

**Expanded Measurement of Economic Activity:
Progress and Prospects**

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Too much and too long, we seem to have surrendered community excellence and community values in the mere accumulation of material things. Our gross national product ... if we should judge America by that - counts ... ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for those who break them. It counts the destruction of our redwoods and the loss of our natural wonder in chaotic sprawl. It counts napalm and the cost of a nuclear warhead, and armored cars for police who fight riots in our streets. It counts Whitman's rifle and Speck's knife, and the television programs which glorify violence in order to sell toys to our children.

Yet the gross national product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages; the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage; neither our wisdom nor our learning; neither our compassion nor our devotion to our country; it measures everything, in short, except that which makes life worthwhile. And it tells us everything about America except why we are proud that we are Americans.

Robert F. Kennedy, Address, University of Kansas, Lawrence, Kansas, March 18, 1968

During the Great Depression of the 1930s, the absence of systematic information on economic activity was a significant impediment to the development of sound economic policy. Recognition of policy makers' critical need for better information about current economic conditions gave impetus to work then underway in the United States to develop the nascent National Income and Product Accounts (NIPAs). The NIPAs, produced by the Bureau of Economic Analysis (BEA), have come to be recognized as a signature accomplishment. In the words of then-Secretary of Commerce William Daley, speaking in December 1999 about the work of the Department of Commerce during the 20th century, "As we searched for our greatest achievement, something... that had the greatest impact on America, it was the invention of the national economic accounts" (Daley 1999).

The NIPAs were designed from the start to serve the needs of policy makers and continue to be critical in meeting those needs. ELABORATE. While the importance of the NIPAs is widely recognized, the limitations inherent in their design also are well known—Simon Kuznets,

the person most responsible for the early work to develop the NIPAs, himself noted that “the welfare of a nation can scarcely be inferred from a measurement of national income as defined [by the GDP]” (Kuznets 1934). This does not imply that the existing accounts lack value or should be replaced—indeed, it would in my view be a grievous mistake to do anything to jeopardize their continuity. The existing accounts, however, may be seen as providing a framework on which a set of expanded accounts designed to meet additional needs can be built.

Building on the Existing Economic Accounts

In an influential paper, Nordhaus and Tobin (1972) discussed the limitations of GDP as a welfare measure, going on to suggest the rough outlines of an alternative measure that, among other things, would reclassify certain expenditures such as spending on police or defense as intermediate rather than final outputs (necessary for the production of output but not of value in and of themselves) and account for the services of household labor and consumer durables. Pioneering work by Kendrick (1976) and Eisner (1985, 1988, and 1989) proposed expanded accounts that incorporated investments in human as well as physical capital. Interest in expanded economic accounting has been reinvigorated over the past decade, with two major reports on the subject issued in the mid-to-late 2000s.

The first of these recent reports, a 2005 National Research Council volume titled *Beyond the Market*, laid out a framework for a set of satellite accounts for home production; government and the nonprofit sector; education and health; and the environment that would complement the existing NIPAs. Key recommendations concerning the methods for developing the proposed set of satellite accounts included (1) measuring the value of outputs separately from the value of inputs (including nonmarket time); (2) using monetary rather than physical metrics; and (3)

assigning marginal valuations wherever possible based on the outcomes of market activities (Abraham and Mackie 2005, 2006).

The 2009 report of the Stiglitz-Sen-Fitoussi Commission—more formally, the Commission on the Measurement of Economic Performance and Social Progress—was broader in scope. A portion of this report was focused on what its authors termed classical GDP issues—broadening measures of household activity, improving measures of government services, examining income and consumption as well as production, and considering distribution as well as aggregate levels. In addition, however, it discussed measures of the quality of life and the sustainability of economic development and the environment. With respect to the quality of life, the Stiglitz-Sen-Fitoussi report encouraged the measurement of subjective well-being and the consideration of objective factors such as education, health, time use, political voice, social connections and insecurity that shape subject well-being. With respect to sustainability, it argued for the development of a sustainability dashboard that focused on the “stocks” that underpin well-being, with separate measures for economic and environmental sustainability (Stiglitz, Sen and Fitoussi, 2009).

