the displaced type of output. An alternative way to handle the problem, which has been extensively explored for various types of durable goods, is to recognize that quality change can be described in terms of dif-

[16] Note that families can, to some extent, effectively sell time to other families through different allocations of market and nonmarket time. One family can choose to repair its own appliances, while another can choose to increase market work and use the proceeds to buy appliance repair services in the market.

[17] See N. E. Terleckyj, "Measuring Output of Government Activities," paper presented at the International Conference on Income and Wealth, Ronneby, Sweden, August 1971; and A. M. Rivlin, *Systematic Thinking for Social Action*, Washington, D.C., Brookings Institution, 1971.

ferent dimensions of performance for which the product is better suited than its predecessors, and that an output measure can be obtained by pricing these performance dimensions with weights obtained via regressions of the prices of various products on particular performance characteristics.[18]

Social Accounting Systems Versus Social Indicators

Two general types of solutions, by no means mutually exclusive, have been advanced as a way to remedy the real or alleged deficiencies in our current system of economic accounts. The first, which forms the main subject of this paper, is to expand the content and coverage of the accounts to incorporate activities that are now excluded, to recognize the intermediate product nature of many expenditures now classified as final output, and in general to incorporate, within a bounded double-entry accounting system, as many of the significant dimensions of welfare as can be conceptualized and measured. An alternative is to devise supplementary indicators which attempt to identify dimensions of welfare which either are not or cannot be fitted within a system of accounts that require a homogeneous unit of measure such as dollars. For example, average years of schooling, crimes of specified types per capita, average number of hospital bed-days per unit of population or per specified type of illness, average carbon monoxide content of the air over major industrial cities, etc., clearly have something to do with economic welfare and at the moment are not accommodated within the economic accounts.[19] The question is whether one should attempt to accommodate such measures within an expanded accounting framework, or whether one should recognize the serious valuation and comparability problems and settle for a supplementary list of social indicators.

Let me start by noting some significant dimensions of welfare that cannot, for the foreseeable future and perhaps forever, be accommodated within an accounting framework that requires a single unit of measure. Of the activities just mentioned, all could in principle be accommodated within a meaningful general framework of economic and

[18] See Price Statistics Committee, Federal Reserve Board, *Price Indexes and Quality Change*, ed. Zvi Griliches, Cambridge, Harvard University Press, 1971.

[19] See "Toward a Social Report," U.S. Department of Health, Education and Welfare, Washington, D.C., 1969; E. B. Shelden and W. E. Moore, *Indicators of Social Change: Concepts and Measurements*, New York, Russell Sage Foundation, 1968; and M. Olson, Jr., "The Plan and Purpose of a Social Report," *Public Interest*, no. 15, Spring 1969.

social accounts: years of education is already implicitly included via expenditures for formal schooling, and an even more appropriate measure—gains in educational achievement for those in school—would be a better output measure than costs of teachers and school buildings if we could agree on a way to measure achievement gains; crimes per capita have measurable economic and social consequences in terms of losses through mortality or temporary disability, destroyed or damaged assets, etc.; hospital bed-days per unit of population represent losses of productive time; and even the carbon monoxide content of the air over major industrial cities could in principle be represented by the economic losses it causes rather than by description of a physical fact.

There are, however, dimensions of welfare that are not easily, even in principle, represented in a set of social accounts. As a nation we are concerned not only with the aggregate output of the economic and social system but with its distribution among persons and families. A more rapid growth of real income coupled with a relative lack of progress on the part of low-income families does not necessarily represent an overall improvement in welfare. The distribution of the gains in educational achievement is not irrelevant to an evaluation of the returns from a better educated population. And it is difficult to see how one can find a place in economic and social accounts for subjective perceptions of wellbeing as distinct from the objective facts. Thus, there is always a need for information, relevant to an evaluation of the economic and social performance of the systems on the whole, which cannot neatly or easily be fitted into a uniform social accounting framework, even one that is greatly augmented relative to the present one. And even if such measures could in principle, and ultimately in fact, be fitted into a unified framework, there is a very long interim period during which comprehensive social accounts could not possibly exist and where social indicator measures represent the only feasible alternative.

A quite different argument is one with an appreciable following in the economics profession, namely, that an attempt to convert the present economic accounts to a much more extensive system of economic and social accounts would accomplish little more than destroying the usefulness of the existing system. The argument deserves careful examination, since the present system of accounts clearly serves a number of useful purposes that can be served in no other way.

The argument seems to have two main strands. One is that government social accountants should not be put in the position of having to make arbitrary judgments about the value of nonmarket activities that

are deemed to have sufficient economic content to warrant their inclusion in a measure of total output or income. Since the valuations of these activities would probably show more variance among social accountants than the comparatively objective or purely descriptive measures contained in the present accounts, it is thought that expansion of the accounts to cover a great many imputations would tend to make the resulting system a more arbitrary and, hence, less widely accepted and useful measure. The second strand is that mixing a greater proportion of nonmarket imputations with the existing collection of transaction-based measures would make the resulting set of accounts less viable as a tool for the analysis of production, productivity, and cyclical variability, where the main focus is clearly on market activity.[20]

My reaction to the first point is that the appropriate coverage and content of economic and social accounts should be determined by their usefulness for understanding and explaining the behavior and performance of the system, and if that imposes a greater burden on social accountants, so be it. On the second point, while I recognize the considerable utility of the existing accounts framework for the measurement of cyclical variability in the market sector, I do not see that expansion of the accounting framework, even a considerable expansion, need result in reduced usefulness for that purpose. The simplest answer to that objection is that economic and social accounts can clearly have subaccounts which deal solely with market transactions. Alternatively, economic and social accounts can have nonmarket supplements that provide additional information which can be easily integrated into the market accounts for those who wish to do so.

Another consideration, which has always seemed highly relevant to me, is that the extension and restructuring of the accounts suggested here might actually increase their usefulness for the analysis of cyclical fluctuations. To cite the obvious case, inclusion in personal consumption expenditures of the large and relatively stable lump represented by the imputed services of owner-occupied housing clearly does nothing to improve the usefulness of the accounts for cyclical analysis. The same is probably true of all the other imputations now made in the economic accounts. Hence, setting up an accounting framework with clearly defined market and nonmarket or imputed sectors has much to recommend it as a way of improving the accounts for analysis of the market or monetary part of the economic system.

[20] *See Supplementary Note A for additional discussion on this point.

In the same vein, splitting out households as a separate sector with its own capital account seems to me a considerable improvement, for purposes of analyzing investment and consumption behavior, over the present structure in which one must work with residential housing as a whole and not the owner-occupied and rental portion of the total, and where such untidy anomalies as the classification of mobile homes under "automobile parts" makes it difficult to analyze the demand for durables without taking special pains to eliminate that particularly expensive automobile part. Of course, anyone who builds cyclical behavior models from the accounts has to deal with these things as a matter of course, but it seems clearly desirable that the accounts set out household investment outlays in a way that makes it unnecessary for everyone to "roll his own," so to speak. Thus, I would reverse the argument completely, and suggest that expansion and restructuring of the existing accounts would improve their usefulness for the major purpose they are now called on to serve—a framework for the analysis of aggregate demand, output, and employment.

Finally, let me note the crucial distinction between social indicators measured in heterogeneous units and economic and social accounts covering a wide range of phenomena and measured in homogeneous units of output like dollars of constant purchasing power. In the formulation of public policy, the second has clear advantages over the first. Let me illustrate with a typical ecology problem. Assume we know that the quality of air and water resources has deteriorated by a specified level in physical terms, or more precisely, by a combination of different physical dimensions. How are we to evaluate the impact of this deterioration? The appropriate policy question surely involves a comparison of the economic and social costs of the deterioration relative to the cost of full or partial restoration. But the physical unit measures tell us nothing about economic and social loss, and before a rational policy can be formulated, someone has to translate these physical unit measures into a loss function. I would rather see that translation process carried out within the framework of an economic and social accounting system than carried out piecemeal and ad hoc by whoever has a particular ax to grind.

A SUGGESTED FRAMEWORK FOR ECONOMIC AND SOCIAL ACCOUNTS

It is not my purpose in this paper to set out a detailed accounting framework in which some parts can be measured currently and others

would have to await future developments on the data or analytical side. Rather, I propose to sketch out the broad outlines of what such a framework might consist of and the conceptual principles on which it would be based. In a later section of the paper, I take up some of the detailed questions and present some quantitative evidence on the changes implied by the proposed accounting framework relative to the present one, but these excursions are best regarded as illustrative.

I also discuss below the question of possible timetables for altering the structure of our present accounts. Some of the suggested changes could easily be implemented and many of them have in fact been implemented in existing studies.[21] Others represent changes within a well-defined framework where the empirical ingredients to implement the framework are lacking, while still others represent situations where a satisfactory analytical framework for the activity and the data required for implementation are both lacking at present. And in some cases in the last category, it is by no means clear that either the conceptual or empirical problems can be solved in a way compatible with the needs of a quantitative social accounting system.

The basic principle that ought to underline economic and social accounts is that the income (output) of the system is derived in one way or another from an implicit set of wealth accounts. Irving Fisher pointed out many years ago that all income is derived from wealth. Although few would follow Fisher in equating social income with consumption (most of us tending to follow the Haig-Marshall tradition of defining income as consumption plus net additions to wealth), the most sensible concept of income is perhaps Samuelson's suggestion of income as the discounted value of all future consumption—clearly a wealth rather than an income concept, and one that recognizes both the future consumption potential of present investment and the inherent arbitrariness of defining income in relation to a particular slice of chronological time.[22]

Although I do not suggest that it is possible or necessary to set up specific wealth accounts corresponding to the economic and social income accounts, I do suggest that the proper interpretation of various types of economic activity can always be derived from a wealth framework, and is often derived improperly if one ignores the basic propo-

[21] See note 1, above.

[22] See I. Fisher, *The Nature of Capital and Income,* New York, 1930; and P. A. Samuelson, "The Evaluation of Social Income: Capital Formation and Wealth," in F. A. Lutz and D. C. Haig, eds., *The Theory of Capital,* London, 1961.

sition that income comes from wealth and from no other source. I should note in passing that, for measurement purposes, it is often true that the only way we have to estimate the value of wealth is by capitalizing an observable income flow, but that is simply the reason why I would not argue for the necessity of a set of wealth accounts per se. The fact that wealth cannot be measured independently of income does not bear on the question of the desirability and usefulness of a wealth framework.

An implicit set of wealth accounts has two general principles of classification—type and ownership. A possible classification by type, which is not without certain ambiguities, would be:

1. Reproducible tangible wealth (structures and durable equipment).
2. Reproducible intangible wealth (the stock of disembodied socially useful knowledge).
3. Human wealth (the stock of skills and knowledge embodied in persons).
4. Natural physical resource wealth (the stock of mineral, forest, water, climate, etc., assets).
5. Sociopolitical wealth (the stock of personal and national security, freedom, equity, privacy, etc.).

The classification by ownership is the familiar one:

1. Enterprise wealth including nonprofit organizations.
2. Personal and family wealth.
3. Common property (government) wealth.

Reproducible Tangible Wealth

Of the classifications of income-producing wealth, only parts of the first, second, and fourth are currently treated in the accounts in a way that is fully consistent with the suggested framework. To the extent that reproducible tangible assets are owned by enterprises (or by the fictional enterprise that owns single-family housing), the income generated by these assets is counted as part of income and output as currently measured. However, if such assets are owned by households or governments, they are not now counted as part of the wealth and are not viewed as producing income to the owners or to society.

Any number of studies have provided empirical estimates of the stock of both household and government-owned capital assets, and many have provided quantitative estimates of the imputed income obtained from these sources; hence, the difficulty is not our inability to quantify the

relevant measure.[23] The most questionable aspect of developing the necessary imputation is that of an appropriate rate of return on these assets in both household and government sectors. For enterprise capital, implicit rates of return are obtained from an impersonal market in which competition insures (it is hoped) that resources are used to their maximum marginal social product and that the return on capital assets represents a competitive equilibrium price. That this is certainly untrue in the short run, and probably in the long run as well in many areas, does not deter social accountants from assuming that it is a good enough approximation to reality to warrant use of the available data on profits.

I do not see how it can be disputed that household capital as well as government capital also yields a return to its owners, although I can see a great deal of legitimate dispute over what an appropriate measure of that return is. For consumers, we have to face up to the analytical problem that rates of return to capital assets almost certainly differ among households: some consumers acquire capital assets by borrowing from the market at rates like 12–30 per cent per year, while others acquire assets by foregoing the income from savings accounts or other liquid assets. Viewed as investment decisions, it therefore seems that some household assets have only to yield a 5 per cent or so return to justify their acquisition, while for other households a return in excess of 20–30 per cent is needed to justify acquiring the asset. Even worse, one often finds that the same household will acquire different assets at very different borrowing costs, suggesting that returns vary among types of assets for the same household as well as among households. For example, the same household will often own a house acquired at a 6–7 per cent borrowing cost, a car acquired at a 12 per cent cost, and a refrigerator acquired at an 18 per cent or 20 per cent borrowing cost. My own preference would be to register these market borrowing costs in the imputed gross income from assets, which in practice means that aggregate gross income from household durables would be a function of the distribution of cash and credit purchases among households. Total interest costs then represent part of the flow of services, and would be subtracted from gross yields in arriving at imputed net income. This seems to me no more difficult than other procedures for estimating imputed returns, and as being closer to the market valua-

[23] See Ruggles and Ruggles, *op. cit.;* Kendrick, *op. cit.;* Juster, *op. cit.;* and R. W. Goldsmith, *The National Wealth of the United States in the Postwar Period,* Princeton University Press for NBER, 1962

tion basis than any alternative.[24] For government assets, the same general principle can be adopted; its application would suggest substantially lower rates of return for government-owned assets than for either household or enterprise assets.

Human Wealth

At present we treat human wealth in the accounts only to the extent that participation in the labor market measures the yield from human capital assets, and that resources spent on formal schooling measure some of the costs of investment in human capital. That treatment strikes me as a long way from being satisfactory, since it not only fails to recognize significant dimensions of human capital investment (in the home and in learning on the job) but also mixes together capital and current account transactions which can and should be disentangled. It is possible to consider changes in the treatment of human capital in the accounts that range all the way from full-scale integration involving the full sweep of both investment and consumption types of nonmarket activity, along with allowance for the appropriate depreciation and maintenance requirements, to a rather modest adjustment of the consumption-investment distribution that simply recognizes the investment nature of direct schooling costs. Getting better measurement of changes in the stock of human capital into the economic and social accounts seems to me of paramount importance to the development of a set of accounts that would substantially expedite analysis of the distribution of economic effort between present and future, the distribution of total wealth among families, and the process of economic growth and development.

An important aspect of the treatment of human wealth in the accounts is the appropriate treatment of nonmarket activity generally. For the most part, these activities are unmeasured simply because they represent uncompensated uses of time on the part of individuals and families. Some of these uses of time involve activities which differ little if at all from those recorded in the accounts because compensation is received —i.e., volunteer help vs. paid nurses' aides in hospitals. Others represent allocations of time which are probably best viewed as maintenance requirements of the human capital stock—sleeping, eating, some personal

[24] Enterprises as well as households borrow at different rates from the market, depending on the characteristics of the loan. Thus, inventory carrying costs or trade credit may be associated with relatively high borrowing costs, fixed investment with substantially lower ones. The accounts faithfully record these differences.

care, and possibly a good bit of what is ordinarily described as leisure. Still others represent activities with an investment implication—rearing and training one's children, job-oriented activities done on a person's own time and not at work, etc. Still others represent pure consumption —watching television, reading, and attending baseball games or concerts. Many of these activities probably represent joint outputs; raising children probably involves a consumption as well as an investment component, and television viewing is often conducted simultaneously with activities such as taking care of the ironing and washing. And finally there are the relatively straightforward, for accounting purposes, activities that simply represent unavoidable job-related costs—regrettable necessities like commuting time and costs. Some of these problems are explored in greater detail below.

Reproducible Intangible Wealth

The next asset category, reproducible intangible wealth, is meant to be coterminous with business and government outlays for research and development. These are currently treated as intermediate products in the accounts except to the limited extent that they are capitalized rather than expensed by business. But the market mechanism surely tells us that these are capital assets with an expected future return—how else does one explain the fact that firms in industries with rapid technological growth and heavy R&D outlays are apt to sell at stock market price-earning multiples of 20 or 30, while other firms in industries with stagnant technology and little or no R&D outlays are apt to sell at multiples of 8 or 10?

While one does not have to regard the stock market as a reliable barometer of all relevant economic activities, the persistence of these relationships over long periods of time suggests that firms with a heavy technological orientation somehow have more assets than show up on the balance sheet in terms of equipment and structures. These considerations also suggest, incidentally, that real profits have been growing at something in excess of reported profits, since research and development outlays have (until recently) had a much more rapid growth rate than other types of investment outlays.

