

Health in the Context of Sustainable Economic Frameworks

This chapter presents a summary of a webinar that featured internationally-recognized experts presenting on current efforts to measure well-being and inclusive wealth. The first presentation provided an overview of how a country's wealth is conventionally measured by their gross domestic product (GDP) and some of the challenges and opportunities in trying to measure wealth beyond that value. The second presentation featured a discussion on efforts to measure inclusive wealth and the focus on including human capital and health in that measure. The third presentation focused on measures of subjective well-being and happiness, and how these measures could be valuable for policymakers. The final speaker reflected on these ideas, and provided the perspective of an economist. Following the summary of these presentations is the reactor and audience discussion.

Moderator John Balbus, M.D., M.P.H, senior advisor for public health at the National Institute of Environmental Health Sciences and co-chair of the Institute of Medicine (IOM)'s Global Environmental Health and Sustainable Development Innovation Collaborative, opened the webinar by introducing the topic and its relevance to environmental health. GDP is the most commonly used indicator of the economic health of a country, and is often used to gauge the country's standard of living. As of late, there has been an interest in using indicators beyond GDP that can incorporate externalities that can affect the sustainability of economic growth, such as environmental impacts, or indicators that can capture aspects of human well-being other than consumption, the basis for GDP measurements.

Economic gain and public health are closely intertwined, said Balbus. Health is both a beneficiary and prerequisite for sustainable economic development, and as such, a discussion of health in the context of sustainable economic frameworks will likely need to address the indicators and metrics that can encapsulate these externalities and their economic impact.

GOING BEYOND GDP: OPPORTUNITIES AND CHALLENGES

*Kevin J. Mumford, Ph.D.
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Kevin Mumford outlined his presentation as an introduction to using GDP to measure economic development, the difficulties in using that measure and when it's not sufficient, what has been done to address those challenges, and how it ties into wealth accounting.

Countries collect large amounts of data to produce GDP statistics, and GDP is narrowly focused on income accounting. The kind of data that might be desired beyond income is not always produced, for reasons such as a low demand and difficulty in collecting it. Income accounting may not be sufficient for answering many important economic questions. Mumford pointed out that growth in GDP does not necessarily indicate growth in well-being or denote that

an economy is on a sustainable path. Mumford discussed Trinidad and Tobago as an example, a small country comprised of two islands off the coast of South America in the Caribbean. In total, there are approximately 1.2 million people living in Trinidad and Tobago, and until just recently, the country has enjoyed very high rates of GDP growth (8 percent annual GDP growth) over the past 25 years. Additionally, there is a high level of international business and a stable financial system in Trinidad and Tobago. In 2011, the OECD moved Trinidad and Tobago from developing to developed country status, and their average per capita GDP has climbed higher and more rapidly than the world's average, indicating that this country is quickly developing. This number can be misleading, however, as the GDP growth has been primarily due to the extraction of natural resources, stated Mumford, which essentially means that Trinidad and Tobago export their wealth out of the country. Trinidad and Tobago have 0.2 percent of the world's natural gas reserves, and produce 1.3 percent of the world's current natural gas, which is a significant amount for small islands. Natural gas is extracted at a rapid rate, which is true for oil and other minerals as well.

Mumford added that the average worker in Trinidad and Tobago spends an average of four hours per day commuting, which indicates heavy traffic. The expected years of schooling in the country is 11.9 years, which is how much a member of the current population will achieve on average, a lower average than Latin America and the Caribbean (13.7 years of schooling) despite a higher average GDP per capita in the region. This suggests that, despite a rapid GDP growth, Trinidad and Tobago may have problems that income alone cannot elucidate.

Mumford continued by broadly considering if income growth, such as the growth from the export of natural resources in Trinidad and Tobago, is sustainable. From an economist's point of view, extracting resources is not necessarily a negative activity for the country, but it could depend on whether the income from these extracted resources is being consumed or invested. Investments in infrastructure, equipment, machinery, and education will yield future income, and from an economic point of view, would engender sustainable income by building a productive base. Other kinds of investments include allowing a forest to grow, or letting a fishery restock. On the other hand, if income is used immediately for pure consumption and doesn't yield future income, it would not create a sustainable path, said Mumford. Since GDP does not differentiate from income that is invested versus simply consumed, it is not sufficient and does not provide a sense of what we are doing with our wealth.

