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It is a pleasure for me to participate in the 57th ISI Conference, even from a long distance. I had very much hoped to join you in South Africa, but in February I took a leave from academic work to become the Chief Economist of the U.S. Treasury, and the press of government business at home has made travel difficult.

As you know, this meeting is taking place in the midst of unprecedented economic turmoil. The world economy has undergone the worst downturn since the Great Depression, brought on by a financial market crisis that spread to the "real" economy. A few weeks ago we learned that the U.S. economy shrank by 3.5 percent from the end of 2007 to the first quarter of this year, greater than the 2.2 percent decline previously reported. The IMF expects the world economy to contract by 1.4 percent in 2009.

The worldwide economic turmoil makes the topic of this conference, and of this session, even more important. Accurate and timely economic data are critical for combating the worldwide recession and for putting the world economy on sounder footing after we emerge from the current crisis.

Even before the economic crisis, a great deal of research was focused on improving indicators of economic performance, and on developing new and credible measures of the well-being of societies more generally. In the U.S., the National Research Council produced two important volumes: *Beyond the Market* in 2005, which proposed ways to integrate non-market transactions, such as home production, into the National Income accounts; and *Nature's Numbers* in 1999, which considered how to expand the National Income accounts to include the environment and natural resources.

In addition, the Commission on the Measurement of Economic Performance and Social Progress – called the Stiglitz Commission for short, after its chairman, Joe Stiglitz – was set up by President Sarkozy of France in early 2008 and will release its report next month. The Stiglitz commission will provide useful recommendations in three areas: 1) improving traditional national accounts; 2) integrating the concept of sustainability in national income accounting; and 3) measuring the quality of life more generally.

I should acknowledge that I was a member of the Stiglitz Commission before being required to resign to assume my current job, and I was a contributor to the NRC report on *Beyond the Market*. Perhaps more importantly, for the last decade I have worked with my colleague Danny Kahneman and a distinguished group of psychologists to develop a new measure of subjective well-being that is based on time use. We have an NBER book coming out from the University of Chicago Press entitled *Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being*.

These efforts all share a common conviction: What is measured matters for policy.

I will use the remainder of my time to discuss progress made in developing new measures of economic performance and subjective well-being, and conjecture on how measurements of well-being can influence policy.

At the outset it is useful to draw a distinction between two types of policy, economic stabilization policy and longer-run economic and social policy. The National Income and Product Accounts have been spectacularly successful and valuable tools in both of these regards. A comprehensive set of economic policies – including the Recovery Act and the Financial Stabilization Plan -- have been aimed at reversing the drop in GDP. Moreover, policy responses have been coordinated around the world to an unprecedented degree in the current downturn. The National Income Accounts, along with unemployment and employment data, provide key metrics for evaluating the success of our policies in stabilizing the economy.

As far as the long-run is concerned, education programs, job training, infrastructure investments, tax policy, and numerous other policies are designed, in large part, with an eye toward raising long-run GDP growth and living standards. In addition, long-run GDP growth is a key input into budget projections, which loom large in policy making.

Although I was aware that the NIPAs were partly born out of the Great Depression, one feature of the Accounts that I had underappreciated is the degree to which timely data are valuable for policy making in a crisis. The NIPA data are particularly useful because they are timely, even though they are regularly revised, sometimes with large revisions. Other data are not as timely. For example, data on job growth by firm size are available with a 9 month lag. Data on the share of income going to the top 1% of households only recently became available for 2007. And there are no timely data on the total number of mortgages refinanced each month, or the savings from refinancing, or the value of loan originations -- key channels for the transmission of policy to the real economy.

It is undeniable that the development of the National Income Accounts has proved to be one of the most important contributions of economics in the last century. Moreover, the fact that the traditional measure of GDP focuses on market activity is a strength when one is trying to diagnose and treat market dysfunction. That said, there are well known limitations of national income accounting that were long ago emphasized by Kuznets, Stone, Clark, and many other pioneers of the accounts. Interestingly, many of the developments of the present day were anticipated and, to varying degrees encouraged, by those who developed the system of National Accounts.

For example, Simon Kuznets wrote in 1941, “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 includes one item or excludes another he is implicitly accepting some standard of judgment.” And, in identifying some of the “paradoxes” that arise when measuring the economy, Pigou famously observed, “if a man marries his housekeeper or his cook, the national dividend is diminished.”

One part of the modern agenda tries to put a price on nonmarket activities, such as home production. This agenda is boosted by the availability of survey data on time use. A good example of this work is the article by Steve Landefeld and his coauthors in the latest issue of *The Review of Income and Wealth*.

The general approach historically was to claim to draw a strict distinction between economic and non-economic activities, and narrow the National Accounts to economic activities, usually defined as those that involve market transactions. For example, Kuznets wrote in 1946, “Life is full of activities that lead to the satisfaction of consumers’ needs and hence their welfare, only some of which can be classified as economic. … Taking a pleasant walk or playing a game of chess with a friend satisfies certain wants, but is not an economic activity; working in a factory or an office is.”

If the definition of economics is the study of the allocation of scarce resources, however, this distinction rings hollow. Time is our ultimate scarce resource. We are all here for a finite period of time. Yet the frustrating time spent commuting to work or the enjoyable time spent playing chess with friends is omitted from the National Accounts. If two countries had the same GDP per capita but workers in one country had more time for leisurely walks and games of chess than those in the other, then we would not say the two economies performed equally well.