The appropriate treatment here is relatively straightforward. The social accountant does have to decide which outlays can appropriately be viewed as oriented toward future rather than immediate returns, and he has to assign a depreciation rate to the accumulated stock of such outlays. But that decision is no more troublesome than the one currently

faced and resolved (pragmatically) in regard to the distinction between investment and maintenance outlay and the associated decision to use the reported data on capital depreciation.

Environmental Wealth

The final two wealth categories present, in some respects, the most difficult conceptual and measurement problems. Most of us would probably agree that both the physical and sociopolitical environment constitute some kind of asset from which the community derives benefits. In our normal business accounting procedures, which are reflected to some degree in the present economic accounts, depletion of certain types of natural resources is explicitly recognized: oil that is no longer in the ground makes us poorer in the future, as do trees that have been cut for railroad ties or house construction and even clam shells whose innards are no longer available to satisfy gourmet palates. We also recognize that natural resources which exist but are unknown or at least inaccessible have no economic and social value until resources are expended to locate and develop them for future use. But these are, of course, within the framework of a set of accounts that register resource use and change entirely within the context of enterprises that produce for sale on the market.

Other natural resources, such as temperature, precipitation, etc., do not explicitly enter any system of accounts except insofar as they are reflected in a higher or lower level of productivity in industries which find them advantageous, such as agriculture. Thus, even the business use of the asset "a warm and sunny climate" tends to be reflected in services of rental housing or owner-occupied housing in resort areas, in the yield of agricultural crops which benefit from that particular climate, and so on. Again, we appear to have an adequate social accounting representation of the benefits (or lack of them) which accrue to the operations of business firms from the use of even free natural resources. And even to the extent that the current concern over deterioration of the physical environment through misuse of natural resources is reflected in one way or other in the costs of ongoing business enterprises, our present accounts tend to recognize that fact: environmental deterioration which imposes costs on business firms will show up as higher prices of goods and services produced and sold, and even investment outlays to restrain or reverse environmental deterioration will show up as higher current investment but lower future net output as depreciation allowances result in lower earnings or higher prices or both.

There is some current dispute about the appropriate treatment of business investments in environmental control, and I will comment on that in detail below.

On the whole, to the extent that changes in stocks of physical wealth have an impact on the operations of business firms within the system, our present accounts are more or less adequate to handle the situation. The major gap is in regard to the effects of changes in physical environmental assets on the flow of direct consumption benefits to ultimate users. In principle, most of these effects could be quantified although we are a long way from being able to do so. If changes in the level and composition of water resources impose direct costs in the form of foregone recreational activities by consumers, one in principle could regard this as imposing an economic and social cost equal to the (unobservable) cost of using less convenient or desirable recreational facilities or of foregoing their use altogether. The fact that consumers cannot individually decide whether or not to buy adequate water resources for recreational needs does impose measurement and valuation problems of a kind that other consumption flows do not. But that is not clearly much different from the valuation problem arising from the fact that some consumption or investment flows result from legislative decree, such as the requirement for all children to have a minimum number of years of formal schooling to be paid for from the public treasury if necessary; the measurement problem is of course more complicated.

This subject is discussed extensively in other conference papers and elsewhere in this paper.[25] At this point I wish to argue only the straightforward proposition that environmental changes can and do have an impact on direct consumption flows as well as on business enterprises, and that these costs can, in principle, be approximated by estimates that are more difficult to make but not more arbitrary than some now included in the accounts. Thus, the differences seem to be in difficulty of measurement, not in differences of concept. The point simply is that there are physical environmental assets that provide flows of direct consumption benefits to final users, and that deterioration (or improvement) in these environmental assets will result in a reduction (or increase) in the flow of such benefits and in economic and social welfare appropriately defined. I would also note that the question whether environmental assets

[25] See the following articles in this volume: M. Olson, Jr., "Evaluating Performance in the Public Sector"; O. C. Herfindahl and A. V. Kneese, "Measuring Social and Economic Change: Benefits and Costs of Environmental Pollution"; and A. M. Rivlin, "Measuring Performance in Education."

are depreciating or appreciating is one that is capable of being answered, in principle and in fact. If air quality in New York City is less good than five years ago, or if it has improved this year over last year, the flow of benefits from environmental assets can be assumed to change in the same direction as air quality. How to measure the costs or benefits of these changes is another question, but to record the fact that benefit levels have changed is not beyond our present state of knowledge or technical competence. Similarly, we know whether use of water resources for recreational purposes is inhibited by an increasing level of pollution and whether that situation has reversed. Thus, it is possible to measure the direction of change, and the quantitative dimensions (in physical terms) of that change, in a number of significant benefit-yielding natural environmental resources.

Although the fact that directions of change in physical environmental assets can be ascertained in physical terms may not seem to create much possibility for measuring the economic and social consequences of the change, we are still better off there than in many aspects of the sociopolitical environment. I do not think that there will be much agreement, if any, on propositions such as "the United States contains more personal freedom today than ten years ago" or "real income is more (or less) equitably distributed today than ten years ago," or "the United States has more (or less) to fear from external aggression today than it had ten years ago," and so on. Sociopolitical environmental assets consist of highly subjective intangibles and in some cases they really involve subjective perceptions of reality. Nonetheless, as social accountants we have to recognize that a society which spends 10 per cent of its total output to provide for defense against potential external enemies, and another several per cent to protect itself against domestic violence, is less well off than a comparable society which can achieve the same level of national and personal security without the need to incur such costs.

This is not to say that expenditures for national or personal security reduce economic and social welfare: indeed, the usual presumption of rational political decisions is that the decline in security that would result from failure to spend these resources would more than offset the costs, and welfare would decline rather than rise.

Sectoring to Include Households and Governments

Before proceeding to discuss some of the substantive implications of this broad framework of social and economic accounts in greater

detail, including some specifics as to which parts of the framework can be implemented with existing knowledge and which clearly need to be deferred until later if implemented at all, let me comment briefly on sectoring.

The principal point that needs to be made is that it is high time we recognized the existence of household units as economic enterprises that purchase goods and services in the market and produce services for their own members. One can have serious reservations about the degree to which household activities can or should be recognized in the accounts, but I do not see how we can gain in understanding economic behavior by continuing to assume that households do nothing but consume and that what goes on inside the household is of total noninterest to economists. I have made the point before [26] that even for purposes of cyclical analysis, the fluctuations in household decisions to acquire tangible capital assets is of at least as great import as business decisions to acquire equipment and structures. Hence, I do not see how we can any longer justify a system of accounts which ignores both the tangible asset accumulations within households as sources of future income as well as the human capital producing operations in which individual households are a major source of inputs. Thus, regardless of how one feels about such matters as imputation of nonmarket activities involving the time of household members in the accounts, I do think that recognition of a capital account in the household sector has significant analytical benefits and no serious drawbacks either on the conceptual or empirical side.[27]

The same seems to me basically correct so far as community-owned or government assets are concerned. As I recall the history of government capital accounting in the U.S., its earlier adoption was vetoed largely on the grounds that it was considered to be a subterfuge by which the incumbent administration was attempting to hide the existence of a sizable deficit in the national budget. Since virtually all shades of opinion have learned to live comfortably with sizable budget deficits (only the monetary economists seem to be much concerned about budget deficits these days), there really seems no practical or analytical reason for continuing to regard the construction of particle accelerators, airports, and super highways as the economic equivalent of putting another GS-12 on the HEW payroll. (I recognize that this is an inept

[26] See Juster, *Household Capital Formation.*

[27] The sectoring problem bears directly on the crucial question of distinguishing between intermediate and final output. See Supplementary Note B, below.

illustration, since someone is sure to point out the major function of the additional GS-12 is to assist in putting together a report on community health programs, which will have a longer life than the particle accelerator, and that in this paper I have stressed the importance of measuring output rather than input!)

As regards the enterprise sector, one issue is whether business firms do or don't provide direct consumption services in addition to the goods or services they sell in the market. In its broadest aspects, the question involves nonmonetary compensation to employees in the form of benefits ranging from more pleasant working conditions to expense-paid business conferences that are 90 per cent tax-free consumption and 10 per cent business. Growth in these benefits is of course encouraged both by employee preference for some income gains in this form rather than in the form of straight compensation, as well as by their nontaxable nature.

Another less pervasive but quantitatively important type of business consumption is that provided by the structure of the advertising business in the United States. Business firms interested in persuading people to buy their product purchase space or time on various communications media like newspapers and television stations, and hope to persuade people to notice their product by providing free information or entertainment. The costs of the information or entertainment are fully charged off as business expenses and presumably show up in higher product prices, while the associated free benefits that go along with the advertising messages are not counted as consumption because they are given away free.[28] And of course a negative side of the same coin is the decline in consumption benefits from observing the local scenery while driving along roads heavily encumbered with pleas to purchase Brand X or Brand Y or to stay awake. In any event, the issue is whether business firms can in principle provide direct consumption benefits, and it would seem that the answer is yes.

IMPLEMENTING THE PROPOSED FRAMEWORK

The first part of this paper has been concerned with the broad outlines of a framework in which economic and social performance would be more effectively measured than at present. In this part I examine in greater detail some of the areas in which marked changes in treatment seem both desirable and, at last in principle, feasible. The final

[28] For empirical estimates, see Ruggles and Ruggles, *op. cit.*

section of the paper discusses the question of an appropriate timetable for implementation of the system, recognizing that some changes are presently feasible and could be accomplished immediately while others that might be equally desirable can only be implemented after substantial additional work on both the analytical and empirical side.

Revised Capital Accounts

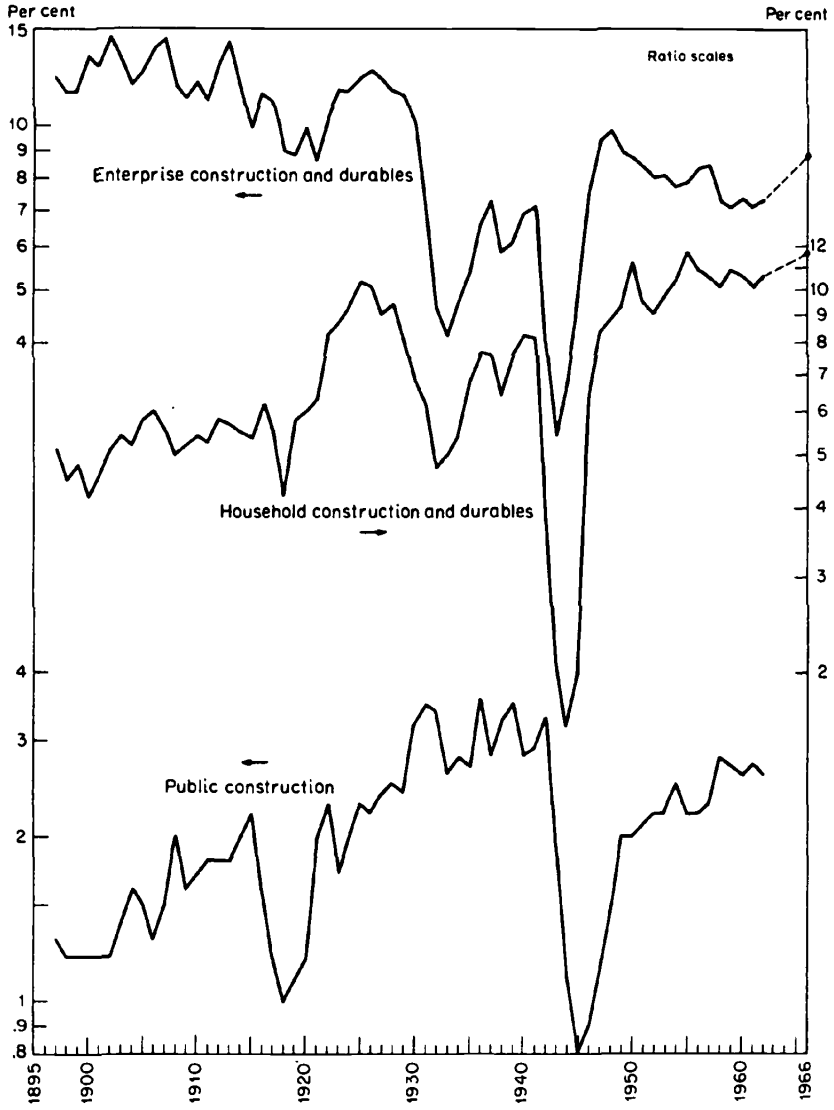
The proposition that the treatment of capital formation in the present accounts seriously distorts the distribution of economic output between present and future cannot be seriously disputed. In a study done during the mid-1960's, I examined the consequences of treating durable goods expenditures by consumers as part of gross capital formation, and of distributing residential construction into household (owner-occupied) and rental investment. The disparity in long-term trends in the investment-GNP ratio between the business enterprise and the household sector, using these definitions, is striking. For example, the ratio of business investment in structures and equipment to GNP goes from around 12–14 per cent in the early part of the century to around 7–9 per cent in the 1960's, measured in constant (1929) prices (Chart 1). While the marked cyclical variability of these expenditures shows up strongly, the virtual uninterrupted secular decline since 1900 shows up equally strongly. For the household sector, in contrast, the ratio of gross investment to GNP shows exactly the reverse trend: from a level of 5–6 per cent around the beginning of the century, household gross investment had moved to levels of 10–12 per cent by the late 1950's and early 1960's. Both cyclical fluctuations and a powerful secular trend are equally evident in the data.

Measured in current prices (Chart 2), the same trend appears, although the decline in the business investment-output ratio is not quite so pronounced while the rise in the household ratio is a bit larger. The difference in trend is unaffected, in that enterprise investment goes from about 14 per cent to about 9–10 per cent, while household investment goes from 3–4 per cent in 1900 to about 10–12 in the 1960's.

A more detailed treatment of a wider range of investment activity has been undertaken recently by Kendrick in a project still under way at the National Bureau. Kendrick's data cover the period 1929 through 1969, and provide estimates of net and gross investment in a variety of intangible capital assets as well as the more traditional tangible asset forms. Investment in intangibles includes direct schooling costs, foregone earnings of students, business and government out-

CHART 1

Business Enterprise, Household, and Public Gross Fixed Capital Formation as Ratios to GNP, 1929 Prices, 1897–1966

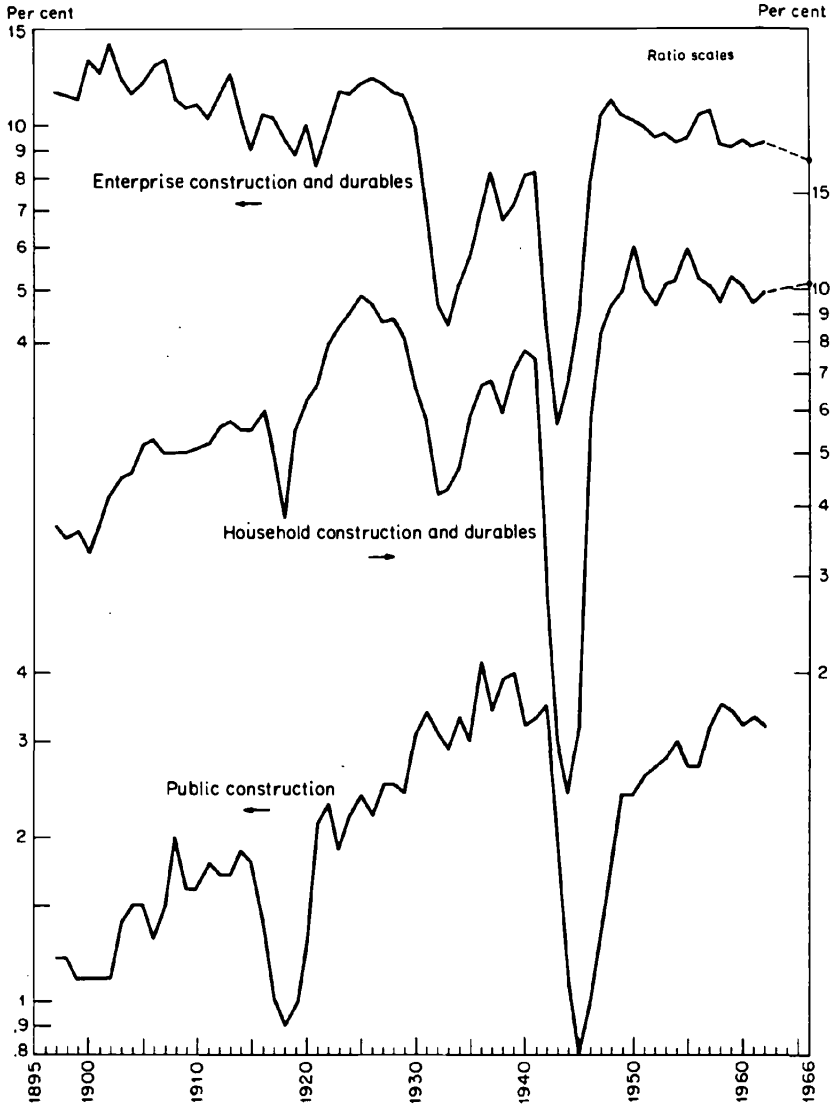


NOTE: Household capital formation includes owner-occupied residential structures and expenditures on consumer durables. Business enterprise capital formation includes capital equipment, commercial structures, and the rental part of residential structures. Public construction excludes military.