Noting this limitation, Mumford mentioned various ideas that have been proposed for adjusting GDP, including green or sustainable GDP measures. Other efforts to go beyond GDP include social indicators (e.g., life expectancy, unemployment, education, or a composite score like the Human Development Index) or environmental indicators (e.g. measures of water and air pollution, climate change, or forest cover). Researchers have looked into direct measures of happiness, such as surveys that ask people to evaluate their well-being.

One promising approach is national wealth accounting, said Mumford. It is a theoretically rigorous approach rather than an ad hoc adjustment to GDP, or combining a set of social indicators with arbitrarily chosen weights; thus, national wealth accounting complements income accounting. Published literature suggests that this measure is a better approach to gauging wealth than income accounting. For example, Dasgupta (2001) demonstrated that potential intergenerational wealth is closely related to a measure of the country's comprehensive wealth – the former does not decline if and only if the latter also does not decline. National wealth accounting does not require assumptions about optimality, nor does it require forecasts about the

country's future choices, reported Mumford. The direct measure of the productive base is called "comprehensive wealth" (Arrow et al., 2012) or "inclusive wealth" (UNU-IHDP and UNEP, 2012), which is discussed below (page 3). To measure a country's wealth, one would take forms of capital, multiply them by their value or "shadow price", and sum them. Comprehensive or inclusive wealth measures more than just financial assets. This measure would include equipment, machinery, forest, fisheries, and even human capital, said Mumford. In this case, sustainability means that a country's wealth is not declining: despite the decisions made by the country, the increases in wealth mean that they have as many opportunities in the future as they would at present time.

To illustrate the point that GDP does not provide a full picture of a country's wealth, Mumford provided the example of a firm looking to invest in a company. If only the income statements (annual revenues and expenses) are available for the evaluation, the balance sheets that display the value of all assets and liabilities would be missing, and the firm would not be able to distinguish between a company that is selling off its assets from one that is actually healthy and selling the goods it produces. On the country level, efforts have been focused on GDP or adjustments to that because it is established and easy, but GDP tells a limited story.

Mumford described some of the challenges in wealth accounting. There are three components to wealth that have specific challenges to optimal measurement: reproducible capital, natural capital, and human capital. Reproducible capital is the type that is currently measured the best, and it is the physical assets. The current national accounts are measuring only investments. To measure reproducible capital, assumptions are made based on 40 years of investment data and a depreciation rate; the stock of reproducible capital can be extrapolated from that. Although directly measuring this would be better, current measures of reproducible capital are done well, said Mumford. Natural capital is also measured fairly well, and consists of stocks of forests, fisheries, minerals, energy reserves, and similar resources. Mumford noted that there are disagreements about the shadow prices of these resources since they are not actively traded. For example, forests provide services for the population, so the value of the forest is more than simply the value of the wood. Human capital is more difficult to measure than reproducible or natural capital, stated Mumford. Education and wage data are available, but ultimately, the productive base is what needs to be measured, the value of the skills that have been taught, learned, or acquired through experience. Health is even trickier to measure, according to Mumford, as it is part of the productive base, but also directly improves well-being through feeling better and enjoying a longer life. Using income on consumption goods and simply feeling better both produce happiness, and well-being is part of a country's wealth, said Mumford. Appraising health presents a great challenge for including human capital in measures of wealth moving forward.

INCLUSIVE WEALTH: INCORPORATION OF HEALTH INFORMATION

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The focus of Duraiappah's presentation spans three phases of work on inclusive wealth: the 2012 Inclusive Wealth Report (IWR) released by IHDP, preliminary results from current efforts to measure inclusive wealth, and the challenges of developing the 2014 report focused on human capital. The IWR is released by IHDP approximately every two years.

The three main points that define inclusive wealth as a measure beyond GDP are that it is a new way to measure progress; a comprehensive approach to health and well-being; and a focus on the sustainability of human well-being. Many suggestions have been made to develop a list of sustainable development goals when the Millennium Development Goals expire in 2015, but it is unclear into what framework these goals would fit. Duraiappah states that wealth provides the conceptual framework for measuring well-being. The final point regarding the focus on sustainability indicates that inclusive wealth measures seek to look into the future as well as at a particular point in time.