As these reports suggest, there are multiple possible objectives for an expanded set of economic accounts. First, expanded accounts might provide more complete measures of investment in capital—broadly speaking, any stock that contributes to the nation’s future productive capacity. Traditional measures of investment reflected spending only on physical plant and equipment. In a knowledge economy, however, business investment in intangible capital has become increasingly important. Taking a broader perspective, households also make substantial investments in intangible human capital that are not captured as such in the existing accounts. Second, expanded accounts could provide more accurate measures of output and

productivity in key sectors such as education, health and government. Third, most closely in the spirit of the remarks by Robert Kennedy quoted at the beginning of this essay, expanded accounts could contribute to the assessment of trends in societal welfare or well-being. Finally, something that is not addressed here but undoubtedly merits further exploration, an appropriately-structured set of expanded accounts could contribute to an assessment of environmental sustainability.

Accounting for Investment in Education

Even within the existing NIPAs, as the importance of intangible capital has grown, the treatment of investment in such capital has evolved. Investment in software was incorporated in the NIPAs in 1999 and investment in research and development will be incorporated later in 2013 (Aizcorbe, Moylan and Robbins 2009). In principle, other forms of business investment in intangibles, such as firm-specific human capital or organizational capital associated with the adoption of productivity-enhancing business practices, also could be incorporated (see, for example, Corrado, Hulten and Sichel 2005, 2006).

Because the existing accounts are not structured to reflect household investment, however, it would be more difficult to incorporate the investments in own human capital made by members of households. Perhaps more importantly, the data needed to measure household investments generally are not available in “real time” or at quarterly frequencies. Further, information about household investment arguably is important primarily for understanding long-term trends rather than short-term fluctuations, meaning that quarterly accounting for such investment would serve little value. The development of satellite accounts for investments in

human capital, and in particular for investments in education and health, offers a possible path forward.

Figure 1, adapted from a similar figure that appeared in *Beyond the Market*, shows the potential elements of a double-entry education satellite account. The costs of investing in education are shown on the left-hand side of the figure; these include not only items whose costs should already be reflected in some fashion in the NIPAs, such as the paid labor of teachers and support staff, the cost of books and other materials, and expenditures on school buildings, computers and other equipment, but also the unpaid time of students, their parents and school volunteers. The outputs associated with investments in education are shown on the right-hand side; these include not only higher workplace productivity, which should be reflected in higher earnings for more educated workers and thus incorporated into the income side of the existing accounts, but also the higher *nonmarket* productivity of more educated individuals together with a broader set of intangible benefits associated with having a more educated citizenry.

The two sides of Figure 1 correspond to the alternative approaches that have been taken in the literature for measuring the value of educational investments. One strand of this literature, exemplified by Schultz (1961), Kendrick (1976) and Eisner (1985, 1988, 1989) has quantified investment in education based on the costs of the associated inputs, including both market and nonmarket time. The other strand in the literature, tracing back to Weisbrod (1961) and developed more fully by Jorgenson and Fraumeni (1989, 1992a, 1992b), measures the investment in education based on the estimated present value of the increment to earnings attributable to education. The two approaches yield very different answers: Estimates of the present value of the increments to earnings attributable to education generally are *much* larger than estimates of the cost of providing that education. These estimates can be reconciled in an

accounting sense by treating the excess of returns over costs as “profits” accruing to the household sector, but this is not entirely satisfactory.

Over the last five years, the Organization for Economic Cooperation and Development (OECD) has begun a major project to measure national investments in human capital. The project seeks in its first phase to build Jorgenson-Fraumeni-type estimates of the value of investment in education and the resulting stock of human capital across many of the OECD member countries (Liu 2011). Data inputs to the project include labor force surveys and country-specific mortality tables that provide information on school enrollment rates by age, gender and previous educational attainment, up to age 40; employment rates and annual earnings by age, gender and educational attainment; and survival rates by age and gender. The project is focused on the returns to education realized in work by persons aged 16 to 64; whereas nonmarket returns (higher productivity of more educated persons in nonmarket activities) are a large part of the returns to education estimated in Jorgenson and Fraumeni’s work, the OECD estimates do not incorporate nonmarket returns. Early results show that, even restricting attention to market returns, the estimated value of the stock of educational human capital generally is much larger than the value of traditional physical capital in those same countries.