SOURCE: Data from Chart 10 in F. T. Juster, *Household Capital Formation, and Financing, 1897–1962*, New York, NBER, 1966; figures for 1966 estimated from Kendrick's data.

CHART 2

Business Enterprise, Household, and Public Gross Fixed Capital Formation as Ratios to GNP, Current Prices, 1897–1966



NOTE: See Note to Chart 1.

SOURCE: Data from Juster, *Household Capital Formation*, Chart 9; figures for 1966 estimated from Kendrick's data.

TABLE 1

Ratios of Net Investment to Net National Product, 1958 Dollars

	1929	1937	1948	1957	1966
Total investment	20.7	17.1	22.8	19.0	26.3
Investment in tangibles	11.9	10.1	12.6	8.4	13.1
Household	3.5	1.5	5.7	3.7	5.0
Government	2.3	3.8	0.2	1.4	1.7
Business	6.1	4.8	6.7	3.3	6.4
Investment in intangibles	8.8	7.0	10.2	10.6	13.2

lays for research and development, and investments in health and mobility.

For tangibles, the data shown above include business structures and equipment along with household structures and equipment and government investment in tangibles except for the military. Table 1 shows ratios of net investment to Net National Product, with the NNP figures adjusted to include imputed income from all capital assets; the data are in constant (1958) dollars. Table 2 shows ratios of gross investment to adjusted Gross National Product figures, both in current prices.[29]

The striking aspect of the Kendrick data is the behavior of investment in intangibles. Whether measured by net investment in constant prices or gross investment in current prices, investments in intangibles have risen dramatically over the past four decades. Much of this growth has taken place since World War II, judging from the difference between the 1948 and 1966 data shown in the tables. Thus, it seems unquestionably true that the relative importance of different forms of capital investment in the economy have continued to show pronounced secular shifts, with the relative importance of investments in human capital and intangible knowledge rising in importance during the last few decades (and presumably also before that, although data are lacking). There may also have been a continuation of the growing relative importance of household as contrasted to business enterprise investment in equipment and structure, a tendency which was clearly observable during the first half of the century.

The analytical implications of these data are considerable. In the first

[29] The data in Tables 1 and 2 below do not include Kendrick's estimates of the investment in children represented by rearing costs up to working age.

TABLE 2

Ratios of Gross Investment to Gross National Product, Current Dollars

	1929	1937	1948	1957	1966
Total investment	35.9	34.1	37.0	38.5	43.5
Investment in tangibles	23.0	21.2	22.7	21.6	23.0
Household	10.2	7.8	10.4	10.3	10.1
Government	2.1	3.3	1.8	2.4	2.7
Business	10.7	10.0	10.4	8.9	10.2
Investment in intangibles	12.9	12.9	14.3	16.9	20.5

place, the fraction of total U.S. economic effort devoted to future uses has not, as is often stated, tended to decline; if anything, it appears to have increased substantially. Secondly, it is probably not true that either household or total saving is characterized by secular stability relative to income; rather, there appears to be a pronounced upward trend in the saving-income ratio, providing that savings are defined appropriately. Finally, the use of capital-output ratios, and inferences drawn from them, will evidently show a quite different conclusion depending on how capital is defined.

Households as Output Producing Firms

In his definitive *National Income and Its Composition* volume, Simon Kuznets remarked about his suggested dividing line between included and excluded economic activities in the national income concept:

> Exclusion of the products of the family economy characteristic of all national income estimates, seriously limits their validity as measures of all scarce and disposable goods produced by the nation. . . . Over long periods distinct secular shifts occur in the relative contributions of the business and the family economy to the total of economic goods, most broadly defined. One must, therefore, guard against the common tendency to consider national income totals as all conclusive summaries of the scarce and disposable sources of satisfaction produced by the nation. Such summaries would become practicable only if the data improved substantially or if the family disappeared entirely as a producer of goods.[30]

Kuznets' decision to exclude intrahousehold activity as part of the output of goods and services, which has become the conventional divid-

[30] Kuznets, *National Income and Its Composition*, p. 10.

ing line, was based in part on lack of available data to implement the needed accounts and in part on a desire to limit the scope of the accounts to activities that would be generally viewed as having economic content and (implicitly) as being explainable within the traditional framework of market-based valuations.

Since Kuznets wrote, the possibility of implementing a set of household accounts has clearly improved substantially in regard to data availability; the desirability of implementing such accounts has, in my judgment, also moved in the same direction. Our present accounts ignore a great deal of purposive activity that is not only a consequence of market forces but also has strongly influenced the way in which the market has developed. Over the past several decades there has been a dramatic growth in labor-force participation on the part of females, with a resulting substitution of time spent in the market for time spent elsewhere; there has been an equally dramatic growth in the stock of household owned capital goods (durables, appliances, etc.) which has presumably increased the efficiency with which intrahousehold activities are conducted; there has been a transfer from the household to largely public institutions of functions like caring for the elderly and the permanently disabled; there have been dramatic shifts in the production function for retail trade services, away from time intensive and locationally convenient outlets toward more concentration among less time intensive and relatively less accessible locations that can be reached only by automobile, and an associated shift of storage costs from the firm to the household; and the growth of home ownership plus very rapid rises in costs for skilled craftsmen like carpenters, plumbers, electricians, etc., has probably meant that maintenance and investment activities in real property have been increasingly carried out within the household rather than in the market. We do not know what the net impact of all these changes has been on the rates of growth of market and nonmarket produced goods and services over time, but it seems increasingly important that we begin to find out.

Perhaps most important of all, analytical developments over the past decade or so have now provided us with a framework in which household activities can be systematically incorporated into economic and social accounts. Here I have in mind both the extensive development of human capital analysis with the work of Schultz, Becker, Mincer, and their associates, and the very promising beginnings of household production function analysis using a framework in which households produce utilities by combining goods purchased on the market with inputs of

their own time. The key to both the conceptual appropriateness and the empirical feasibility of implementing household accounts into a system of economic and social accounts clearly lies in the analysis and measurement of the allocation of time. To the extent that we can impute broadly agreed on valuations to the use of time outside the market, and to the extent that we can identify analytically appropriate uses of time, the complete articulation of household accounts is both appropriate and feasible.

Before examining some of the problems that would need to be resolved in the process of full implementation of household accounts, it might be well to state explicitly how our present accounts treat household activities. It is one thing to point to the difficulties and arbitrary valuation procedures that would inevitably be involved in a fully articulated set of household accounts; it is quite another to argue that our present treatment is satisfactory and that any change would make it worse. To quote an admittedly biased observer:

> At present, the accounts essentially specify that only the application of human skills to activities that result in money earnings are to be counted as output, and no adjustment is made for either positive or negative net investment in the stock of human capital. Hence, students, housewives, hospital volunteers, unpaid members of civic or social agencies, vacationers, and Wednesday afternoon golfers are all presumed to be engaged in unproductive activity.
>
> The possibilities for anomalies are boundless. . . . For example, according to the present system, output is increased if a woman stops putting in ten hours a week at a remedial reading clinic for ghetto youngsters and begins to work ten hours a week as a dental technician; output will be increased if a clinical health program manned by volunteers becomes funded through a government grant and the volunteers thus receive pay; output is increased if a man who ordinarily takes off one afternoon a week to relax is coerced into earning income during that afternoon; output is reduced if, to cite the traditional case, a man marries his housekeeper. . . .[31]

In short, our present set of accounts recognizes that human capital produces an output only when its services are purchased in the market. Nonmarket uses of such capital, whether it consists of organized and purposeful activities with a close counterpart to compensated market activities, pure leisure activities which yield direct consumption benefits like going to the opera, to a baseball game, or watching TV, activities

[31] F. T. Juster, "On the Measurement of Economic and Social Performance," NBER, *50th Annual Report,* New York, 1970.

like eating and sleeping designed to maintain the stock of human capital, activities oriented toward future market productivity and earnings such as going to school or teaching one's children, and activities like being unemployed or underemployed and thus allowing one's skill to depreciate and deteriorate are all regarded as a homogeneous collection of activities with a common value equal to zero.

Yet the first produces net output by the usual standards of market imputation, the second certainly has a positive effect on welfare although it is admittedly difficult to value, the third is a necessary cost which one would like to minimize, the fourth is an investment which will show up as future income, and the last has a net value which is at best zero and at worst substantially negative. Hence, if the choice is between staying with our current treatment or moving to implement a comprehensive treatment in which households are viewed as firms producing output with a twenty-four-hour time input to be allocated and valued, I would opt for the latter despite the formidable difficulties involved. However, there appear to be alternative and reasonably sensible way stations between these two extremes, and these may represent an intermediate target worth aiming at and capable of being reached.

Let me begin by sketching out the analytical and empirical requirements for full implementation of household accounts, then note some of the more serious difficulties. Implementation of a complete household sector account basically involves recognition of the fact that households produce output by using the services of stocks of tangible reproducible assets like houses, cars, and appliances, stocks of financial assets, and stocks of human capital assets. The latter can be used either for earning money income in the market or for a variety of activities outside the market. The present accounts incorporate the influence of household ownership of financial assets and housing; extension to other household tangible capital goods is a relatively straightforward matter and has been discussed above. Except for the underestimate of output associated with earnings that reflect a combination of market output and learning geared to future market productivity and earnings, the part of human capital allocated to the market already shows up in the accounts as the earnings of labor.

Hence, the major subject of discussion is the extension of outputs to cover the allocation of human capital to activities outside the market. These cover a wide range of activities with different conceptual content. Thus the basic problem is: How do we value the output and income

associated with the use of human capital in nonmarket activities, i.e., what value do we place on time allocated outside the market?

In one sense, the measurement and valuation problem is trivial: if we are willing to assume that all human activities are adjusted so as to yield equalized returns at the margin, all nonmarket activities can be valued at market wage rates. Thus, the gross output of human capital is an hourly wage rate multiplied by 24; for measuring net output we simply subtract the amount of time associated with human capital maintenance activities.

There is something to be said for this view on both the theoretical and empirical level. Individuals can generally allocate their time between market and nonmarket activities as they see fit, and families can do so with even greater ease than individuals because they have more flexibility in the alternative ways of allocating the total available time of all family members. The market provides us with a great many illustrations of the flexibility with which individuals and families do allocate time. Families can and do substitute purchased services (housekeeping, child care, home maintenance, etc.) for inputs of their own time, and the higher the value of time as reflected by market wage rates the more likely the substitution of purchased services for own time. Similarly, families can and do substitute market earnings for leisure or nonmarket activities, either by varying hours of time via overtime and multiple job holdings or by moving into or out of the labor force as the demands for household time vary with number and age of children, etc. A good first approximation, therefore, is that available time is allocated so as to equalize its value in all activity at the margin. If one of these activities is involvement in the market, we have a price at which time can be valued. This is essentially the approach adopted by Nordhaus and Tobin in their recent paper,[32] and it is clear that available data are sufficient to enable us to develop a broad quantification of that framework. There are, of course, some problems.

The first and most important is whether it is reasonable to assign what is usually an average observed wage rate to an allocation of time that evidently ought to be based on marginal wage rates. Except in those cases where individuals are on the margin of expanding or contracting their labor supply to the market, we cannot observe marginal wage rates. In the clearest such cases, people holding second jobs in order to augment money income, marginal wage rates are generally lower than

[32] See W. D. Nordhaus and J. Tobin, "Is Growth Obsolete?", below.

average wage rates on principal jobs, not equal to or higher than such rates. In general, however, we cannot tell whether individuals or families are at the margin on substitution of market for nonmarket activity, or whether during any given observation period they tend to have too little or too much market activity. The reason we cannot tell is the existence of conventional rigidities in time schedules in the job market. There may be a presumption that disequilibrium on the side of too little market activity, hence a marginal wage rate lower than observed wage rates, is more common than the opposite: for those whose normal schedule requires more market activity than they wish, intermittent absenteeism seems a fairly common way to make the adjustment. But for those in the opposite situation, ability to put in small additional increments of hours is less easily accomplished. Finally, nonmarket time should clearly be valued at earnings after tax rather than pre-tax, since the tax laws do not recognize nonmarket activity as generating taxable income.

We can define a number of analytically useful categories to describe the way in which human agents of production allocate time. The relevant distinctions have to do with types of activities where the appropriate valuation criteria might be different, and where imputed time values might thus vary. Candidates for the most relevant categories would be:

1. Time allocated to maintenance of the stock of human capital itself.
2. Time that represents a cost of engaging in job-market activity.
3. Time that represents a cost of maintaining the flow of intrafamily maintenance activities.
4. Time allocated to "pure" leisure or consumption.
5. Time devoted to investment in future job-market productivity.
6. Time devoted to investment in other family members (children).
7. Time devoted to purposeful activities for which some job-market counterpart exists.

To make the intended distinction a bit clearer, the kind of activities I have in mind under each of these categories are as follows: For human capital maintenance, eating, sleeping, and probably some part of leisure; for costs of job-market activity, commuting time; for intrafamily maintenance activities, housework, food preparation, etc.; for pure leisure, any activity carried on for its own sake rather than because it serves as an input into some other activity; for investment in market productivity, job search, school attendance, general skill-upgrading; for investment in other family members, primarily rearing and training children; and for purposeful market-related activities, most volunteer work like helping

in hospitals, running the boy scouts, and attending PTA executive committee meetings.

Simply running down the list of activities suggests the nature of some of the valuation problems, and they are both numerous and difficult to resolve—some, probably impossible to resolve because questions of motivation are basically at issue. Just illustrating some of the problems may seem discouraging, but my view is that many of them can be handled with just as reasonable valuation assumptions as underlie the ones we now make all the time. To pose some of the problems: How much apparent leisure is really a cost of maintaining job-market productivity, or at least a mixture of maintenance and pure consumption activity? How do we handle joint activity, such as commuting to work and reading the newspaper or having a pleasant chat with fellow commuters? Does time spent in maintaining household services like meals available on time, orderliness, cleanliness, etc., represent time spent in maintaining a *fixed* level of intrafamily household services or does the level of final output itself increase as, for example, more capital is mixed with the same or a lesser amount of labor time? Is the leisure time of a $100,000 a year man worth more than the leisure time of a $10,000 a year man? It obviously costs more, but does it have more ultimate consumption value? How do we differentiate between activities that represent both investment in future earnings on the market and also contain a significant element of final consumption because individuals enjoy learning things and improving their skills? How do we value the quality of time, as distinct from its amount, spent on rearing and training children? By market wage rates? By level of formal schooling of the parents? By the perception of an unseen observer psychologist who is an expert at child rearing? And, perhaps trivial but still important, should volunteer activities be valued at the market wage rates of their closest market counterpart or at the market wage rate of the individual volunteer in his customary pursuit? That is, is a college trained person a more effective hospital volunteer than a high school trained person?

While I do not regard any of these questions as yielding simple, unambiguous, and generally agreed upon answers at the present state of our knowledge, I also do not regard exclusions of this range of activities as being particularly helpful when it comes to evaluating economic and social performance over time. In general terms, my feeling is that many of these distinctions can be made in a reasonably objective way, and that the resulting information will on balance improve the way in which the accounts record economic activity and output flows. The valuation prob-

lems are both interesting and treacherous, and deserve a good bit of study and research before one moves much beyond a rather simple and relatively arbitrary distinction among types of activities. But it does seem to me that such distinctions can now be made, and that the above list of activity types is a reasonable initial framework.

Let me make two final points on the question of using marginal market wage rates to value activities on the assumption that time has been allocated at the margin so as to equate its value in all uses. I do not think that recognizing different valuation bases for different types of activities is necessarily inconsistent with that view. For example, the relevant marginal wage rate in a great many of the nonmarket activities discussed above may be much below the observed average wage rate for market activity. If the choice is to work an extra two hours a week in the market or to spend that time in pure leisure activities, the relevant wage rate is what could be earned in the extra two hours divided by the total amount of time it would take to expand market activities by two hours of paid work. Counting the time involved in locating a way to spend an extra two hours a week working, and adding the cost of getting to and from the additional work activity, the after-tax earning from expanding market activity could wind up being a rather small fraction of an observable market wage rate. It could well be low enough to make it worthwhile for a $50,000 a year earner to cut the grass himself, even though he could hire a teen-ager for $1.50 an hour to do so. In short, the efficient use of blocks of time for different types of activities may tend to make it difficult, though not impossible, to expand market activity by small amounts. As a result, the relevant marginal wage rates may not only be quite a bit lower than observed wage rates for many families and individuals, but may vary with the type of activity because of the transition costs of changing activities.