Duraiappah presented inclusive wealth as a framework with three propositions that underlie the entire premise. The first proposition is that well-being is defined as the discounted flow of present and future generations' consumption flows. In this proposition, consumption flow is not limited to material consumption, but also issues like the utility of having an aesthetically pleasing landscape. The focus of inclusive wealth is able to move from the constraints of well-being, which is difficult to monitor and context-specific, as discussed above, to looking at the determinants of well-being which comprise the productive base. The second proposition states that the discounted flow of consumption is dependent on the capital asset, the productive base, of the economy. The productive base is comprised of the three capital bases described above by Mumford (reproductive, natural, and human capital). The two with the most impact on wealth are natural and human capital. The third proposition, which is a definition, is that well-being increases as long as the change in the social value of that capital asset base is positive. "Social values" refer loosely to the shadow or social prices of externalities, which ties the inclusive wealth framework to theoretical economics to strengthen it, but also means that research is required to appraise the values not reflected in market prices. From those propositions, it is clear that inclusive wealth focuses on change rather than absolute amounts, said Duraiappah.

Next, Duraiappah moved on to present preliminary results from the IWR 2012 which showed changes in inclusive wealth from 1990 to 2008. The 20 countries analyzed in the report comprise approximately 75 percent of the global GDP and 60 percent of the global population. As such, they are major producers and drivers of worldwide changes. In the report, most of these countries are initially defined as sustainable, i.e., the change in the productive base has been positive. 19 years later, this value changes to negative, and approximately 25 percent of the countries become unsustainable on a per capita basis. This indicates that the productive base is not growing at rate needed to maintain the increasing population, said Duraiappah.

In most countries, human capital has increased over time, in some countries more than others, such as Germany and Brazil (Figure 2-1). Human capital primarily stems from education in this diagram, and does not include health. In Figure 2-2, natural capital is added to show that nearly every country experienced a decline during this time period in natural capital, which includes renewable and non-renewable sources. Finally, in Figure 2-3, the added lines indicate the change in inclusive wealth in these countries. In this graph, China has one of the largest changes in inclusive wealth, which is due to their buildup of produced and human capital, and a

drawdown on natural capital, said Duraiappah. Much of China's natural capital is imported from other countries.