Given the early stage of the OECD initiative, there are not surprisingly still a number of outstanding issues concerning the resulting estimates to be resolved. As in the Jorgenson-Fraumeni papers, these estimates of how educational attainment affects earnings begin with data for a synthetic cohort of individuals whose current earnings are used to infer the life-cycle pattern of earnings for people with different amounts of education. To the extent that the relative earnings of those with different amounts of education vary over time due to changes in demand conditions or that the quality of education has changed, however, using synthetic cohort data to

proxy for expected future earnings could be misleading. It is also possible that those with higher education tend to benefit more from other sorts of investment in human capital—early childhood investments, investments in on-the-job-training or investments in health—and that this confounds the estimates of the return to education. Even leaving these potential issues aside, estimates of the present value of the anticipated returns to education are sensitive to assumptions about future earnings growth, the discount rate and the effect of failing to complete a year of schooling on expected educational attainment. Given the nature of the data on which they are based, the estimates produced to date have been relatively aggregated; for many purposes, estimates disaggregated by level and type of schooling would be of value. Finally, estimates of investment in education based on anticipated future earnings ultimately should be reconciled with estimates based on the costs of obtaining that education.¹ These many challenges notwithstanding, the OECD project is an important step towards the development of a more comprehensive education satellite account.

The growing interest within the statistical community in the measurement of investment in education has been paralleled by a growing interest among policy officials in better understanding what we are spending on education and what we are getting for that expenditure. All levels of education, including early childhood and K-12 education, have attracted attention and calls for reform, but for tractability I will restrict my attention here to higher education policy. The growing policy interest in higher education has been driven largely by growth in the costs of college attendance as well as by questions about whether the returns to investment in a college education justify the required expenditure. For present purposes, I would like to emphasize the strong potential linkages between the policy interest in college affordability and

¹ See Abraham (2010) for further discussion of these issues.

the work already underway within the statistical community to develop an educational satellite account.

By way of background, average published tuition and fees at public U.S. four-year colleges and universities—the schools that most students who pursue a bachelors degree attend—have grown rapidly over the past decade, increasing 5.2 percent per year in real terms between 2002-3 and 2012-13, from \$5,210 per year in 2002-3 to an estimated \$8,660 per year in 2012-13 (2012 dollars, exclusive of room and board) (College Board 2012). Thanks in large part to growth in Federal educational assistance in the form of Pell grants and the American Opportunity Tax Credit (AOTC), the net prices actually paid by students have grown much less than sticker prices over this period. Pell Grant expenditures totaled an estimated \$35.6 billion in 2010-2011, with awards reaching about 9.3 million undergraduates, about half of the student population, compared to \$14.7 billion in Pell Grants and 5.5 million students assisted in 2007-2008 (Department of the Treasury 2012). The AOTC was introduced in 2009; it can be claimed for four years rather just two years, is partially refundable and has higher family income limits than the Hope Credit it replaced. In 2009, the latest year for which data are available, nearly 12 million taxpayers (8.3 percent of all returns) claimed the AOTC and the value of the credit to these taxpayers totaled \$12.3 billion. After adjusting for grants (from all sources) and tax credits, average net tuition at public four-year colleges and universities grew from \$X,XXX in 2002-3 to \$X,XXX in 2012-13, an increase of \$X,XXX, much less than the \$X,XXX increase in sticker prices at the same schools noted above (College Board 2012).

While Federal financial aid for education has played a critical role in helping to keep college affordable, offsetting future increases in the costs of higher education with continued growth in Federal financial assistance is unlikely to be a viable strategy. College graduates

continue to earn substantially more than those with lower levels of education and college enrollments have remained high, but the large amounts of both public and private money flowing into higher education have led to increasing discussion in the policy sphere of the value proposition associated with these investments. As a result, there is growing interest in developing the data needed to track the outcomes of those who attend and graduate from institutions of higher education.

It turns out that the information needed to construct the higher education component of an education satellite account is very similar to the information that policy makers will need in order to be able to evaluate the performance of the higher education sector as a whole and, at a more disaggregated level, the performance of different types of schools and even individual higher education institutions and programs. This confluence creates both new opportunities and new urgency for work to develop an education satellite account.

A major barrier to satisfying both objectives—the statistical analysts’ interest in developing an education satellite account and the policy makers’ interest in holding the educational sector accountable—has been the lack of data that allow student outcomes to be monitored. Starting in YEAR, the Department of Education has awarded grants to a total of XX states to build student-level longitudinal data systems. When fully realized, these longitudinal data systems will allow students to be tracked from the K-12 grades through any higher education institutions they may attend and into the workforce. ADD SOME DETAILS ON WHAT ED HAS SUPPORTED AND FUTURE PLANS, WITH EMPHASIS ON PORTION OF THIS WORK RELATED TO HIGHER EDUCATION.