The second point concerns the economic and social cost of unemployment or underemployment. Evidently, a person who is unable to find market work does something with the available time; hence, we would necessarily find that such an individual undertook a number of definable activities which were presumably of less value to him than the market work he is unable to locate. In some such cases, counting unemployment or underemployment as something akin to leisure may not be inappropriate at all. Workers whose job patterns call for seasonally intensive activity combined with a Florida vacation and unemployment compensation during the off-months may be relatively rare or relatively frequent, but their unemployment does not involve much if any social cost. On

the other hand, those unable to find gainful employment for long periods of time ought to be represented in the accounts not only as enjoying "leisure" with a very small or zero value, but also as suffering declines in marketable skills as their unemployment period lengthens and their competitive position in the labor market deteriorates. While these distinctions may be difficult to draw in particular cases, I do not see them as being unmeasurable. Finally, the fact that human skills can be eroded by persistent unemployment surely warrants recognition in an accounting framework whose purpose is to measure changes in present and future wellbeing.

Environmental Assets and Returns

The question of how to treat outlays for environmental control is a major one for this conference, and is discussed in the Herfindahl-Kneese paper as well as in the background article by Denison. If I understand the discussions in both these papers, there are conceptual difficulties with either suggested treatment.

Viewing the returns from environmental assets as a flow of ultimate consumption services seems to me to provide the right framework for analysis of expenditures on environmental control equipment. Let us consider several alternative states of the world. In the first, environmental assets are never permitted to deteriorate and the flow of benefits remains unchanged at a fixed level. That is, water and air resources are maintained at a given state of physical purity corresponding to some happy condition existing in agrarian society. Through time, the growth of industrial output and changes in technology result in an increasingly serious waste disposal problem, since negative byproducts are likely to rise more sharply than the volume of output. But none of this potential emission problem is ever permitted to appear because stringent regulations require that business enterprises and households undertake defensive expenditures to filter out any possible rise in the unwanted byproducts of industrial growth. Since the by-product problem grows more rapidly than output, the implication is that defensive expenditures also grow more rapidly than output. The question is: How should we treat these defensive expenditures by enterprises and households, given that a rigid level of control is constantly maintained?

The answer seems unambiguous and straightforward. Emission filters on automobiles, tall stacks on factories, and water treatment facilities at industrial plants add nothing to the flow of economic or social benefits produced by the system. They simply represent costs of maintaining the

constant level of environmental benefits from which society is presumed to have started. To the extent that these costs are incurred by business enterprises who have larger capital stocks and depreciation allowances to show for it, the lower-than-potential rate of growth of real output which these control measures impose is appropriately measured and no adjustment needs to be made. To the extent that these costs are incurred directly by households, adjustment of price indexes to record emission control devices as a quality improvement clearly gives the wrong answer —the car does not run any better or more efficiently, and it simply costs more to get the same combination of vehicle services plus constant environmental benefits. Thus, it is not appropriate to count consumer defensive outlays as part of net output, nor is it desirable to add back in industrial defensive outlays as a part of net output.[33]

But let us be clear about the assumptions that justify these conclusions. This result follows only because it has been assumed that the flow of environmental benefits (which is, unfortunately, unobservable) remains at a fixed level and does not change over time. While the environment is not being improved by these defensive outlays, it is not being permitted to deteriorate either and thus we can avoid the difficult and possibly unmanageable problem of what to do if environmental quality is altered by defensive outlays.

The second state of the world bears a closer resemblance to what we have today, although still not (probably) a perfect one. Here, let us assume that industrial growth with its undesired byproducts is allowed to result in a deterioration of environmental assets, thus reducing the flow of environmental benefits, and that environmental quality approaches an asymptotic floor fixed by law. That is, society at some point decides that environmental deterioration has gone far enough, and imposes a set of constraints in physical terms which fixes the level of environmental benefits at something less than it was in "the good old days." At this new fixed level, environmental assets and benefit flows are maintained by defensive outlays on the part of both enterprises and households. As before, the presumption is that the level of defensive outlays necessary to maintain the given level of environmental qualities will grow through time because byproducts grow more rapidly than output.

Even in this case we still get unambiguous and defensible criteria for handling environmental control outlays. All such outlays, by assumption, fail to result in environmental improvement and are designed solely to

[33] *See Supplementary Note A for amplification of this point.

maintain a specified level of environmental quality. Thus, at no point do we have a combination of increased defensive outlays and net improvement in environmental quality; we do observe that increasingly larger outlays are needed to maintain the fixed (but lower than original) quality level. As in the first case, all the control outlays have done is to maintain a fixed level of environmental assets and benefit flows; the increasingly higher costs incurred to do so do not warrant inclusion in net output.

The only difference between case two and case one is that economic and social welfare is overstated by net output in case two, because the level of environmental benefits to consumers is less than it was before the age of industrial growth and nothing in the accounts records this fact. But from the time we begin making defensive outlays, the accounts properly register changes in the flow of final output if enterprise outlays are not counted as part of net output and if direct consumer outlays are counted as a price and cost increase but not as a quality improvement.

Before proceeding to discuss the third case, which I think looks much like what we are actually experiencing, a serious difficulty with cases one and two should be noted. The problem is that neither can represent (on any reasonable assumptions that I can think of) an optimum level of economic welfare given the resources available to society. When changing technology and growing wealth result in a rising flow of undesired byproducts which deteriorate environmental assets and benefit flows, it cannot be right to maintain environmental assets at any fixed level of quality. A slightly lower quality can always be purchased with some reduction in defensive outlays, thus making more resources available for the production of goods and services. Since the cost of maintaining constant quality is assumed to rise constantly, at some point the benefits of permitting a bit more deterioration must outweigh the costs, and an optimally ordered society would move in that direction. To put it in extreme form, it cannot be worth paying any price to maintain the stock of American eagles so that eagle connoisseurs can enjoy the benefits of bird-watching, nor can it be worth any cost to maintain all streams and rivers at sufficient levels of purity to enable anyone to drink from them without harm, etc. Thus, no society should actually adopt the kind of standards which would make welfare measurement relatively simple and straightforward. While that is unfortunate for the social accountant, it seems a modest price to pay for an improvement in welfare.

The third case supposes that society allows environmental assets and

benefit flows to deteriorate until the cost of that deterioration becomes sufficiently noticeable to arouse a public outcry, then takes steps to enforce environmental control outlays which initially result in a net improvement in environmental quality and subsequently in a more or less constantly maintained level of environmental quality. In effect, the system overshoots the eventual target by a bit in the process of getting geared up to fight environmental deterioration, then returns to a target level which is itself a variable and not a constant.

This case provides the justification for Denison's proposed treatment, which would count defensive outlays by consumers as net output and would add back into net output defensive outlays by enterprises. The justification for so doing is that these defensive measures have resulted in a clear welfare improvement (the improvement in environmental benefit flows) or else the legislation would not have been passed, and in this situation one does not want to have the national accounts recording that output growth rates have declined as a consequence of defensive expenditures.

The difficulty with this argument is that one may get the right answer (at least in terms of direction) in comparing one quarter with the previous one or one year with the previous one, but one almost certainly gets the wrong answer comparing output today with output a decade or two ago.

The case for treating defensive outlays of firms and households as part of net output and thus welfare increasing activities is that they have in fact improved environmental quality and the accounts should register that improvement. The argument against such treatment is that the environment is clearly worse today than it was in the mid-1950's, and comparison of real output between these two periods is already overstated because environmental deterioration has been permitted to occur —and the suggested treatment of defensive outlays would make the comparison even worse, not better. For the social accountant, the key to what is the appropriate measurement clearly lies in recording direct changes in the flow of environmental benefits. Welfare producing activity can be thought of as consisting of the combination of environmental benefits plus goods and services produced from available resources. If available resources are used to combat environmental deterioration, welfare must be assumed to be higher. But higher than what? The answer is that it is higher than it would have been if such outlays had not been undertaken, not higher than last quarter or last year.

Thus, we cannot tell whether welfare is improved over some past

period simply by noting that defensive outlays that yield a net return have been increased. If the outlays have been sufficient to cause a net improvement in environmental quality, welfare broadly considered may have gone up; if all the outlays have done is prevent the environment from deteriorating even further, welfare broadly considered has gone down, but not as much as it would have without the defensive outlays.

Hence, there is no solution to the treatment of environmental control outlays unless we can also quantify the change in direct consumption benefits from the environment. If such quantification were possible, environmental control outlays would represent a cost of maintaining a given quality level, but the outlays themselves are not part of net output while the direct benefit flows are.

Without quantification of direct benefit flows, I see no way to handle environmental outlays to be correct both for comparing this quarter with last quarter or this year with last year and for comparing this year with ten or twenty years ago. I take for granted that the environment, now or after national policy has succeeded in establishing higher standards than at present, will still be worse than in the simpler agrarian society from which long-term trends in output are being measured.[34] If forced to choose between alternative treatments, my own preference is to subtract defensive outlays by consumers and not to add defensive outlays by enterprises. The reason is that all defensive outlays are geared to specific aspects of environmental quality, not to the problem in its broadest prospectives, and I think it is a reasonable assumption that defensive outlays will only result in eliminating particularly apparent sources of damage and will not in general provide an improved over-all level of environmental benefits. That is, the single most reasonable assumption to make is that society recognizes that environmental quality can only be purchased at a cost, and that it is willing to live with a non-improving level of environmental benefits provided the most troublesome problems are eliminated. Thus, on the whole, outlays for environmental control tend not to result in over-all improvement, but only keep the deterioration within tolerable bounds—an assumption that amounts to no more than supposing that the political judgments underlying environmental legislation reflect a cost-benefit calculus which tends to be a reasonable approximation to optimal allocation. Different assumptions will of course produce different conclusions about appropriate treatment.

[34] That is, it will be worse considering that the benefits yielded by such environmental improvements as paved streets are considered to be counted already in the stock of government capital.

One implication of this argument, which bears on the general question of how to treat nonmarket activities in economic and social accounting systems, concerns the relevant time dimension for welfare oriented accounts and market transaction accounts. A case can be made for the proposition that cyclical variability in economic welfare is reasonably well measured by something like our existing accounts. Secular changes in economic welfare, in contrast, seem to me not necessarily well measured, and the measurement would be greatly improved by making serious attempts to account for the kinds of economic and social phenomena discussed at this conference. The treatment of environmental investment just discussed might well provide the wrong answer in terms of changes in social and economic welfare if comparisons are made between one quarter and the previous one or even one year with the previous one. The analysis would, it seems to me, provide the correct answer when comparing longer spans of time, and is thus entirely appropriate for measuring long-term rates of change. Thus, one might argue for a set of accounts which measures market phenomena on a monthly or quarterly basis, and a wide range of market-related phenomena on a less frequent basis.

The second set of environmental assets, the sociopolitical ones, is in one sense simpler to handle and in another present more conceptual problems. The reason they are simpler is that we have more of the appropriate kinds of data readily available, and the question is how to use the data rather than how to obtain it. The conceptual problems are typified by that rather ancient chestnut: how do we treat national defense outlays.

The basic difficulty with defense outlays, as I see it, is that we have no present or foreseeable way to determine, directly or indirectly, whether the asset "security from external aggression" is higher or lower as a consequence of different levels of defense outlays. It is perfectly clear that the effectiveness of any given volume of resources devoted to defense against external aggression depends entirely upon the volume of resources similarly devoted by potential external enemies. Thus, $10 billion of U.S. defense outlays buys as much security as $100 billion if Soviet and Chinese defense outlays were one-tenth their present size. It is this interaction of domestic and foreign outlays for national security that makes it impossible to decide whether the community is more or less secure than in previous years or in previous decades. Obviously, one is always more secure, given the level of foreign outlays, if one's own outlays are higher; but the mutual escalation that seems inherent in this

process ultimately seems to end up providing about the same level of security at a much higher cost.

The basic issue here as elsewhere turns on whether expanded outlays for national security have in fact resulted in net investment in the sociopolitical asset, national security.

The only clear-cut case I can think of where a rise in national defense outlays can be thought of as adding to assets rather than simply maintaining them is the case of an aggressor nation that builds up its military establishment in order to expand its territorial coverage and (presumably) derive some economic benefits by conquest. Although there are plenty of critics who regard the United States as an aggressive nation, I know of none who are willing to argue that our recent military involvements have been based on the hope that investments in military outlays would produce an economic return. The acquisition of Texas after the Mexican War may have produced an economic return and the war itself may have been motivated partly by the hope of such return, but it seems a little difficult to argue that, for example, either the Korean War or the Vietnam involvement was either motivated by, or can be sensibly analyzed in terms of, the returns to investment in aggression.

There is, incidentally, an interesting difference between the case in which defense needs (real or imagined) result in a country spending x per cent of its resources for military purposes, and the case where deterioration of the physical environment results in a country deciding to use the same x per cent of resources to control or abate pollution. In the latter case, there is a strong presumption that deterioration of the environment is a direct consequence of a normal functioning and growth of the economy; if so, the accounts clearly overstate the flow of benefits from economic growth unless they include an allowance for the negative by-products of growth. In the former case, however, aside from the military aggression case noted above, deterioration of the sociopolitical environment as manifested by the need to maintain a large or growing defense establishment is unrelated to the normal functioning and growth of the economic and social system.

If so, and if the size of the military establishment is simply an exogenous event, should one penalize the system by registering defense outlays as a cost of maintaining the sociopolitical environment? If the objective is to measure economic and social welfare, the answer seems to be yes: Resources used for defense cannot be used elsewhere, and I cannot see that it matters *for purposes of measurement* whether defense

needs are a cause of one's own actions, are real but exogenous to one's own actions, or are wholly imaginary. It does, however, make a great deal of difference *for purposes of policy decisions* whether or not the system has caused its own defense needs. If this is the case, there is a large hidden cost to a change in social policy that increases the optimum size of the defense establishment, just as there is a large hidden cost to a growth policy that produces deterioration in the physical environment as an inevitable concomitant of growth.

One solution is to make the explicit assumption that the level of the asset "national security" is entirely invariant with respect to expenditures for that purpose. That is, national security is always the same, and the only thing that varies is the cost of maintaining security at a fixed level. According to that view, all expenditures on goods and services for national defense represent maintenance costs of one aspect of the sociopolitical environment, and never represent net investment or disinvestment in that asset. Thus, it would be misleading for the social accountant to regard national wealth as increasing simply because more airplanes, tanks, etc., are being produced, or to regard stocks of military capital as depreciating because those same airplanes, tanks, etc., are wearing out. Stocks of military capital are built up when it is necessary to do so in order to maintain a given level of security, and they are allowed to depreciate when it is no longer necessary to do so in order to maintain the same level of security.

On the whole, that seems to me a sensible and justifiable treatment of the problem, and it has the added merit of being no more arbitrary than any other assumption and involving the least cost in terms of resources needed to make the calculation.

Other aspects of the sociopolitical environment, to the extent that they are measurable at all, present problems that are little different from the physical environmental ones discussed above. Freedom from violence against persons or property is a sociopolitical environmental asset that has deteriorated somewhat in recent years. The deterioration manifests itself in explicit costs that are observable and measurable—crime rates, property damage, etc. The costs of containing the deterioration within tolerable bounds are also identifiable and measurable and they comprise outlays for police and fire protection, safety locks, night watchmen, private guards, etc. All such outlays are simply costs of maintaining personal security, and if they have done nothing more than keep deterioration within limits the decline in total wellbeing is underestimated simply by removing such outlays from measured final output: the true decline

would also register the amount of deterioration in the flow of benefits in addition to the higher maintenance costs of keeping the deterioration at its present level.

Substitution of Output for Input Measures

For purposes of measuring performance, a major shortcoming of the present accounts is their orientation toward measuring outputs by the cost of inputs in areas where the measurement of true output is difficult or impossible.[35] All social accountants are well aware of these areas, and of the fact that they comprise an increasingly important portion of total output as conventionally measured. In education, health, police protection, fire protection, the administration of justice in the courts, in national defense industries, in much of construction, to cite just the obvious cases, what is recorded as output in the accounts is really some kind of cost of inputs index without any adjustment for productivity gains. These conventions have not been adopted because social accountants are lazy or incompetent or lack an innovative spirit. Rather, they have been forced on the social accountant by a general inability to devise satisfactory and independent measures of the outputs produced in these sectors. We would all like to do better than measuring the value of education output by the cost of teachers' salaries and materials plus (or often not plus) the value of buildings used for instructional purposes, but it is not yet clear that we can.

The real question is not whether we should undertake a wholesale revamping of economic and social accounts to substitute clearly superior output measures for the obviously unsatisfactory input measures now in use. Rather, the question is: Can we devise some index of output that is a closer approximation to what is wanted than the input index now in use? Put that way, it should be possible to improve on present practice in at least a number of areas. Data are becoming available which, while not directly reflecting output, at least come much closer to it than input costs. For example, there are a lot more pupil achievement scores available than used to be the case, and what the schools are supposed to be doing, among other things, is improving on those scores through time; there are data on days lost through illness and lives lost through the incidence of disease; we know a good bit about crime rates, and how

[35] This discussion refers to the measurement of changes in output in constant dollars. In current dollars, changes in input costs and output values are obviously identical by definition. Thus, we are talking about what is essentially a deflation problem.

they have changed over time; there are data on fire losses through the records of fire insurance companies; and so on. While I do not suggest that these are readily convertible into output measures, it does seem reasonable that these and similar kinds of information could be used to construct what are essentially intermediate output indexes, with the characteristic of being no worse than input indexes and, if carefully constructed, a step closer to the objective of measuring final output. That is, I would simply argue that we can do better than we have in devising proxies for the effectiveness of services where the market does not provide us with much information on output, and that it is worthwhile to spend some effort in trying to devise output proxies that could be considered candidates for an index of real output over time.