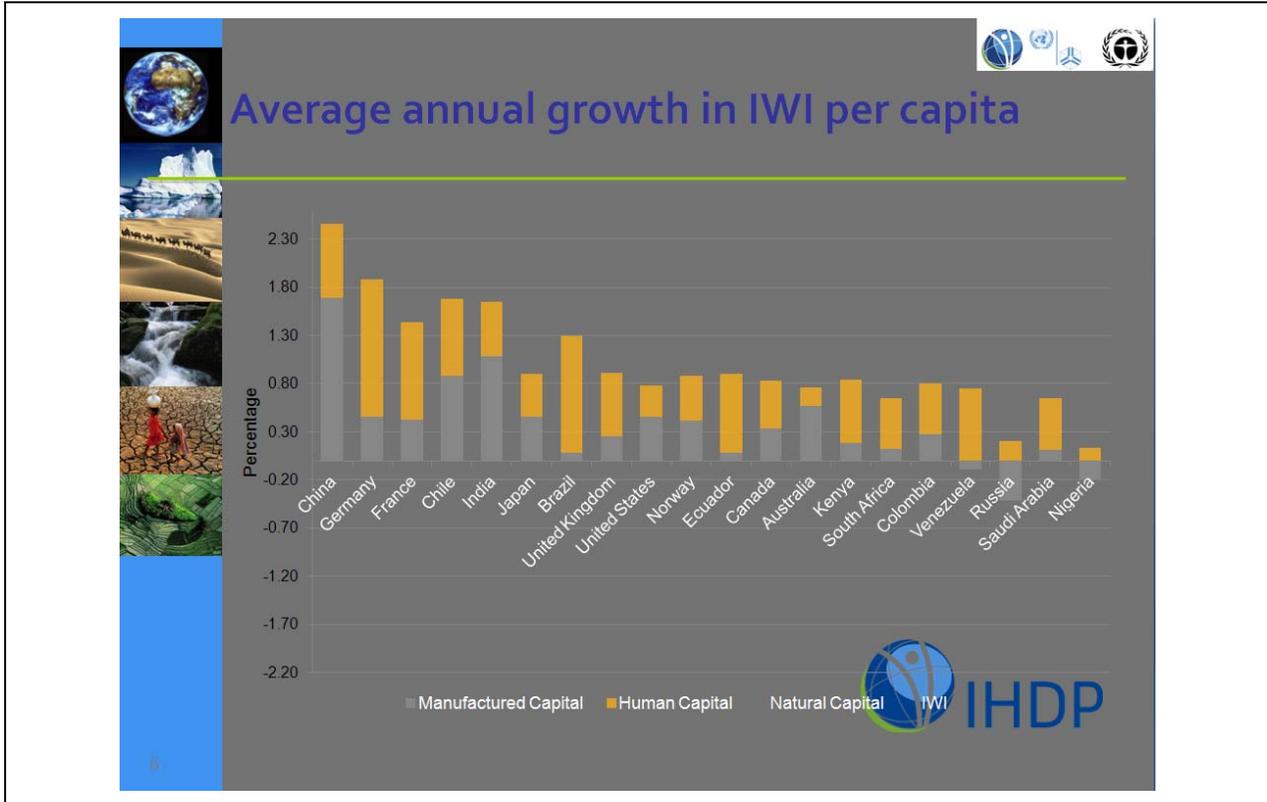


Figure 2-1 Annual Average Growth in Manufactured and Human Capital

SOURCE: Inclusive Wealth Report, 2012

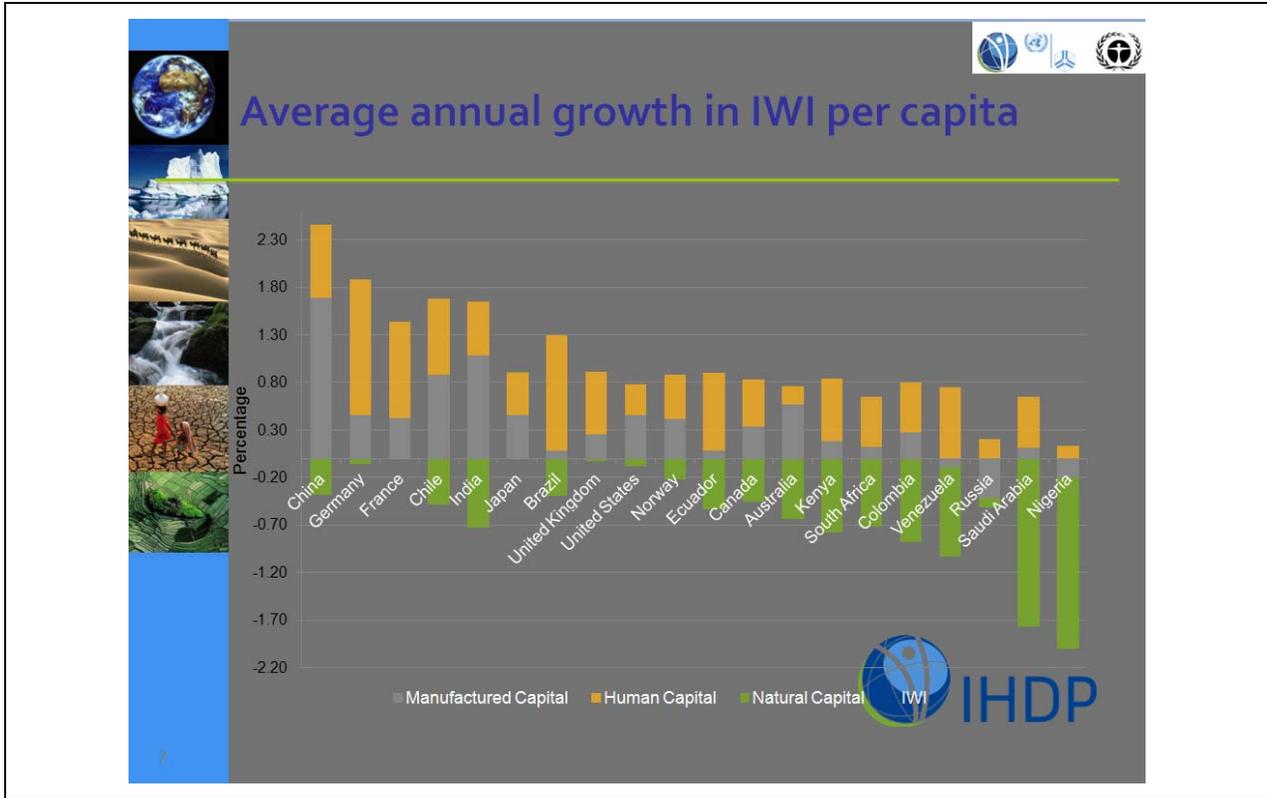


Figure 2-2 Annual Average Growth in Manufactured, Human, and Natural Capital

SOURCE: Inclusive Wealth Report, 2012

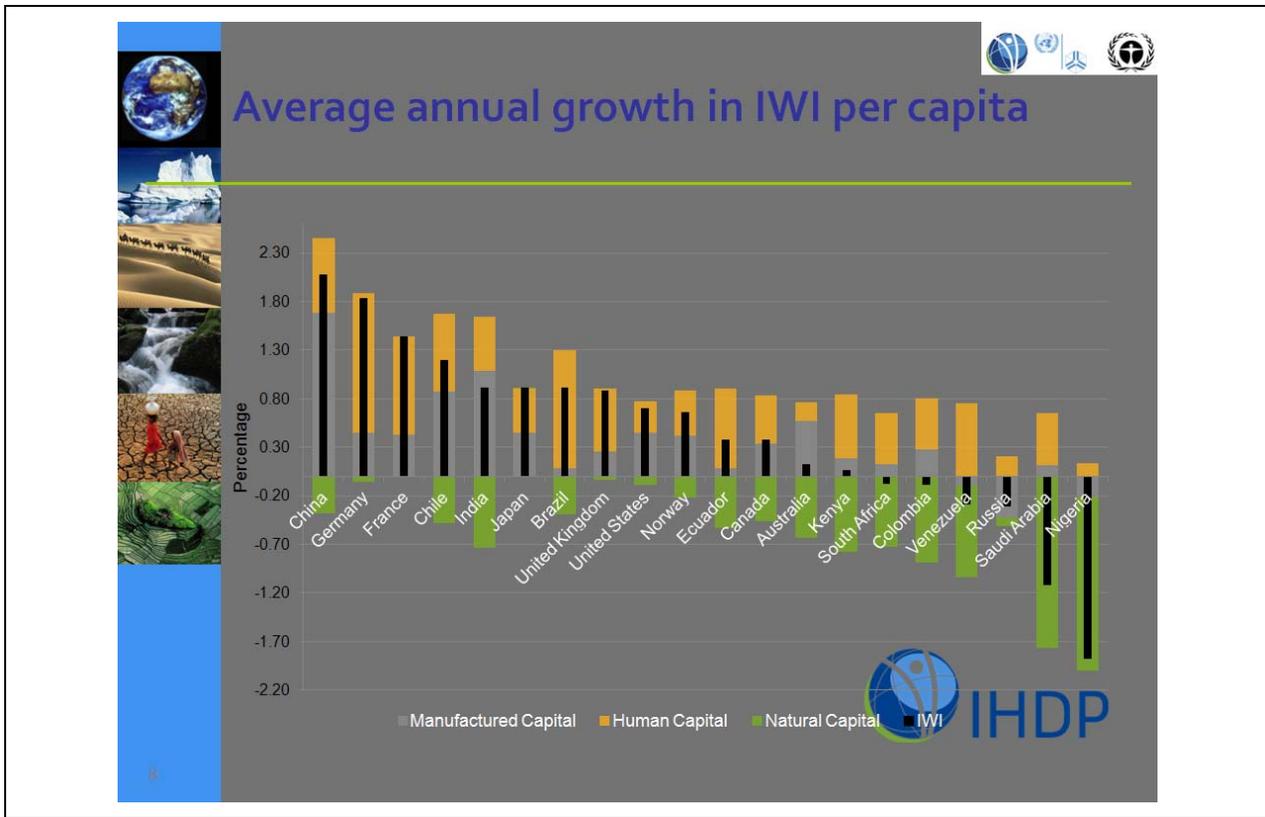


Figure 2-3 Annual Average Growth in Manufactured, Human, and Natural Capital and the Inclusive Wealth Index

SOURCE: Inclusive Wealth Report, 2012

Although health was not included in the human capital computations, it was discussed in preparation for the IWR. In 2008, the IWI or productive base of Germany’s economy totaled over \$19 trillion. By contrast, the value for health capital is significantly greater, over \$411 trillion. This trend was the same for Ecuador. Durappaiah stated that health was kept out of the analysis because the value would be exceedingly dominant, and it was unclear if the methodology to calculate this amount was correct. Discussion has occurred in recent journal articles, and the initial response indicates that the number may be correct because health is of a high value to people.