More directly related to the desire to hold institutions of higher education accountable for their performance, the Department of Education has announced plans to produce scorecards for

colleges and universities that will make it easier for students and their families to make initial comparisons across the different institutions they may be considering. Plans for the scorecard call for measures of the annual cost of attendance, graduation rates, debt incurred by students who attend the institution, and the post-graduation earnings of those who earn a degree from the institution. Some of this information is presently available, but the earnings piece of the scorecard will require student-level information about those who attend a particular institution to be linked to administrative information about those students' employment and earnings in the years following graduation. The measures currently planned for the scorecards refer to relatively short term earnings outcomes, but longer-term earnings outcome measures also could in principle be developed.

These developments in the policy sphere can be expected to lead to improvements in the data available to those working to develop satellite accounts for education. The state longitudinal data systems, for example, ultimately should be helpful to analysts for identifying the return to higher education separately from the return to earlier school experiences. Data that relate the institution attended or even perhaps the courses of study pursued to labor market outcomes ultimately should be able to support the construction of more disaggregated estimates of the return to education. Further, the intense policy interest in understanding what we are getting from our investments in higher education implies that there is likely to be an appetite for aggregated statistical measures of the sort that would be embodied in a satellite account for education.

Accounting for Investment in Health

Figure 2, adapted from a similar figure that appeared in *Beyond the Market*, shows the potential elements of a double-entry health satellite account. The costs of investing in health are shown on the left-hand side of the figure; these include not only items whose costs should already be reflected on the product side of the NIPAs, such as payments to health care providers, but also items that are not reflected in the NIPAs, such as the value of the time that individuals invest in their own health and the time of unpaid family caregivers. On the output side, better health is associated not only with higher market earnings, already reflected on the income side of the NIPAs, but also the value of reduced mortality and morbidity to individuals who enjoy longer lives and a higher quality of life, which are not generally reflected in the NIPAs.

Recognizing the importance of the health care sector, there have been efforts in recent years to begin to develop a satellite account for health. If successful, these efforts can help to fill in the information gaps that preclude a comprehensive assessment of output and productivity in the health care sector and that sector's contribution to the overall economy. A major limitation of existing data for this purpose is that both the NIPA data on health care expenditures and the Bureau of Labor Statistics (BLS) data on medical prices are organized by type of product or service (e.g., pharmaceuticals, other medical products, physical services, paramedical services or hospital services) rather than by disease. For the purpose of understanding the efficiency and effectiveness of health care, however, what is needed are data that are organized by disease. More specifically, development of a health care satellite account will require information about the resources used to treat diseases and the outcomes achieved for people with those diseases.

While there is still much to be done, the federal statistical agencies have made progress over the past five years towards developing these data. Research at the BEA has focused on

developing disease-based measures of household medical care expenditure (Aizcorbe, Liebman, Cutler and Rosen, 2012). Research at the BLS has focused on the development of disease-based price indexes that begin to account for shifts in treatment patterns (Bradley, Cardenas, Ginsburg, Rozental and Velez, 2010). The BLS price indexes will be of value to the BEA for breaking out the contributions of price and quantity to the growth of overall medical care expenditures.

As work to develop disease-based measures of medical spending and outcomes has progressed, some of the decisions and challenges that will need to be confronted to develop such data have become more apparent (Aizcorbe, Liebman, Cutler and Rosen, 2012). A first necessary step will be to agree upon a scheme for categorizing diseases. A major question here will be the appropriate level of specificity to use in organizing the data. Second, better and more comprehensive sources of data on health spending will need to be developed. Much of the work done to date in this area has made use of the Medical Expenditure Panel Survey (MEPS), which has a nationally representative sample but is too small to represent unusual conditions. Perhaps not surprisingly given the large share of health care spending that occurs at the end of life, the MEPS also appears to under-represent the highest spending individuals. Third, methods to allocate spending across diseases will need to be developed. Options that have been proposed include the encounter-based approach; the episode-based approach; and the person-based approach. As described by Aizcorbe et al (2012), the encounter-based approach is relatively easy to implement, but does not deal well with co-morbidities and leaves out spending with no diagnosis code. The episode-based approach uses a natural unit of observation, but defining what constitutes an episode may be difficult, and co-morbidities and spending without a diagnosis code again are problematic. Aizcorbe et al (2012) suggest that, while it is more complex, the person-based approach, in which regression analysis is used to relate health

spending by an individual to that individual's diagnoses, may be the most promising. Finally, in order to adjust appropriately for changes in the quality of treatment, evidence on treatment effectiveness and an agreed-upon metric for valuing improvements in health outcomes will need to be developed.