A similar argument can be made with respect to those product areas where quality change is pervasive and not generally caught in the procedures for measuring output change now in use. In general terms, a quality change is not captured in present deflation procedures unless it can be represented by an identifiable change in cost. But much quality change is not of that nature, and simply consists of the replacement of products that yield more services for the same price and cost. Such measurement is possible only if we can identify and quantify the dimensions of quality improvement, e.g., by the construction of hedonic price indexes.[36] While I am no more sanguine than the rest of the profession about the operational feasibility of being able to construct hedonic price indexes that are analytically and empirically satisfactory, it does seem that efforts along this line have at least a modest payoff in terms of measuring what the system is doing rather than what it costs to do it.

Intermediate Versus Final Output

Much of the disagreement between defenders and critics of our present system of accounts really comes down to what is a sensible definition of final and intermediate output. At present we classify everything purchased by households as final consumption, everything purchased by government as final consumption, and most of the things purchased by business enterprise as intermediate products because they later appear in different form for sale to ultimate household, government, or business users. We all recognize that this is a convenient and useful fiction, in that most of what we now call final product is really intermediate in the more

[36] For studies about both the construction of hedonic price indexes as well as the application of such quality indexes to specific industries, see Griliches, ed., *Price Indexes.*

fundamental sense. The question is: Can we devise a different set of convenient fictions that comes closer to measuring what would be generally agreed on as final product? This is a very old problem in economic and social accounts, and has been the subject of much discussion and controversy in the past. There are really no fresh analytical insights, so far as I can tell, that can be brought to bear on the question. But that does not mean that there might not be general agreement on a different set of conventions than the one embedded in our present system of accounts.

The problem is best illustrated by asking how to measure final consumption by households. At present everything purchased by households from enterprises is so classified. By the most rigid definition, only the surplus of satisfaction-yielding output over all requirements for maintenance of both tangible and human capital stock would be so classified. But what is necessary, for example, to maintain the stock of human capital is very probably a function of what people have gotten accustomed to rather than some absolute physically determined maintenance requirement. And if we further recognize that what is essential for maintenance probably depends on the degree to which it yields satisfactions comparable to those obtained by associates and neighbors, the entire concept of final output dissolves into the proposition that what is needed keeps pace with what is available and that final output is neither worth discussing or trying to measure.

One does not have to go to quite that extreme, and that is why conventional treatments are useful and analytically helpful. For example, it seems clear (at least to me) that few people prefer to commute to work if they can avoid it. In a simpler society many people walked to work because their work was very close to their home, and if they lived further away they walked because there was no choice. In our society, people locate themselves with reference to the advantages and disadvantages of distance from work place, and the fact that they choose a location from which they must ride to work and pay for it means only that any location has both positive and negative aspects, not that commuting costs are any less a cost.

In a similar vein, it can be argued that washing machines and clothes dryers are not final output, except for those few families who realize a consumption benefit from ownership per se.[37] People want washing

[37] Lancaster's approach to consumer demand theory contains an implicit analytical distinction between the intermediate and final output components of consumption goods and services.

machines and clothes dryers to wash and dry clothes, and the alternative is to wash them by hand and dry them on the line. But the output is washed and dried clothes, not the equipment or the time, which clearly represent inputs. Nor do I think families buy vacuum cleaners, dust mops, and other cleaning supplies because they derive direct consumption benefits from their ownership. Rather, what people want are houses free from dust and dirt and the stains from leftover food, and a specified level of such benefits clearly represents final output while the cleaning implements required to produce it do not.

How far one wants to push this argument is another question. Do people go on picnics because it relaxes them and therefore enables them to work more efficiently or because they like to go on picnics? I suppose the answer must differ from one family to the next, and I am not sure we can ever hope to find out whether picnics are a maintenance cost or a final output. Do families buy furniture because they need a place to sit or because they like what the furniture does to the appearance of their house? I think this is different from vacuum cleaners and dishwashers, since people do derive pleasure from contemplating a new couch and I doubt that many people derive pleasure from contemplating their new vacuum cleaner. On the other hand, it does seem to me that people go to hospitals because they are sick (or need reassurance that they are not sick), not because the food is good and the room is airy and bright. I doubt that people collectively spend money on national defense because they enjoy watching tanks and planes in the annual Army or Navy parades. I doubt that people collectively decide to put filters on their automobiles because it improves the performance of the car or produces more vehicle-services per mile; nor do I think that people pay for the services of policemen, armored cars, personal weapons, and improved locks on their cars and houses because they derive consumption benefits from these activities. So far as I am concerned, these are pure and simple costs of maintaining a flow of services from assets, and they represent final output only to the degree that they increase the flow of services from those capital assets via net investment.

Regrettable Necessities and Progress

Some recent discussions have suggested that any attempt to differentiate between final output and intermediate product in the form of regrettable necessities is incapable of improving on the current "convenient fiction" that all products sold to households and governments are homogeneous with respect to their ultimate consumption value. Es-

sentially that point is made in both Edward Denison's recent article and in Arthur Okun's note.[38] The argument is that treating commuting costs or the costs of heating and air conditioning as regrettable necessities (maintenance costs, in the terminology generally used in this paper) basically amounts to saying that it makes no difference whether people walk or ride to work or whether they do or do not have air conditioning, and that what is a regrettable necessity for those who ride to work and have air conditioned homes is surely at least as regrettable for those who do not.

The real issue seems to me somewhat different, and in fact the issue is different in the two illustrations. If I choose to locate at a fair distance from my place of work, I presumably do so with full cognizance of the fact that commuting time and costs are involved in enabling me to get to and from work. Whether commuting costs are high or low is determined by a locational decision with multiple arguments—the gains and losses associated with choosing to live at greater or lesser distances from the work place. I do not see any way out of the proposition that if the same gains could be obtained by living next door to the work place, everybody would prefer it and commuting costs would decline. Thus, I am not better off by having a car in which to ride to work; more precisely, I am not better off than if the same locational advantages could be obtained without the need to commute.

On whether expenditures on goods like air conditioning and heating are regrettable necessities, it matters greatly for the analysis whether we are comparing welfare in the same country at two different points in time or comparing it at the same point in time between two different countries with rather different natural environments. Expenditures for air conditioning and heating are essentially a way of buying reduced temperature variability. That reduction in variability has a cost, and the national income statistician would presumably judge, along with others, that the cost is worthwhile if it is incurred. But the real output obtained—more stable and comfortable temperature and humidity —is clearly higher in the case of families who purchase air conditioning and heating than for those who cannot, and the cost of the purchased inputs is a fair reflection of that difference in benefit flow.

In contrast, if one is comparing welfare in a country like the United States with welfare in the Virgin Islands, a good case can be made for saying that expenditures by U.S. residents on heating and air condition-

[38] See Denison, "Welfare Measurement and the GNP"; and A. M. Okun, "Should GNP Measure Social Welfare?" Brookings *Bulletin*, Summer 1971.

ing do not provide any more benefits than Virgin Islanders get by simply living where they do. The real output is still mean level and variability of temperature, and if it can be bought with no cost in the Virgin Islands that is surely at least as good from a welfare viewpoint as obtaining it by purchasing air conditioning and heating equipment in the United States. Thus, national accounts cannot be used to compare welfare between countries with different levels of natural resource benefit flows, although it is still true that expenditures on temperature and humidity control devices yield significant benefits for those in climates where such expenditures reduce undesired variability.

In any event, keeping a firm eye on flows of net consumption benefits yields the correct answer in both cases, while ad hoc arguments about whether one is better or worse off with air conditioning do not. Within the environmental wealth-income framework, a pleasant and relatively invariant temperature is clearly an asset which costs nothing to get in some parts of the world and a good deal to get in others. Over time, countries where this is not a natural phenomenon can acquire more of the desired good, but only at a cost. Thus, if the United States spends enough on heating and air conditioning, it can eventually attain the level of environmental benefit of the sort the Virgin Islands residents have always had with no costs at all. Appropriate welfare accounts should register that dichotomy.

It should be recognized that distinctions between final and intermediate product will inevitably have some element of arbitrariness surrounding them. That seems to me unavoidable, and I do not suggest that there are ways to get around it. Nonetheless, there are degrees of arbitrariness just like anything else, and I would argue that we can provide a better set of distinctions between intermediate and final product than the ones now embedded in the conventions underlying our existing accounts. Nothing compels us to go the complete route of intermediating virtually all of output because one could think of arguments for doing so. Converting some but not all of our present final outputs to intermediate outputs should represent an improvement in what we now measure as net output, and there is no need either to decry the fact that all such conversions that could be made were not made or that the conversions are based on the judgments of social accountants.[39] Our present accounts are partly based on that, and I simply sug-

[39] To quote Kuznets (*National Income*, p. 3): "The statistician who supposes that he can make a purely objective estimate of national income, not influenced by preconceptions concerning the 'facts,' is deluding himself, for whenever he

gest that those judgments can be significantly improved with a wide degree of consensus that the change represents an improvement.

Possible Timetables for Implementation

So far this paper has been addressed almost exclusively to examination of an economic and social accounting framework that represents an objective to aim at, not necessarily or even probably one that represents an achievable goal next year or in the next five years or even in the next decade. The pragmatic question is: Given agreement about the broad outlines of the framework, what if anything should be done immediately? Within a few years? Within the next decade?

Immediate Objectives. The suggested framework contains a number of separable changes which differ as to difficulty of implementation, agreement about the desirability of implementation, and the availability of the data with which implementation can be achieved. These changes might be categorized as follows, in roughly descending order of feasible implementation:

1. Sectoring to include households and governments as enterprises.
2. Capital accounts to include tangible consumer and government capital, intangible business capital, and some dimensions of human capital (e.g., outlays for formal schooling).
3. Provision for direct consumption benefits provided by enterprises.
4. Provision for those costs associated with maintenance of physical and sociopolitical environmental assets where the costs can easily be measured or are measured now.
5. Inclusion of the major categories of time allocated to nonmarket activities by households.
6. Substitution of output measures for input costs.
7. Improvement of present output measures for quality change not associated with distinct cost differences.
8. Provision for complete human capital accounts, going beyond schooling costs to include foregone earnings, learning and training at home, and learning and training in the job market.

includes one item or excludes another he is implicitly accepting some standard of judgment, either his own or that of the compilers of his data. There is no escaping this subjective element in the work, or freeing the results from its effects. In consequence, all national income estimates are appraisals of the end products of the economic system rather than colorless statements of fact; and, like all appraisals, they are predetermined by criteria that are at worst a matter of chance, at best a matter of deliberate choice."

9. Measurement of the direct environmental benefit flows to consumers.

As far as the first two items are concerned, there is no question that economic accounts incorporating these activities can be implemented; they already have been in several published and in-process studies. Including a household sector that does more than consume owner-occupied housing, along with a counterpart government sector that makes investments as well as provides services, and expanding the capital accounts to register investment by business in intangibles and by governments and households in formal schooling does no more than rearrange existing transaction flows in a more analytically useful framework. The only real questions involve imputations for the return on consumer and government owned capital assets, and in both cases there are available market yardsticks. In fact, there are alternative market yardsticks available, which complicates the problem somewhat. Since many of these suggested changes have regularly been advocated by virtually all critics of the present accounts since the time the accounts were framed, and since the necessary empirical measurements are available in abundance, the case for implementation as soon as resources permit seems to me entirely persuasive.

Recognition that business firms provide direct consumption benefits to households (generally but not exclusively employees) seems to have a slightly lower priority both on the data side and on the conceptual appropriateness side. One aspect of the problem is a purely institutional difference in the financing of news and entertainment; significant differences in the treatment of identical activities are created between countries where communications media are nationalized and those where they are private. The argument here rests in part on the desirability of uniform treatment, and since most developed countries have nationalized communications media, the U.S. accounts might appropriately yield to the common denominator. But the analytical arguments are compelling: one cannot question the simple fact that the news media provide information, entertainment, and opinion which is costly to produce and for which no direct charge is made. It does not seem less arbitrary to impute interest income to the owners of checking deposits for services rendered than to impute entertainment income to the viewers of television programs. In the latter case it is not even necessary to buy a joint product, since one does not have to suffer through the advertising.

Intermediate Range Implementation. The situation is perceptibly different for the next four areas on the list. There is no general agree-

ment among social accountants on how to handle either national defense outlays or defensive expenditures for environmental control—although perhaps that situation might be different at the conclusion of this conference. There are serious and perhaps insoluble measurement problems involved in the latter, since there is no way to identify changes in output that are a consequence of environmental quality legislation or requirements, as pointed out in the Herfindahl-Kneese paper. For those environmental control outlays that can be identified and measured, it appears desirable as a minimum to start collecting and tabulating information in order to have a better data base for whatever decisions eventually emerge.

On the nonmarket activity sector, the problems are both unavailability of adequate data and the need for conceptual clarification of how these activities should be valued. Both require time as well as research inputs to overcome, and we can expect that the implementation of nonmarket activities in economic and social accounting systems will have a much broader base, on both the data and the analytical side, within the next several years. Needless to say, any emerging agreement does not necessarily involve inclusion of the full range of nonmarket activities, or even of any such activities, in a fully integrated system of accounts.

Longer-Range Implementation. The last two changes are subject to much more serious difficulties than the others both in terms of available data and agreement on appropriate conceptual structures. Both lend themselves to being better understood and quantified by research efforts, of which several are reported on later in this conference. One appears more likely than the other to emerge with operationally useful concepts and available data with which to measure them—for example, full implementation of the human capital concept is probably both feasible and desirable, given research under way or in prospect. Prospects for direct measurement of environmental benefits seem a bit further off if not totally unmanageable with our present techniques, although an interesting alternative way of handling the problem was recently suggested in the Nordhaus-Tobin paper prepared for the NBER's economic growth colloquium.[40] Their approach abstracts entirely from the need to measure either physical environmental changes or the consequence of changes in flows of economic benefits, since they rely on the

[40] William Nordhaus and James Tobin, "Is Growth Obsolete?" *Economic Growth*, Fiftieth Anniversary Colloquium V, New York, NBER, 1972; the text, excluding the appendixes, is reprinted in this volume.

market to have provided equalizing wage differentials between areas with differential flows of direct environmental benefits. While physical flows on the environmental side can certainly be measured in principle with enough resources, and while the economic consequences of these flows can in principle be approximated (how much would you pay to clean up the X river so that you could swim in it?), these possibilities seem further away and more difficult to achieve.

SUPPLEMENTARY NOTE A:
Production Accounts and Output Measures

One distinction that needs to be made clear concerns the use of the accounts to measure changes in production or productivity, and their use to measure changes in economic welfare. This difference appears to be at the root of the disagreement about the proper treatment of pollution control investments. Perhaps the best way to structure this problem is to recognize that there are different levels at which the distinction between intermediate and final product can be made. Let me illustrate with the treatment of emission control devices on automobiles.

From the point of view of production and productivity analysis, equipping vehicles with emission control devices clearly represents an addition to final output. One can consider this either as the production of two separate goods—the vehicle and the emission control device —or as the production of one good with an additional dimension of performance, similar in many ways to the addition of automatic transmissions on vehicles. Thus, the accounts should record that production of goods is increased by the addition of emission filters, and if such filters are produced more efficiently and become available at lower real cost, that ought to show up in analysis of productivity in the market sector.

From a broader point of view, however, emission control devices may represent an intermediate or instrumental product rather than a final product. They clearly do nothing to increase the consumption benefits obtained from automobile services, and they may or may not expand other types of consumption benefit flows. Whether or not they do depends on whether the filter has increased the flow of environmental benefits, managed to hold the flow constant by preventing deterioration, or served only to keep deterioration within tolerable bounds. Taking a long-term view of the productivity of emission control devices suggests that either of the latter two conditions probably holds; environmental quality is presumably less good than ten years ago, and automo-

bile filters have succeeded only in making deterioration less than it otherwise would have been. While filters constitute gross investment in environmental assets, they would not result in net investment unless they have more than offset the natural forces making for environmental degradation.

Thus, vehicular emission control devices are clearly part of gross national product in current prices, and for production account purposes they are also part of gross national product in constant prices and should not be deflated out. But they would not be part of net (welfare-oriented) output in constant prices, and would appear only as an offset against the depreciation of environmental assets.