Some economists have tried to expand the national accounts to include leisure, by valuing leisure time at the wage rate. Although superficially appealing, this approach raises several problems. First, and most obviously, the wage rate is a poor measure of opportunity cost for those who are involuntarily unemployed. Second, how one distinguishes activities between leisure and home production is not immediately apparent. (I detest gardening but my wife finds it a desirable hobby.) Third, and related, even if the wage rate does approximate the cost of a marginal hour of leisure, most of leisure time is spent in inframarginal pursuits, which are likely valued more highly than the wage rate. Finally, the wage rate does not properly account for the pleasantness or unpleasantness of working conditions. This point was made eloquently by Kuznets, who worried that the gravest omission from National Income was the hedonic costs of job tasks that are "disagreeable, exhausting, dull, monotonous, or nerve wracking" as compared with those that are "light, instructive, diversified or amusing."

Now, it has long been recognized that omitting nonmarket activities and the flow of hedonic utility skews one's impression of economic performance because the line between market and nonmarket activities shifts across countries and over time. In 1937 Gerhard Colm wrote, "Intertemporal and international comparisons of national income would be distorted, if the measurement included the exchange economy alone." And a year earlier, in urging economists to search for broader standards of social value, John Maurice Clark wrote that "measures of value which may be less exact than those of the market are also much more fundamental." Like Clark, I have my doubts as to whether placing a market price on all nonmarket activities and creating an all-inclusive GDP figure is even a worthwhile goal.

The approach to measuring well-being that I have been most engaged in follows a different path. It uses time allocation and the flow of hedonic experiences as the basis for analysis. Specifically, my colleagues and I have developed survey methods in which individuals provide time diaries on their activities and report their emotional experiences during those activities.[1] Emotions include feeling happy, sad, interested, angry, and in pain. For each moment of the day, we have ratings of the various emotions on a 0-6 scale, where 0 means the emotion is not

[1] See A. Krueger, et al., (2008), "National Time Accounting: The Currency of Life," www.krueger.princeton.edu/nta2.pdf.

present at all and 6 means it is very strong. We have partially validated this approach by comparing real-time reporting, physiological measures such as the stress hormone cortisol, and recall data. I won't bore you with the details of this work, but I will mention that it can easily be adopted to work in the framework of national time-use surveys. In fact, we developed a well-being module for the American Time Use Survey that the Bureau of Labor Statistics evaluated with cognitive testing, and is in the process of seeking final clearance to include in its 2010 survey.

The resulting data provide an indication of the flow of emotional experience. Differences between groups, between countries, or over time can be attributed to differences in the amount of time devoted to various activities and differences in the emotional experience of those activities. We call this approach National Time Accounting (NTA). It is not the only feature of subjective well-being, but it captures an important aspect of well-being.

One measure that we have proposed that has some desirable features is the fraction of time spent in an unpleasant state, which is defined as a period in which the strongest feeling is a negative one. We call this the U-index. The U-index is robust to interpersonal differences in how individuals interpret the scales, as long as a given individual uses the same interpretation for the positive and negative emotions.

Some of our results reinforce conclusions from earlier studies of subjective well-being and others provide a new window into well-being. For example, the U-index is especially high for people who are dissatisfied with their lives or unemployed. Time spent searching for work, commuting to work, and working is especially unpleasant. Time spent with friends is particularly enjoyable.

How will findings like these influence policy? It is pretty clear that well-being measures will primarily be an input for consideration of longer-term policy issues. Time-use and subjective well-being data can provide a valuable compliment to national income in deriving a fuller understanding of the evolution of progress of societies over time. How are nonwork activities changing? Is the mix shifting to more- or less-enjoyable activities? Is paid work becoming more or less interesting and burdensome?

Although it is perilous to predict how NTA could influence policy formation – especially because elected officials already do take into account and anticipate what makes their constituents happy in policymaking -- one possibility is that it could lead to greater attention to how public policy influences people's allocation of time. For example, as I mentioned, commuting time is considered by many to be unpleasant. In this connection, it is noteworthy that the American Recovery and Reinvestment Act devotes almost $50 billion to improve our Nation's road and bridges and support high-speed rail, mass transit and airports.

A focus on subjective well-being also resolves a tension in economic policy making. Some economists have questioned why cyclical downturns receive so much attention in economic policy making given that cyclical gaps are small compared to the effect of a small increase in the long-run growth rate. Yet this view misses the destructive and often long-lasting effect of unemployment on people's psychological well-being.

Finally, an emphasis on NTA could lead to greater recognition that working conditions are too often an overlooked feature of economic output. For example, in our research we find that working under time pressure or in isolation significantly degrades one's work experience. Furthermore, for workers in blue collar jobs the incidence of pain rises during work hours compared with nonwork hours, whereas for workers in white collar jobs there is no difference in reported pain during work or nonwork episodes.

Kuznets recognized that omitting the burdens, monotony and dissatisfaction of time spent at work "warns us against too easy an acceptance of the thesis that high national income is the sole desideratum in theory or the dominant motive in fact in a nation's economy."

While measuring the hedonic flow of emotions is a challenge, it is a challenge with potentially very high rewards. As Jan Tinbergen has said, "Progress in our understanding can only be based on the push for measurement of phenomena previously thought to be non-measurable." The National Income and Product Accounts can be improved by building satellite accounts for near-market activities. National Time Accounting provides a push for a rather different type of measure, where the yardstick is time spent in a pleasant or unpleasant state, not money. It is my hope that National Time Accounting can someday provide a complimentary framework to National Income accounting that enriches our understanding and leads to better informed policy making.