As with education, efforts by economic statisticians to develop a health satellite account have been paralleled by significant and growing policy interest in the evolution of health care spending and productivity. Health care spending has grown much faster than overall GDP and, as a result, health care has represented an ever-growing fraction of total national output. There is enormous policy interest in what is driving per capita health care costs—improvements in care versus increases in the price of care—and in finding ways to slow the growth of those costs without adversely affecting the quality of care. Health care experts have suggested a variety of possible means of “bending the cost curve,” such as taking steps to reduce administrative overhead; increasing the availability of preventive care; redesigning payment schemes to provide doctors and hospitals with stronger incentives to control costs while maintaining the quality of care; and providing better information to patients and their providers on best treatment practices to inform their health care decisions. Much research is needed, however, to determine how well these strategies work and how they can be implemented most effectively.

Similar to the situation with respect to education, a major barrier to satisfying both the statistical analysts' interest in developing a health satellite account and the policy makers' interest in achieving better health outcomes at the lowest possible cost has been the lack of comprehensive data that allow health spending to be linked to health outcomes. Individual researchers have done interesting work based on insurance claims records; Cutler, McClellan, Newhouse and Remler (2001), for example, used Medicare claims data to study changes in the

effectiveness of the treatment of heart attack patients over time, and other researchers have made use of claims data for selected private insurance providers. CITE A FEW MORE RECENT STUDIES. Better answers to the questions policy makers are asking about health care, however, will require more comprehensive data.

In this regard, the formation of the Health Care Cost Institute (HCCI) is an exciting development. The HCCI is a nonprofit organization established to provide broader access to detailed data on health care spending for research purposes. A central goal of the Institute is to foster a better understanding of what is driving health care costs. Researcher access to the HCCI data repository will take place under controlled conditions that protect the confidentiality of individual patients. The current database, rolled out in May 2012, includes more than 5 billion claims records from four large insurers that, taken together, provide health insurance coverage for 33 million people, and there are plans to add claims records from additional insurers as well as Medicaid claims records. The HCCI repository could in time provide reasonably comprehensive coverage of the health care sector, especially if, as expected, the implementation of the Affordable Care Act leads to a decline in the number of uninsured patients whose interactions with the health care sector do not leave a trail of insurance claims (and who thus are not represented in insurance claims databases).

Another relevant development is the funding provided under the Affordable Care Act for comparative effectiveness research. Under the terms of the Act, the agenda for this research is to be set by the Patient-Centered Outcomes Research Institute after broad public consultation. The first such review was recently completed. The language of the Act states that estimates of cost-effectiveness will not be used “as a threshold to determine coverage, reimbursement, or incentive

payments” under Medicare. The hope is nonetheless that better information on what works and what does not will help to move spending towards more effective treatments over time.

These developments in the policy sphere can be expected to improve the information available to those working to develop health satellite accounts. Insurance claims data, such as those contained in the repository being developed by the HCCI, can help with allocating spending by disease category and also with tracking the experiences of individuals who may have multiple interactions with the health care system. Better information about the effectiveness of alternative treatments can help with making appropriate adjustments for changes in the quality of care over time. Further, as with education, the intense policy interest in understanding what we are getting from our investments in health care imply that there is likely to be an appetite for aggregate measures of the sort that would be embodied in a satellite account for health.

Improving the Measurement of Government Output

While this essay has been focused primarily on the development of satellite accounts for education and health, there may be broader synergies between economic accountants and policy makers with regard to the measurement of government activity. The existing NIPAs measure government output based on the cost of the inputs (largely labor) that it employs. By construction, a measure that assumes the output of the government sector grows in line with the labor it employs will show no growth in labor productivity. Because they are based on an embedded assumption about productivity growth, however, such measures obviously cannot serve the growing policy interest in assessing and improving the efficiency of the government sector.