If we had direct measurements of environmental benefit flows, the capitalized value of any change in benefit flows would appear as depreciation or appreciation. The investment cost of the filters would not show up directly in this case, but would be reflected indirectly in the net amount of depreciation or appreciation. That is, in the absence of investment in filters, the implication is that there would have been either a greater amount of depreciation or a smaller amount of appreciation. If the filters have simply prevented deterioration from taking place and thus maintained environmental assets intact, the accounts should simply register the absence of any change from previous periods in environmental benefit flows. An equivalent way to produce the same result is to show depreciation on environmental assets as the precise quantitative equivalent to gross investment in such assets in the form of filters, thus having gross investment and depreciation accounts of equal size with net investment of zero.

The main point is that, for purposes of analyzing production and productivity the gross national product accounts would continue to serve their current very useful purpose of incorporating goods that are not further processed within the enterprise sector of the economy, and in valuing these goods at their costs of production. But for describing consumption and net investment flows with a welfare-orientation, a substantial range of products which make no contribution to welfare but simply prevent welfare producing assets from deteriorating should be subtracted out as representing gross but not net investment.

SUPPLEMENTARY NOTE B:
Economic Accounts and the Organization of Economic Activity

The difference in treatment in the present accounts between activities carried out in the enterprise sector and those carried out in house-

holds, as well as between activities carried out by private firms and by governments, might be regarded as analytically justifiable if the characteristics of activities were uniquely associated with their production in a particular type of economic organization. It is one thing to argue that housework or television viewing or child-rearing does not constitute economic output, while police and fire protection do, if all of the former activities are carried out solely by households and not by firms or governments while all the latter are carried out solely by governments and not by firms or households. But that argument is less persuasive if activities are carried out simultaneously within households, enterprises, and governments, with their location being determined by considerations of demand, efficiency, and cost.

The kinds of anomalous situations that most tend to irritate critics of our present accounts are precisely those in which a given activity is usually carried out by households but is, in fact, sometimes carried out by firms or governments, and where the activity is counted as output in the latter two cases but not in the former. In such situations, the valuation of total output depends on the location of particular activities, and one can get quantitatively important shifts in measured output where nothing has really changed except that production has shifted from the household to the firm or vice versa.

One way to decide whether or not a given activity should be considered as output is to ask how the activity would be handled in the accounts if it were carried out by business firms and sold for a price. Application of this criteria would exclude consideration of some types of welfare-producing activities which could not conceivably be organized by business firms and sold to consumers or government, and these turn out to be precisely the cases where the most disagreement exists with regard to inclusion or exclusion of the activity in measured output. For example, business firms can hardly sell leisure time to individuals, although they obviously sell products that are complementary to leisure time.

Let me illustrate the problem with two typical cases. The present accounts classify most activities involving protection against fire and theft as final output; these are predominantly but not exclusively activities organized by governments. Yet they can be organized by business firms, and where this is the case the costs of protection show up as intermediate rather than final product. This is true whether each firm buys its own protection or whether specialized firms produce protection and sell it to other firms. As a consequence, the services of alarm

systems or Pinkerton guards used in business are not final output, but the same services provided by municipal employees are. Moreover, alarm systems or private guards hired by individuals rather than firms are considered to be final output, just as much as the services of municipally employed policemen and patrol cars. The reason for the coexistence of private and governmental protection systems presumably is that people want different amounts of protection, and some of them choose to supplement what the government provides. But that does not make one output and the other not.

Next, educational services are produced in all three sectors. In very early childhood years, households typically produce their own education and training services for their own children. But in later years, households typically purchase educational services from either private firms or governments. The reason for this division of labor presumably has something to do with relative efficiency in the respective producing units. In early childhood years, rearing and training children is a highly unspecialized and time-intensive activity; buying the service would cost a large fraction of the earnings of a typical family, and that's why it's done by families themselves except those rich enough to afford a full-time nurse or governess. As children mature, rearing and training activities require somewhat more specialized skills but can be carried out at considerably lower unit cost, since the typical pupil-teacher ratio is a lot higher than the typical nurse-baby ratio. Hence, we have organized schools from which parents buy education services.

Moreover, one of the reasons for the relative inefficiency of market produced nursery care is that the necessary time-inputs cover most of the day but are heavily concentrated in small segments of the day. Thus, a mother taking care of her own children can do a great many other things while the children are sleeping or playing alone, while a business producing the same services cannot efficiently do any of the complementary things that mothers of young children do when not immediately occupied with the children. The pattern of time-use in the rearing and training process changes as the child matures, and that is presumably why organized schools become more efficient at some stage of the child's development. But none of this constitutes a reason to count formal schooling as output and training at home as not. The measurement problems are obviously more serious for training at home, but that seems to be the only real difference.

In measuring changes in output and income with a given set of rules about what is to be counted as output and what is not, technical change

that alters the relative efficiencies of production among different types of organizations may thus introduce essentially arbitrary changes in the measurement of output. For example, the advent of the safety razor drastically changed the distribution of barber services—toward the household and away from the business sector. Increased social frictions associated with urbanization, along with the development of sophisticated protection devices, have probably altered the mix of protective services toward the firm and away from government. Neither these nor similar changes ought to influence the measurement of output.

COMMENT

GEORGE JASZI, Department of Commerce

Although he does not say so explicitly, Juster deals with the core of the work of the Office of Business Economics. He proposes a basic restructuring of the national accounts as we prepare them currently. I am uncertain whether this response to him is a "defensive" use of my time, in Juster's sense of the term, or a use of my time that generates positive delight.

I am quite anxious because I know that I shall be excluded from the restructured measure of U.S. output if I am judged defensive. Should I be offensive to escape such ignominy?

Given the nature of my involvement, I shall not engage in intensive analysis of some of his proposals, but address myself to all of them. I shall state which of them I should like to implement and to which I am opposed. I shall give my reasons in each case, but I shall have to be brief—much briefer than desirable—because the story is long and the time I have to tell it, short.

SPECIFICS

Accounts for Tangible Consumer and Government Capital

Juster proposes the establishment of capital accounts for tangible capital held by consumers and government. I associate myself with this proposal, even though I would be more inclined than he to stress the difficulties surrounding its implementation especially in the case of government capital. Difficult decisions relating to coverage, service lives, depreciation, and valuation will have to be made.

Even though there is no real disagreement here, I should like to provide some perspective. These capital accounts are on the blueprints of

the full-fledged systems that some of the most conservative national accountants would like to implement. It would be wrong to believe that we are faced here with a novel proposition with which national economic accountants, as distinguished from the broader minded race of sociologically inclined investigators, would tend to disagree. Far from it, we at OBE, who can certainly be thought of as belonging to the former stick-in-the-mud type, have almost completed estimates of the stock of consumer capital, as I believe Juster knows, and shall proceed to estimate government capital if budgetary resources permit.

Juster mentions that in the OBE accounts mobile homes are classified with automobiles in personal consumption expenditures instead of as part of housing investment. Judging from the context, I must assume that he considers this as evidence of the shortcomings of the broader aspects of our method of dealing with consumer capital accounts. I would have to disagree with such reasoning. It would be about as cogent as reasoning that his plan for capital accounts is defective because in his paper he inadvertently omits inventories from his itemization of wealth.

If present practice is to be adduced as evidence of basic flaws, Juster could have cited a more convincing case. He could have drawn attention to the fact that we have not yet integrated our estimates of business capital with the regular publications of the accounts, and he could have pressed us about using Internal Revenue Service-based depreciation charges in lieu of economically meaningful estimates in the latter.

It is convenient here to correct Juster's interpretation of our preference for gross over net output measures. Our use of gross measures stems largely from our caution in introducing economic measures of depreciation. We do not feature the gross measures, as Juster seems to think, primarily because we believe that they are superior in economic analysis. The concepts and methods underlying economically meaningful depreciation estimates are subject to considerable controversy within the economic and accounting professions, and we also know from experience that business is quite sensitive to the measurement of depreciation because it affects corporate profits. We want to be as sure as we can about the theoretical and statistical foundation of our estimates before we incorporate them into the official accounts.

Imputed Returns on Tangible Assets

I turn to imputed rates of return on tangible assets. As far as I know, Juster has wide support for his proposition "that household capital as

well as government capital also yields a return to its owners. . . ." I certainly subscribe to it. My view that no imputation of a net rate of return to either form of capital should be made in the foreseeable future has somewhat different roots. It stems from the proposition that in some cases no estimate is preferable to a poor estimate.

I do not agree with Juster that estimating such imputed rates of return involves no greater shortfall from the ideal than do our present estimates of corporate profits. He seems to believe that we would like to measure profits as they would be in a competitive economy that is in equilibrium and in which private and social marginal products are equal; and that we settle for the profits of the actual world only because we cannot reach this goal. I have always thought that we want to measure profits of the actual world and that in measuring them we are not settling for a second-best.

I must disagree also with Juster's statement that many usable estimates of imputed net returns have actually been made. Finally, I do not think that the procedure which he suggests for consumer capital is encouraging. If I understand it correctly, it results in a zero net rate of return.

In sum, I am skeptical about prospects in this area of measurement. If any progress is to be made, the first step will have to be a clarification of what concept of a net rate of return would be useful in economic analysis. Would a variable or a fixed rate of return fit the underlying concept? And what pattern of variability, or what level of fixedness, would provide useful empirical approximations to whatever our analytical aim turns out to be?

Intangible Investment and Capital

I have difficulties in evaluating Juster's proposal to extend the measurement of investment to intangibles, because he does not provide a definition of investment. Let those who are inclined to react to this comment by saying that it is pedantic because the concept of investment is self-evident hold their fire, and try their hands at penning a definition that is satisfactory. I think they will be surprised.

Setting this handicap aside, I believe that the calculation of intangible investment and capital stocks presents problems of coverage, service life, depreciation formula, and valuation procedure that are much more difficult than the ones that are encountered in the preparation of estimates of tangible capital. I regret that lack of time compels me to let this statement stand as assertion, but expect that many who hear it will agree.

I may note in passing that Juster's statement, to the effect that it would not be more difficult to calculate depreciation charges on intangibles than it is to calculate the IRS-based depreciation charges now embedded in the accounts, leaves me aghast. As I have just noted, the IRS-based charges are practically useless in economic analysis (although they have some claim to existence because they summarize actual calculations performed by business). Also, I cannot see how, even if one wanted to, the IRS-based methodology could be transferred or adapted to the measurement of depreciation on intangible capital.

I am receptive to work on intangible investment in spite of these caveats. I am fairly ignorant on this subject, but I sense that many important kinds of specific analysis (and not just the yearning to measure welfare) require such estimates. It would seem to me that progress in this area will have to be based upon a specification of the conceptual tools that are required for the solution of problems of analysis and decisionmaking that we face. It may turn out that in the course of such a specification certain segments of the work will turn out to be more important and feasible than others and that a sensible research strategy will emerge.

Household Production

Juster proposes extensive imputations for household activities. My philosophy about imputations is that incursions into the nonmarket economy should be permitted only with stringent safeguards. In each case, the investigator should be in possession of a search warrant that is issued to him only if he can prove that he is looking for information he requires to analyze significant specific problems for the solution of which there is realistic concern; and that a search warrant should not be issued to him just because he wants to go on a fishing expedition to measure welfare. Given this predisposition, I was initially somewhat skeptical of Juster's proposed time and motion study of households, but I have come to the conclusion that the type of study he suggests might be of great interest if it were based upon the insights of individuals or groups who are sensitive to the sociological processes that are fundamental to our society, and not on the fancies of isolated research subcultures.

However, I cannot go with Juster all the way. I cannot follow him in his attempt to measure hours spent that are truly outputs and to eliminate hours that represent inputs: The reference I made at the beginning of these comments to one way in which he tries to formulate the distinction was not purely facetious. Nor can I follow him further in his attempt to

value the hours so obtained. I think that the full imagery associated with will-o'-the-wisps and quagmires is fitly displayed in connection with his attempt, and that I need do little more than to refer the reader to Juster's own discussion to document this view.

I do, however, go one step further to formulate my own bewilderment. I take it that Juster does not want to value the time spent in various types of household production by imputing to them the price of the closest market analogue. For instance, he would not want to value the time I spend doing homework with my children at the wage rate that a school teacher earns. Instead, he proposes to use the wage rate I earn. This would result in estimates in which my fumbling attempts to teach new math to my children would be valued much higher than the instruction provided to her own child by a competent school teacher. Also, it would provide no basis for valuing the time of rentiers and retired people and of preschool and school children. Surely, the welfare of these groups must be a large chunk of total welfare.

But perhaps most disturbing, I cannot see why the value of an hour of leisure should be equated to the wage rate of the person enjoying the leisure. The hourly wage rate I earn in a job that combines fatigue and boredom does not seem to have anything to do with the value of the hour I spend watching my favorite TV program. What relevance does the sum I would require to do an oven-roast for an hour have for the value I should put on an hour I spend rocking on the porch? I cannot think this through. The only thing that comes to my mind is the story of another Tom. That Tom was forced to whitewash a fence by his Aunt Polly and managed not only to get his friends to do the chore for him but also to get them to pay him for being allowed to do so. Perhaps what our Tom suggests is feasible also, especially because he is willing to settle for imputed dollars. I should add that the puzzle was suggested to me by my friend Denison; the association was mine only.

Let me note finally that Juster seems willing to put up with input measures in his proposals for household production, instead of pressing for output measures as elsewhere in his paper. I suspect that he is motivated by the biblical recognition that "sufficient unto the day is the evil thereof."

Evidently, this is an area that is full of booby traps. But even if we were successful in valuing the time spent by consumers during nonwork hours, I should like to see these estimates as supplementary information integrated into the accounting system rather than as a part of the measure of production. This is so because I cannot be shaken of the common

sense view that there is a distinction between production and leisure and that for most purposes it is useful to keep the two apart.

Miscellaneous Points

Before I turn to the environment and to other matters dealt with later in Juster's paper, I want to be sure that I have addressed myself to all the major alterations he has proposed so far. I take note of his suggestion to impute a value to the services of TV (upon further thought, other news media, including newspapers, would also be involved) and to a limited range of services provided by business to its employees. I see no objection to extending the measure of production in these two ways, although I am a little surprised that Juster is in favor of the latter extension. However, if Juster were to advocate—what to the best of my understanding he does not—measuring the "conditions of work" broadly defined, I would have to question the feasibility of such a project.

I am not sure that I have commented on everything that Juster wants us to do by way of restructuring the accounts of households (and government). In particular, I am not sure whether I have caught the full significance of his statement that the "sectoring [is] to include households and government *as enterprises*" (my italics); and I am not sure whether Juster has fully transmitted the lessons for national accounting of the burgeoning theories of human capital and household economics which we have neglected so far.

I should like also to register some skepticism about Juster's generalization that "the basic principle that ought to underlie economic and social accounts is that the income (output) of the system is derived in one way or another from an implicit set of wealth accounts." The establishment of a human wealth account leads *prima facie* to the proposition that human consumption is an intermediate product, like pig fodder. Far from being heuristically useful, the new approach which a human wealth account opens for income and output measurements is planted with snares and delusions which the national accountant will have to dodge assiduously and ingeniously if he is to reach an output concept that is worth reaching.

Environment

The management of the environment has become an important public issue and, even though the current burst of concern may not be fully sustained, it is likely to remain one in years to come. Accordingly, the national accountant should lend all the aid and assistance he can to the

analysis of environmental problems even if he is not particularly interested in the measurement of welfare. The measurement of the environment is a difficult problem and Juster does not improve the clarity of our view of it by implying that a somewhat related problem, the accounting for the depletion of natural resources, has been solved. It has not. Because of insurmountable difficulties in dealing with natural resources in a manner useful for economic analysis, the discovery value of natural resources and charges for their depletion are left out of the accounts.

If I understand him correctly, Juster believes that no wholly satisfactory way of accounting for environmental change is possible unless both the value of environmental damage and of the costs of abating it can be quantified. He also seems to see that a valuation of environmental damage is not in the cards. He is less explicit about this, however, and there are passages in his paper that point to a contrary view. But in his suggested solution for the measurement of environmental change he does not contemplate the valuation of damage, and works with antipollution expenditures only. I shall follow him in this respect and not argue that the valuation of environmental damage is indeed impossible. This is an extremely interesting and complex problem about which it is difficult to reason and which should be clarified further. But it is just as well that I need not concern myself with it in these comments which threaten to become overlong.

With the problem and its solution set in terms of the use of information relating to antipollution expenditures only, Juster advocates the omission of such expenditures when incurred by consumers and government from real output (in which they are now included). He rejects the solution advocated by Denison to the effect that antipollution costs incurred by business (now excluded from real output) should be quantified and used to interpret changes in output as now measured or, conceivably, added to it. I cannot go much further here in describing the background. But I want to note that the anomalous behavior of the present measure of output which Denison's proposal is designed to deal with is this: Real output as currently measured declines if there is a shift of factors of production to the abatement of pollution from the production of items (say automobiles) sold to consumers or government, if the abatement activities are paid for by business.