In the European Union, Eurostat has called for national statistical agencies to develop direct measures of the volume of government services provided to individuals. SAY A BIT MORE ABOUT EUROSTAT GUIDANCE. An influential report prepared for the Office of National Statistics in the United Kingdom (Atkinson 2005) offers one set of more specific guidelines for how such measures might be developed. Efforts to date in several countries have concentrated on education and health, using measures such as the number of students served and indexes of the number of health care procedures performed. There has also been some work on public safety and social services, using measures such as the number of prisoner nights, the number of fires attended, and the number of adults and children in care.

For someone charged with managing the resources of a government department in order to provide a particular set of services, using available resources more efficiently in order to provide a larger volume of services is a positive accomplishment. Viewed from that perspective, volume measures of the sort recommended by Eurostat and in the Atkinson report make a great deal of sense. For someone who is concerned more broadly with how well the government is doing its job, however, these seem like the wrong sort of metrics on which to focus. Ultimately, I would argue, assessments of the value of government services will need to focus on outcomes rather than on outputs. Questions of interest might include, for example, whether public schooling raises students' subsequent earnings; whether the provision of publicly-supported health services leads to longer lives and better health; whether the activities of the criminal justice system are helping to lower the crime rate; and so on. The measurement of outcomes is, of course, a considerably more complicated task than the measurement of the sort of outputs envisioned by the Eurostat guidance and in the Atkinson report.

Consider as an illustrative example the activities of an agency charged with enforcing a set of rules related to workplace safety. Multiple options for deploying this agencies' resources are available: The agency may offer compliance assistance to firms subject to its regulations; conduct inspections to identify violations of the regulations; assess fines or other penalties against those found to be in violation of the regulations; or engage in broader public communications about the regulations and enforcement actions undertaken by the agency, designed to affect the behavior of a larger number of firms. The number of workplace inspections that the agency carries out would be a natural volume measure of this agency's activities, but it is not necessarily the case that more inspections will lead to better outcomes. The impact of an inspection program will depend, for example, on how it is targeted. Further, even if inspections tend to lower injury and illness rates at the workplaces that are inspected, at the margin there may be other things the agency could do with its resources that would have a larger impact, for example, engaging in employer outreach and education efforts that reach a broader audience. There is at present relatively little research evidence available to guide the resource allocation decisions this enforcement agency must make, but it seems clear that simply counting the number of inspections the agency performs—or even tracking some weighted average of the counts of all of the agency's various activities—could be a very misleading indicator of the value of its activities. As a conceptual matter, measures of value added and productivity for government based on outcomes rather than outputs—in this case, how the agency's activities have affected the incidence of occupational injuries and illnesses in the economy as a whole—seem clearly to be the most legitimate basis on which to evaluate the government's performance.

Here, too, the measurement challenges that confront the economic statistician overlap significantly with the concerns of policy makers. In an era of tightening government budgets, making efficient use of available resources is becoming increasingly important to government managers. Doing this well requires good evidence on what works and what doesn't work to produce desired outcomes. Last May, Jeff Zeints, the Acting Director of the Office of Management and Budget (OMB), issued guidance to federal agencies calling for them to document how they use evidence to allocate their resources and to demonstrate a commitment to expanding the use of evidence in carrying out their operations. Specific suggestions mentioned in the guidance memorandum included seeking opportunities for low-cost evaluations using administrative data; expanding evaluation efforts within existing programs; using comparative cost-effectiveness data to allocate resources; tying grant awards to evidence; using evidence to inform the enforcement of criminal, environmental and workplace safety laws, and appointing a high-level official to strengthen the agency's evaluation capacity. This is a powerful document—because OMB has responsibility for developing and overseeing the President's budget, its stated view on how agencies should be allocating their resources carries great weight. The goal of this nascent initiative is to develop and apply a stronger body of evidence about the impacts of the full range of government activities.

As with education and health, then, there is hope for complementarities between the policy makers' interest in improving the functioning of government and the statistical analysts' interest in producing better measures of government output. Further, more meaningful measures of government output are apt to be of considerable interest to government policy makers and managers.

What About Measures of Well-Being?