Juster presents illustrations showing that in cases in which the increase in pollution that would have occurred in the absence of antipollution expenditures by consumers (or government) is exactly offset by these expenditures, their omission will give the correct welfare answer for the

change of output whereas Denison's measure will result in an overstatement. (Because of his belief in the priority of wealth concepts, Juster would state the same condition by saying that net environmental assets are not changed by the antipollution expenditures.) Denison's measure will give a correct welfare answer in cases in which the antipollution expenditures are associated with corresponding improvements in the environment. Juster chooses the former solution on the ground, I believe, that as compared with the past, environment is not likely to improve in the long run as a result of antipollution expenditures.

I am strongly inclined toward Denison's solution on the following ground, even though it also is beset with difficulties which I shall not discuss here. I am not willing to base a general solution of the problem on the particular assumption that the increase in pollution that would have occurred in the absence of antipollution expenditures is exactly offset by them, any more than on the alternative assumption under which Denison's proposal happens to work. My disinclination to follow Juster has to do with the kind of output measure toward which his solution points. Juster's solution is based on the assumption that we can identify in the national product certain kinds of expenditures which are "defensive" (and proceed to exclude them from output).

I believe that "defensive expenditures" is a disabled veteran among output concepts which cannot be relied upon to provide effective support in output measurement. It suggests that food expenditures defend against hunger, that clothing and housing expenditures defend against cold and rain, that medical expenditures defend against sickness, and religious outlays against the fires of hell. The concept then demands that these expenditures be left out altogether, or that they be recognized only to the extent that they are not offset by a change in needs. For instance, an increase in bread production should be counted only to the extent that it is not offset by healthier appetites; an increase in the output of galoshes, to the extent it is not offset by increased rain; increase in the number of aspirin tablets, to the extent it is not offset by an increase in the number of headaches (perhaps of national income estimators who have followed Juster's advice).

I am stopping at the gates of hell. I think that it is a basic mistake to try to construct a measure of national output that attempts to exclude items on the basis of the indefensible distinction that they are "defensive," and to roll into one "needs" and "production," two concepts that should be kept apart. I should like to be able to say that bread production has increased if the number of loaves of bread produced has in-

creased, without further investigation of the state of human appetites. I prefer Denison's solution because it does not rely heavily on feeble concepts, and keeps distinct distinctions that should be kept distinct.

Output vs. Input, Intermediate vs. Final Output, and Regrettable Necessities

In the final sections of his paper, Juster discusses many important issues that are not as disparate as their titles would indicate. They have much in common and are closely related to Juster's discussion of the environment. From a heuristic standpoint it would be extremely useful to find their common factor. I shall make an incomplete attempt to do so in the following comments.

Output vs. Input Indexes. Substitution of output for input measures, for instance in measuring the services rendered by government, is obviously a worthwhile objective if it can be achieved, because, to put it most broadly, it is an essential condition for cost-benefit analysis. My only objection to Juster's approach is that he seems to associate the problem particularly with government. He does not realize in a systematic way that measurement of household consumption is beset by exactly the same problem. I am not referring to the trivial case of domestic service, but to a more general phenomenon that can be illustrated by the observation that we measure the flour, spices, butter, sugar, etc., purchased by housewives and not the cakes she bakes with these ingredients (or perhaps something even further removed). This is no different from the present treatment of government expenditures which is being criticized. We measure the labor, pencils, pens, writing pads, etc., OBE buys, and not the national accounts that some think it cooks. Or should these accounts not be counted because they are misleading indicators of welfare? Or should we try to measure an event that is even further down the line? I am not drawing the household analogy facetiously. Juster, in particular, should not think so. After all, he regards households as producing enterprises whose activity should be analyzed instead of letting them live in the benign neglect that is now granted to them as passive consumers. Incidentally, the neglect is not as complete as Juster implies. Reading his paper, one might think that we are not interested in classifications of consumer expenditures. In fact, we prepare one of the most elaborate classifications which exists.

The consumer analogy is helpful, I believe, because it brings out the generality and full complexity of this problem. I do believe that further search for improved output measures should be undertaken in spite of the

very disappointing return that research of this type has yielded to date. I am not hopeful at all that the conventions now used in the accounts can be superseded, but the work undertaken should prove useful in various kinds of specific cost-benefit analysis.

Hedonic Output Measures. Juster suggests the wider use of "hedonic" indexes based on regression techniques as an improvement over the conventional method for measuring quality change that takes into account only the quality improvement that is accompanied by an increase in real cost. When I last surveyed this territory, I came to the conclusion that the hedonic method was in principle identical to the conventional method, and best regarded as an alternative technique of implementing it. I did so in a note, in the *Review of Economics and Statistics,* which received wide neglect but, to the best of my knowledge, was not shown to be wrong.

Service vs. Goods Output. I should like to question another generalization that Juster makes about real output measurement, one that is by no means unique to him. It is that the volume of service output as a class is harder to determine than the volume of output of tangible commodities as a class. I find it easier to quantify the output of shoeshines than that of automobiles. This is not intended as a capricious example; I do not believe that the frequently voiced generalization about the relatively greater difficulty of satisfactorily measuring service than commodity output holds.

Defense and Other Defensive Government Outlays. Juster revives the hoary proposition that national defense outlays (and other "defensive" government outlays) should be excluded from the measure of national output. The argument he conducts is essentially the same as he makes for the amputation of antipollution expenditures: He claims that defense expenditures are "defensive" and therefore should be excluded from output if we assume that they offset the increase in insecurity from aggression which would have occurred in their absence, an assumption which he is willing to make. In the course of his argument he states that he doubts "that people collectively spend money on national defense because they enjoy watching tanks and planes in the annual Army or Navy parades." I believe he is somewhat short of sociological insight in making this remark. Certainly in some European countries military pomp is an important form of collective conspicuous consumption. Should not this be taken into account in comparing the welfare of nations? Also, there have been and are warlike nations to whom war is a form of production, just as hunting is production to tribes of hunters. But I should

not really be drawn into these murky speculations. I reject Juster's recommendation to amputate military production on the same ground that I reject his proposal for the treatment of the environment: The concept of "defensive outlays" is too feeble to back him up.

"Defensive outlays" is not the only concept which Juster uses in his argument. The concept of "regrettable necessities" is also introduced. This seems to be an identical twin of "defensive outlays." A third in his platoon of tottering veterans is "expenditures that are made not for their own sakes but for the sake of obtaining something else." It would be interesting to explore the relation of this concept to the other two. I know that it is at least their first cousin, but I would not be surprised if upon further analysis we would find that we are dealing with triplets. These concepts are not new. They are the Eternal Jews of national income measurement. They do not die and, unlike some other old soldiers, they do not even fade away.

In connection with the controversy about the government, I note that Juster considers our current treatment a major miscarriage. It is tantalizing therefore to read in an earlier part of his paper that our system represents only a "conceptual modification" of Kuznets in the treatment of government. In the words of Auden "the mouse we banished yesterday is an enraged rhinoceros today."

My sadness about this vicious transformation was alleviated only by an old story. A scientific congress was being harangued by a speaker who insisted that, after all, the anatomical difference between the sexes was very small. The audience listened patiently for a long time, but finally one of its members cried out: "Long live the small difference."

Commuting and Air Conditioning. In the last part of his paper Juster returns to the application of the concept of "regrettable necessities" (alias "defensive outlays") to components of consumer spending, specifically commuting and air conditioning. I do not think that he adds any new point. He comes to the conclusion, which I expected, that commuting expenditures should be omitted from the GNP. To my surprise, however, he favors the inclusion of expenditures for air conditioning. I cannot follow him in his argument in either case. In the case of commuting, for instance, it might be argued that larger expenditures for commuting buy additional environmental comfort: We buy the clean air and quiet of the suburb instead of putting up with the smoke and noise of downtown. This would seem, in Juster's own conceptual framework, to call for the inclusion of commuting expenditures. As regards air conditioning, we might argue for its exclusion on the ground that the need for it is to a

large extent the result of the rise of urban civilization in which masses of humanity are crowded together like ants in a heap. Compare the oppressiveness of the heat that threatens urban slums with that associated with rural surroundings. Thus, one might argue that an increase in air conditioning is not a sign of increased welfare. Quite to the contrary, it is a "defensive" outlay to offset a deterioration in our welfare which would be even larger if we would not defend ourselves against it.

GENERAL CONSIDERATIONS

Before I summarize the main points of my argument, I should like to mention two differences in style of thinking and working that separate me from Juster.

Differences in Styles of Research

The first of these can be illustrated by reference to the often heard proposition "It makes sense in theory but it cannot be done in practice." This proposition has some validity; undoubtedly there is some antithesis between theory and practice that results in a synthesis that is nearer to truth. But I do believe that the proposition should be kept on a short leash lest it promote empty theorizing on the one hand and mindless empiricism on the other. By and large, I like to believe that good theory works in practice. Juster's style of thinking admits a larger gulf between theory and practice than mine.

This difference is camouflaged by a second one: I have a much narrower view of what can be done in practice than he. Reading his paper, I never ceased to be amazed as to what he considers feasible: the imputation of net rates of return to intangible capital, the valuation of time spent outside work, the implementation of the concept of defensive outlays, to mention only a few examples at random. Suppose I look out of the window and decide that a good imputed rate of return on capital is 9 per cent because a much lower rate would compete with Treasury bills and a much higher rate would smack of usury. Does this act of mine prove that imputation of net rates of return is feasible? It is hard to analyze our difference. But I sense that it may be due to the fact that Juster is willing to put up with much more subjective judgment than I am, and that he is less eager than I to make sure that a solution which is dubbed feasible is also useful for the analysis of some specific problem.

In support of his contention that certain procedures are feasible, Juster often contends that procedures now used in economic accounting are just as "arbitrary" as his. But there is a great difference between the two

kinds of arbitrariness. By and large, the national accounts depict transactions in the way the transactors see them. This picture is modified only at the margin, in the interest of hardheaded economic analysis. It can be called arbitrary only if one looks at it from the vantage point of an undefined concept of welfare. As we have seen, Juster's procedures are arbitrary in quite another sense.

Impossibility of Welfare Measures

As to substance, the basic difference between Juster and myself is that he believes in the usefulness and possibility of constructing measures of welfare; I do not. Such measures are not possible because they have no boundaries; because they try to quantify what cannot be quantified; to value what cannot be valued; and to roll into one, aspects of human activity that should be kept apart. These comments have spelled out the reasons for my disbelief. In this summary I want to repeat only that it is due mainly to the fact that we cannot rely on our trio of faltering output concepts: defensive outlays, regrettable necessities, and expenditures not made for their own sakes.

I hasten to add that I am not among those who say that a measure of production is unnecessary, or that a measure of production can be defined without reference to welfare. This is the other extreme. What I do believe is that it is the art and responsibility of the national accountant to steer his ship firmly between the two extremes without veering to port or starboard.

The Need for Welfare Measures

It is often said that welfare measures are needed for economic and social analysis and for the decision-making, mostly by government, which should be based on such analysis. This argument seems weighty, but upon closer examination there is less to it than appears at first sight. One important approach to the measurement of welfare is to value elements of welfare that are not now valued, in prices at which consumers would value them in case they did value them. The other approach is to admit the value judgment of the estimator on a broad front.

As to the first approach, I cannot discuss here the great difficulties that arise in obtaining realistic consumer valuations under these conditions. The consumer is not likely to have a realistic evaluation of what he is asked to evaluate, because he does not have the daily practice of market transactions through which he learns to evaluate the things he buys and sells. In addition, he is not likely, in giving his answers, to take

his budget constraint into account. I am reminded of the story in which a customer is charged one dollar for a widget in a hardware store and protests angrily that the same widget is being sold for ten cents in the store across the street. Upon being asked by the store owner why he did not buy it across the street, he says that it was out of stock. "On days I am out of stock, I also sell it for ten cents," the store owner replies.

Even if a realistic consumer evaluation could be elicited, it is very questionable whether this evaluation would have much relevance for major government decisions. As I see it, such government decisions are made in areas in which there are important externalities and/or in which the existing distribution of income does not result in a just allocation of purchasing power. Inasmuch as the expression of subjective preferences in the market place fails to equate private and social marginal product when externalities are present, and inasmuch as these market expressions are tainted by an unjust distribution of income, I doubt very much whether measures of welfare based upon a reconstruction of individual preferences would be as useful as they are generally said to be.

Alternatively, the proposed measure of welfare could eschew a reconstruction of consumer preferences and use the judgments of the national accountant who constructs it. This would put the national accountant in an impossible position, and the results he produces would be of no use to the policymaker. Juster walks away from this issue when he says, "if that imposes a greater burden on the social accountant, so be it." If we are looking for pithy statements to summarize the essence of the situation, I prefer Okun's remark that in national accounting there is no room for philosopher-kings.

An Alternative Approach

The focus on the measurement of welfare is a snare and delusion to the national accountant. It is more fruitful to look upon his task in another way. It is his task to construct a comprehensive description of the economic process that is disciplined and realistic and, as such, useful in the analysis of problems that call for decision-making in our society. Obviously, output must be in the center of this picture, and the process that is depicted must be the production, distribution, and use of that output, because that is what our economy is all about.

In the description of this process, let him use imputations sparingly—only when they are dictated by the needs of analysis and decision-making. But even more important, let him shun amputations like hell, because they result in loss of vital information about the process.

This view of the task of the national accountant will provide tools that are feasible and useful. It does not preclude better approximations to economic welfare than are available at present, and, inasmuch as it is unnecessary to be pedantic about the delineation of what aspect of human activity is economic, the view provides for the integration of a wider range of phenomena into the accounts, more likely as supplementary information, but conceivably also as changes in the present definition of output. This view has the signal advantage over the welfare approach of putting the horse before the cart.

Usefulness of Alternative Approach

Juster admits that the present accounting framework is useful for the analysis of cyclical fluctuations, but says that this framework is becoming obsolete, because interest in cyclical problems is becoming passé. We in Washington do not share this observation—perhaps we are too provincial—and feel that Juster's position is as exaggerated as the reports of Mark Twain's death.

Moreover, Juster's emphasis on the cyclical uses of the present accounts is lopsided. His discussion would imply that the heyday of the accounts was during the Great Depression of the thirties. He seems to forget that these accounts did not see the light of day until the forties, and that the period of their most intensive use was in the postwar period in which the economy became less cycle-prone, according to Juster because of several structural changes which he enumerates in his paper.

The accounting system we now produce would be of interest also if cyclical problems were really a matter of the past. Employers and employees would remain interested in wages and profits; sales managers would want to monitor the markets in which they sell; concern with our balance of payments would continue; and government would always want to know about tax bases and tax yields—to mention only part of the intelligence that is revealed by the accounts.

Moreover, it is not true that the changes Juster proposes would not impair, but on the contrary improve, the usefulness of the accounts in their present function. In putting forward this view in the earlier part of his paper, Juster illustrates it by reference to a more careful separation of cash and imputed items, a better separation between consumption and investment, and other features that are quite compatible with the entelechy of the present accounts. He does not mention at this stage certain of his most basic proposals, for instance, his treatment of environment and national defense expenditures: all major amputations which,

unlike his imputations, would mutilate the measure of output to an extent that would make it useless in the uses to which it is now put.

Juster argues further that the reconstruction of the accounts would make them more useful for long-term economic analysis. I am not an expert on growth, and I have overdrawn the time that has been allotted to me, but permit me one more doubt: In a long-term analysis of the productivity of textile workers, would it be really advantageous to have productivity rise if these workers produce civilian suits and to set productivity at zero if they produce military uniforms?

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George Jaszi's critique of the paper by Tom Juster may seem to presage a Holy War. The battle cry of the Office of Business Economics would appear to be, "No measure is better than a poor measure." The appeal is to the great majority of us who are economists, not psychologists, and have little taste for measures of "welfare" that stem more readily from the psychiatrist's couch than the market place.

But wars are costly and it would be good to avoid this one, all the more so because on the real issues there should be no division. Rather, these issues should unite all economists in the further pursuit of more consistent and more useful measures of economic income and output, a path on which we were well and boldly started by Simon Kuznets more than a third of a century ago.

For the real issues go back to the central economic concept of income: the sum of consumption and the accumulation of capital. We may make many accommodations to institutional arrangements, and stress for convenience transactions that take place in the market. Our measures are most exact (though not necessarily most correct) for economic activity in the carefully accounted business sector. But we should never lose sight of that central concept of income, which has nothing to do with markets or business, which would exist in a socialist economy without the latter and a Crusoe economy without the former.

Income is consumption plus capital accumulation. And consumption involves services to individuals—I was about to say final services, but perhaps I should say services rendering final utility. While problems of measurement may vary, as far as that central concept goes it should not matter whether the consumption services are purchased by the house-

hold, business, or government, whether they are sold in the market or not, or even whether they have readily observable market counterparts. And capital accumulation, or investment, is part of income no matter the form or the institution in which it is accomplished, whether in the physical capital of plant and equipment and inventories measured by the OBE and the development of our wealth of natural resources which the OBE does not usually measure, or in the human or intangible capital of knowledge, training, and skills, social or individual.