So far, I have been discussing methods for improving the measurement of resource utilization and production in key sectors that are characterized poorly or incompletely in the current accounts. An alternative to proceeding down this path would be to focus instead on developing broad aggregate measures of welfare and well-being. Several alternative approaches to measuring well-being have been proposed in the literature (Smith 2011 provides a useful review). First, the existing GDP measure can be adjusted so that it comes closer to capturing the output that one would expect to contribute to well being; for example, the value of household production could be added to the conventional estimate of GDP and defensive expenditures could be subtracted. Second, composite indicators that weight measures for several individual dimensions of interest can be constructed; examples of this approach include the United Nations Human Development Index and the Genuine Progress Indicator. As a variant on this approach, indicator dashboards can be developed that leave the weighting of the various dimensions to the user of the data; the OECD Better Life Initiative, which provides measures for a range of domains, is a nice example. COULD ELABORATE A LITTLE. Development of aggregate measures of subjective well being is a third approach. A whole literature has developed about how best to do this, whether using global measures of life satisfaction; measures of affect at particular points in time; or time accounts designed to track variation in time spent in pleasant or unpleasant activities, as proposed by Krueger (2009).

It is easy to see in principle how information about subjective well being could be useful for policy evaluation. For example, in deciding whether it is worthwhile to build a new bridge, it might be important to know how the bridge would affect the amount of time drivers spend in traffic as opposed to doing other more enjoyable things. There has been considerable discussion

in the United Kingdom about using subjective measures for policy assessment and the Office for National Statistics (ONS) is investing heavily in this approach. It remains unclear, however, whether the development of subjective measures—and especially the development of broad aggregate measures of well being—will in fact have the desired effect of changing the way that policy officials make their decisions.

The experience of the ONS with developing an experimental satellite account for household production in the early 2000s may be illuminating. The impetus for the development of this account was the recognition that there is a great deal of non-marketed production that is omitted from the conventional economic accounts. The ONS put a fair amount of work into developing estimates of the value of non-marketed output produced by households and the estimates showed the value of household production to be sizable as compared to conventionally measured GDP (see Holloway, Short and Tamplin 2002 for details). Despite the high quality of the work that went into the development of the experimental account, however, there turned out to be no real demand for the estimates, and the exercise ultimately has not been repeated.

The jury is still out, I think, on whether the aggregate measures of well-being currently being developed by various statistical agencies will fare better. Like the ONS household production estimates, the aggregate well-being measures are intellectually interesting, but it is less clear how they might be used to guide day-to-day policy decisions.

Conclusion

Our existing economic accounts serve many users, but exist primarily to serve the public policy process. Similarly, I would argue, the opportunities and potential rewards for the development of expanded economic accounts are greatest in those spheres where there is a

compelling public policy interest in the information that would be produced. There are good arguments, I believe, for the development of satellite accounts for education and for health. Policy makers care a great deal about the magnitude of our investments in these forms of human capital and about the performance of the education and health sectors. Further, data being developed to meet immediate policy needs should help to inform the construction of satellite accounts for education and health. The same may be true with respect to improved measurement of government more generally. A key test for the broader measures of welfare and well-being that have received so much discussion in recent years will be whether they prove to be not only intellectually interesting but also useful for policy purposes.

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Figure 1: Elements of a Double-Entry Education Satellite Account

Inputs	Outputs
<p>Paid labor:</p> <ul style="list-style-type: none"> --Teachers --Support staff <p><i>Volunteer labor</i></p> <p><i>Students' and parents' time</i></p> <p>Materials: Books and other</p> <p>Fixed capital: School buildings and other structures, equipment, and computer software</p> <p><i>Social capital</i></p>	<p>Educated individuals</p> <ul style="list-style-type: none"> --Higher workplace productivity --<i>Higher nonmarket productivity</i> --<i>Intangibles: Better informed citizens, improved individual and societal well-being</i>

Source: Adapted from Abraham and Mackie (2005).

Figure 2: Elements of a Double-Entry Health Satellite Account

Inputs	Outputs
<p>Medical care</p> <p>Market labor/capital</p> <p><i>Volunteer labor</i></p> <p><i>Time invested in individual's own health, time of family caregivers</i></p> <p>Other consumption items</p> <p>Research and development</p> <p><i>Quality of environment</i></p>	<p><i>Measures of health status, and valuations of changes where possible</i></p> <p>Income from being healthier</p>

Source: Adapted from Abraham and Mackie (2005).