If we commit ourselves firmly to that central concept, we see that the research and development expenditures of the firm may constitute just as significant investment, contributing to the flow or "growth" of future output as the firm's expenditures for plant and equipment. Similarly, the training of the worker on the job and the education of the future worker in home and school constitute investment. But also, of course, the clotheswasher acquired in the home is just as much investment as the clotheswasher acquired in the commercial laundry or laundermat. And the clotheswashing services are just as much consumption in the home as in the commercial establishment.

If we recognize that we accumulate wealth in developing our natural resources then we may not find it strange to note the decumulation of wealth in the despoiling of these resources and in the destruction of our environment. All of the environmental investment of so much current interest is then indeed clearly investment, but to be matched, or more than matched, by the disinvestment or capital consumption which takes place when we destroy the value of our air, our water, and our land.

Further, if we keep our eye on the economic activity taking place and not only on the market transaction to which it relates, there is no more—or less—reason to consider the services to business by a private detective agency as intermediate than similar services provided by municipal police. All security forces may be seen to constitute current maintenance expenditures to protect or preserve intact human and physical capital, or investment in their future preservation. But that same argument may well be extended to national defense expenditures. These too are presumably devoted to protection of the nation's human and physical capital—or to acquisition of that of another nation. They are either akin to maintenance expenditures or to gross investment, with a comparable but not necessarily equal allowance for capital consumption as weapons systems or armed forces, or their purposes become obsolete.

With the argument that the supplementary accounting called for by the revisionists among us would be arbitrary and inaccurate, the matter

of capital consumption allowances and rates of return is a good place to linger. Can there be anything more economically arbitrary than the present measures of business capital consumption allowances? They are overwhelmingly at the whim of tax considerations, and change rapidly over time as accounting depreciation in very considerable part conforms to allowable tax depreciation. The OBE's *Survey of Current Business* has itself reported the results of substantial studies documenting the vast differences in capital consumption allowances that relate to differences in depreciation methods. Would allowances for capital consumption of household and government capital have to be any more arbitrary than those currently offered for business? Freed from the tax-motivated constraints that have affected business accounting, they might more easily be permitted to correspond to a meaningful and consistent measure of economic depreciation. And if only because of the vagaries of depreciation charges but also for many other reasons relating to the arbitrariness of estimation and allocation of costs over time, there is hardly much more cause for satisfaction with the Department of Commerce estimates of earnings on business capital than with the series we outsiders would project for earnings on capital in the household and government.

The OBE is not after all universally opposed to estimating what seems conceptually important even where the record of market transactions or the figures of business accountants are not available. Most conspicuous, within the business sector itself, are inventory valuation adjustments, again "arbitrary" but accepted in the service of a central concept.

The growing band of economists devoted to innovation and expansion in our national income and product accounts does not comprise alien psychologists and other social scientists aiming to measure some mythical concept of happiness or welfare. We are concerned with the usefulness and integrity of our own economic accounts. We want our measures of income and output to permit reasonable comparisons across countries and economic systems and over time. We want measures of outputs and factor inputs to be just those and not arbitrary aggregates of activities which at a particular time and place happen to fit our quite institutionally determined categories of "final products" and the "costs" of their production. We want to be able to perceive the paths of output and input in a way that will be most useful to ascertaining the extent and factors in economic growth, for our own nation and the world.

If battle lines must be drawn I must certainly here be on the side of Tom Juster—and Richard and Nancy Ruggles, John Kendrick, William Nordhaus, and James Tobin and most of the participants in this con-

ference, including Simon Kuznets, who see no vice in boldness in the pursuit of theoretical consistency and social and economic relevance. I am hopeful and confident that George Jaszi and his able band in the government will aid us in that pursuit and, where appropriate, join us. We want no Holy War.

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I suppose I ought to take some kind of position on this hassle. Do I join the standpatters like Denison and Okun, who remind one of the unforgettable words spoken by Senator James K. Jones on the floor of the Senate: "Change the name of Arkansas? Never!" Or do I support the deviationists like Juster, who believe that the best things in life are imputed? Actually, the differences between them are not very important in a practical way. Denison and Okun only want their GNP; they can hardly complain if someone, possibly even the OBE, processes the figures further, rearranges them, adds and subtracts some things, and calls the result MEW, or measure of economic welfare, to use the Nordhaus-Tobin phrase. On the other side, Juster would presumably have no objection to publishing the quarterly MEW tables in such a way that anyone can recover the old-fashioned GNP from the data given.

This is very important. One hundred quarters of more or less comparable national income and product accounts constitute an environmental resource of some significance, at least to economists. I don't care what Tom Juster does to the figures, as long as twenty-five years from now there are two hundred quarters of comparable data available.

Actually I do care what Tom Juster does to the figures and, with some minor reservations, I think he suggests doing right and interesting things. I don't see how any reader of the Nordhaus-Tobin paper can fail to find the results fascinating and to want to know what a more extensive approach to a MEW would show. It will be done, in any case, even if only by private research workers. It will be done for the obvious reason: Just as Okun wants his GNP so that he can study the effects of stabilization policies on production and employment, so many others will want their MEW so that they can analyze and evaluate the effects of other kinds of policies on economic well-being. Exactly as with the national accounts, if the thing can be done seriously, it will eventually have to be done by the federal government—if not in OBE and Commerce, then elsewhere—because no one else has the resources. Before that can hap-

pen, however, professional economists and others will have to reach some agreement on a compromise framework that is both sensible and feasible. Juster's paper, and indeed this whole conference, are part of that process.

In that spirit, I suppose the proper thing for me to do is to raise questions where Juster's analysis and recommendations are least convincing.

For example, I confess that I have never been entirely happy with the "human capital" approach to education. I don't doubt at all that there is an investment-like element in education, with the return coming in subsequent higher productivity and wages. But I have deliberately said "investment-like" because it is not precisely clear to me that what education creates is properly a stock. It is even less clear to me that it is appropriate to add the stocks belonging to different people. I have the impression that the human capital theorists have tended to ignore—and therefore to underestimate—the consumption component of education. It has seemed to me also that they have failed to analyze the consequences for the social valuation of education of the possibility that diplomas and degrees function in part as a kind of signaling or screening device for certain traits and habits, and not simply as a scale measuring the volume of a stock accumulated. So I would have to be convinced that the right thing to do is to treat all educational expenditures as gross investment.

If I am suspicious of the stock concept as applied to human wealth, I am obviously going to be suspicious of the concept of "sociopolitical wealth." This is at best a metaphor, and not a very useful metaphor. The main trouble with it, as Juster says himself, is that it is hopelessly subjective. Am I entitled to deduct from the MEW some allowance for the activities of the Vice-President and the Attorney General if I am convinced that they are subtracting from the sociopolitical wealth of the United States? In the case of the Vice-President, can I allow for his exports of negative sociopolitical wealth to other countries? Must the figures be revised when someone with different political opinions begins to compile them? Once again, I am arguing against the superstructure, not the probable practical outcome. The main effect of adopting Juster's point of view is that, say, defense and police expenditures would be excluded from MEW unless there were independent evidence that they had done something over and above offsetting potential deterioration of national security and internal peace from other causes. That seems sensible to me.

Here, by the way, I think Denison is wrong in arguing the contrary.

He says that this procedure "yields the false result that we are equally well off whether, in the same circumstances, we . . . provide or do not provide for national security." This argument appears to be a confusion of gross and net concepts. Denison earlier agrees that NNP is in principle a better measure than GNP of the output available to satisfy needs. I could equally claim that it is not, because it makes the false claim that we are equally well off whether, in the same circumstances, we replace or do not replace worn-out machinery and buildings. Defense spending may be part of GMEW, but only that part of it that does more than offset wear and tear on the national security belongs in NMEW. (The analogue to a "worsening international situation"—assuming it were true and not mere lies as it no doubt often is—is a natural disaster that destroys a lot of existing plant and equipment. In both cases net spending is reduced for given gross spending.)

On an interesting but minor point, I think that Juster is probably wrong in arguing for the exclusion of all commuting expense from MEW. As a matter of casual observation, I am not so sure that people would really rather live near their work. Of course nobody enjoys commuting, but it is not very useful to take this view to mean that people would like to live near their work provided that the neighborhood had none of the characteristics of a neighborhood near which people work. As a matter of theoretical analysis, I think it can be shown that part of an increase in commuter expense does represent increase in welfare: loosely speaking, that part which is not offset by falling rents as you move further from the workplace.

I guess I am somewhere between the standpatters and the deviationists, but with a definite leaning toward the latter. I would like to see much more experimentation along the lines mapped out by Juster and actually followed for some distance by Nordhaus and Tobin. The experimentation needs to be both analytical and practical, with a view to finding out what can actually be done with available data, and how it can be interpreted rationally. The analytical and the practical come together on the key problem of the valuation of nonmarket activity or, more broadly, of noninternalized market activity as well. Okun seems to take it for granted that if you cannot observe a market price—hard money in the act of changing hands—that's the end of it. More adventurous souls might be willing to take a flyer on inferring valuations from a combination of theory and indirect observation.

I think it has to be kept in mind that the object of experimentation is not the definition of a perfect measure of economic welfare. Any major

step in that direction, starting from the income and product accounts, would be an achievement. What is absolutely indispensable is the evolution of some sort of professional consensus on a concept that is feasible, analytically sensible, and interpretable. Otherwise one can hardly expect the federal government to make the major investment necessary to launch a statistical enterprise against which, as in the case of the national accounts, its own performance will eventually be judged. It is enough if that concept is only an imperfect measure of economic welfare, as long as we understand what it means. I am not much impressed with the argument that others will incorrectly interpret it as a complete and perfect measure of economic welfare. Half the people who talk about the GNP every quarter don't understand what it means either.

I make my final remark with diffidence, because I ought to have thought it through myself instead of asking it as a question. One of the useful things about the income and product accounts is suggested in the name: the relation between the product side and the income side. This is not a trivial piece of good fortune. I think the main reason why the notion of social accounts has dwindled into the much more limited idea of a collection of social indicators is that there is no double-entry framework of this kind that could serve as the definitional scaffolding of theory. Now neither Juster nor Nordhaus-Tobin makes any comment about the income side of their expanded welfare accounts. They talk entirely in terms of the product side. Well, what does happen to the income side? Is there a meaningful total? Is there a meaningful breakdown? Will the traditional income categories have to be supplemented by some transpersonal account that collects benefits not imputable to any person in particular? Under ideal conditions, one can interpret the wage as the value of the marginal private product of an hour of labor. It is natural to wonder if, hidden on the income side of an ideal set of MEW accounts, is a number that could, under ideal conditions, be interpreted as the value of the marginal social product of an hour of labor.

REPLY BY JUSTER

Jaszi's comments can be grouped into three categories: First, those where he is in essential agreement with my paper; second, those where he is unhappy with my suggestions but where the differences can probably be resolved by a more careful statement of our respective positions;

third, areas where we are quite far apart on substantive issues. In quantitative terms, I would judge that despite the generally critical tone of his comments, each of the above categories contains roughly a third of the points discussed (weighted, of course). Let me make a few specific comments where I think we have no real disagreement but where misunderstanding apparently exists. I will also comment briefly on the points where substantive differences seem to be important

Jaszi notes that my suggested procedure for estimating net returns to consumer capital results in a zero estimate, presumably because I suggested that the returns be estimated from interest charges or foregone returns on liquid assets, depending on whether the purchase was financed with borrowed funds or equity funds. If all consumer capital were purchased with borrowed funds, and if the life expectancy of the capital asset coincided with the term of the loan, Jaszi would be correct. But neither condition holds. For capital assets purchased with equity funds, I do not see how the presently estimated actual or imputed interest returns to households would be affected in any way, and there would be an additional imputed interest return to households that acquired capital assets for cash. For those who borrow, the expected life of the capital assets is greatly in excess of the typical loan repayment period, and the assets would presumably continue to yield a return after the loan has been repaid. Thus, there would be some net income created by the imputation.

On the question whether one should be aghast at my suggestion that estimation of depreciation charges on intangibles present problems which are no worse than for tangible capital assets, I think there is simply a misunderstanding. I had in mind that the calculation of economic depreciation on intangibles was no worse than the calculation of economic depreciation on tangibles, not that there existed IRS data from which one could calculate intangibles depreciation as is currently done for tangibles. My assumption was that economic depreciation estimates were preferable to IRS based estimates, and that a change from the tax basis to an economic basis would be made for tangibles. The source of the misunderstanding is my own imprecise language, not the quite normal interpretation given to it by Jaszi.

On the very complicated question of how to value time spent in nonmarket activities, I did not really suggest a preferred solution but instead pointed out the range of alternative solutions and noted some of the problems arising with each. Along with Jaszi, I agree that this is a very knotty question, and I am not now prepared to argue strongly

for any one solution. Let me be a bit more specific about the alternatives. Jaszi asks whether it makes sense to value his "fumbling efforts to teach new math to his children" at his own wage rate rather than the wage rate of a professional teacher. I think he should not be so modest. My guess is that George Jaszi is substantially more productive in his "fumbling" efforts to teach new math to his own children than his child's teacher is—but that's because he is a person with a very high degree of quantitative sophistication and his child's teacher is probably not. Another way to put the question is: Why do the George Jaszi's of this world spend time in supplementing the formal training of their children by their own efforts? In part, it's because they are like any other parent and enjoy spending time with their children; helping to teach their children represents one way of spending time that they view as useful. But in part, I suggest that Jaszi's reference to teaching his children new math is not independent of the fact that he is George Jaszi rather than Alfred Kazin or Arthur Schlesinger, and that similar references by the latter two would probably be in the context of teaching their children an appreciation of literature or an understanding of political philosophy, not new math.

To put the matter more generally, I make the assumption that people generally allocate their time in a rational and systematic way, and that choices about particular activities reflect not only their own comparative advantage in different activities but also the choice between using their own time or buying the equivalent product in the market. We all do a bit of both when it comes to training children, since we buy the services of full-time teachers when the child gets to be a certain age (but not before). And it could be argued that if a person spends time in a particular activity rather than other activities, or if he buys the equivalent service where possible, the reason is that marginal products in all activities are being equalized.

The other alternative, while different, seems to me not less arbitrary; one could value nonmarket time at the wage rate of the closest market counterpart. If I teach my children new math, I get the imputed wage rate of a mathematics teacher. If I spend time shaving myself, I get the imputed wage rate of the barber. If I spend time driving my family on a Sunday afternoon outing, I get the imputed wage rate of a chauffeur. And if I spend my time watching the Monday evening football game, I get the imputed wage rate of???

In general, I do not presently see any perfectly satisfactory solution to this problem, and I do not suggest one in the paper. On the other

hand, I do not see how we can ignore the fact that nonmarket uses of time are just as productive, although harder to value, as market uses of time.

Jaszi notes that the proposal advanced by Edward Denison to deal with outlays for pollution control is really designed to deal with the problem that at present sectoral shifts in the location of pollution control outlays have an influence on the measurement of output. The reason, as Jaszi points out, is that pollution abatement activities paid for by business show up as a higher cost of producing an unchanged real output, while if the abatement activities are represented by consumer or government purchases of products, they show up as final output.

I agree that the present treatment is an anomaly, but I would point out that this anomaly is very pervasive and is, in fact, one of the considerations underlying the suggested treatment in my paper. It doesn't just apply to pollution control devices, as is surely evident. For example, if protection against theft and violence is represented by business outlays for guards, watchmen, machine guns, and pistols, it does not enter final output as presently defined; but it does enter final output if these same activities are engaged in by governments who hire policemen or consumers who purchase weapons and locks. The same is true for national defense outlays. If all of the business firms in the community got together and decided to form a private army to defend their property against external aggression, the national accounts would faithfully register the fact that national defense outlays were intermediate product and not final product. But if the citizens of the community band together through their government and decide to hire a public army, it's final output.

Finally, let me try once more to persuade the critics that the notions of "defensive outlays," "regrettable necessities," and "instrumental" outlays are neither so devoid of empirical content nor so analytically intractable as Jaszi's comments would suggest. It is certainly true, as Jaszi suggests, that defensive expenditures are not easily identified: food expenditures do defend against hunger, clothing and housing outlays do defend against cold and rain, medical expenditures do defend against illness, and so forth. But it does not follow that the defensive character of food against hunger requires that food expenditures be left out of final output. One can defend against hunger with sirloin steaks and asparagus tips followed by an after-dinner brandy; one can also defend against hunger by purchasing the appropriate mixture of soybean meal

and water. The difference between the two is that the first costs a lot and the second costs a little, and that the first goes substantially beyond defending against hunger in the direction of providing final consumption benefits net of expenditures required to maintain the stock of human capital. That really seems to be the issue here. Virtually all of my suggested defensive outlays can be characterized as outlays required to maintain a given flow of benefits from one or another type of asset, while Jaszi's objections to the concept are all illustrated by activities that go well beyond the maintenance cost of assets and thus provide net consumption benefits.

Thus, while I do not question the proposition that implementation of the defensive outlay concept is neither simple nor easy, I do insist that meaningful distinctions can be made between outlays required to maintain benefit flows from assets and outlays which are not. That is what I mean by defensive, and perhaps a better term is instrumental, or the one I use most consistently, which is simply "maintenance."