Despite this high value for health, time trends show that the change over time has been slight, whereas the changes in other forms of capital have been significant. For example, Germany saw a nearly 40 percent increase in human capital between 1990 and 2008; for health, this increase was less than 10 percent. Duraiappah again emphasized that human capital is primarily education, and health is measured by longevity; specifically, the function of an individual’s longevity in terms of the marginal value in just living an extra year. Whether or not this is the right shadow value to use to measure health capital is undetermined. Duraiappah revisited the three main components of health: the utility of simply being healthy, the productive nature that comes from being healthy, and the value of living an extra year. The large values for health capital are computed without taking into consideration the first two components,

indicating that health is still undervalued. For the 2014 IWR, the focus will be on two components of human capital: education and health, said Duraiappah.

Duraiappah summarized some of the challenges encountered in measuring health. First, health's value outweighs all other forms of capital by a factor of 20 or above, as demonstrated by the previously referenced German economy. The next challenge is determining whether or not the value of a statistical life is the right approach for a shadow or social price. Additionally, as mentioned before, only one component of health is being captured, and current estimates leave out the utility and productive nature of being health. Finally, there are interdependencies among other forms of capital and health. Duraiappah used pollution as an example, which significantly impacts health. Theoretically, this should be captured through the shadow price, but in reality it is a difficult undertaking, requiring a computation of the impact of pollution on health and subtracting that directly from the estimate of the productive base. These are the challenges that will also be present in developing the 2014 IWR.

HAPPINESS AND PUBLIC POLICY

*Richard Easterlin, Ph.D.
University of Southern California*

One area of interest for going beyond GDP and other economic measures is subjective well-being, said Richard Easterlin. Subjective well-being is measured through a nationally representative survey that asks participants how they would rate their happiness, satisfaction with life, and his/her standing on a best-to-worst life scale. One example of a subjective well-being measure is happiness. In the United States General Social Survey, participants are asked "Taken all together, how would you say things are these days? Would you say that you are very happy, pretty happy, or not too happy?" Similarly, life satisfaction is measured by the World Values Survey using the question "All things considered, how satisfied are you with your life as a whole these days?"

Easterlin stated that the question is always raised as to whether the measures of subjective well-being are meaningful. In a report commissioned by President Sarkozy of France in 2009, 25 leading economists agreed that "Research has shown that it is possible to collect meaningful and reliable data on *subjective* as well as *objective* well-being... [T]he types of questions that have proved their value within small-scale and unofficial surveys should be included in larger-scale surveys undertaken by official statistical offices" (Stiglitz et al., 2009). Official actions have been taken by the Organisation for Economic Co-operation and Development and the United Nations to promote the collection and publication of subjective well-being measures. From Easterlin's viewpoint, the meaningfulness of data is indicated by what people say when asked about what makes them happy; the responses of most people questioned around the world are similar.

In a 1965 survey of twelve countries, participants were asked an open-ended question to determine their concern with factors affecting their happiness. Overall, the three most prominent factors are living level, family, and health (77, 50, and 34 percent of respondents mentioning indicated respective concerns) (Cantril, 1965). A person's character and work also are factors of

significant concern. Broader social matters such as social equity, international relations, and domestic policy were not considered by a high percentage of participants to matter much to their personal happiness. The factors that take up the most time in a person's life dominate people's responses on subjective well-being and personal happiness, said Easterlin.

Measures of subjective well-being have a few advantages over indicators like GDP or the Human Development Index, according to Easterlin. Subjective well-being measures can focus directly on a person's feelings about his or her life, rather than relying on indicators that are externally constructed by social scientists or statisticians. They can also be comprehensive and are able to cover a wide range of concerns that impact self-reported well-being, including living levels, health concerns, and work satisfaction, which are traditionally omitted from other measures like GDP. Additionally, it can be easier for the population to identify with measures of happiness. Easterlin pointed out that subjective well-being may not be the best measure of well-being, since it does not generally reflect potentially important factors like political or civil rights. However, he argued that they are better than the alternatives that are currently in use.

Easterlin moved on to discuss the policy implications of using subjective well-being measures. Evidence shows that economic growth does not in itself raise subjective well-being. Longitudinally, rapid economic growth does not impact subjective well-being; however, there is an observed positive, short-term relationship between GDP growth and subjective well-being. Countries with high rates of economic growth do not seem to have more rapid sustainable well-being growth to accompany that trend, said Easterlin. This is illustrated in Figure 2-4, which is constructed using data from 17 Latin American countries. As GDP growth rates increase, changes in financial satisfaction change insignificantly with little to no slope to indicate a correlation. Similarly, there is no observed relationship in China between economic growth and improvement in life satisfaction in recent years. Thus, the potential policy conclusion that economic growth leads to greater sustainable well-being is not true, according to the evidence presented by Easterlin.

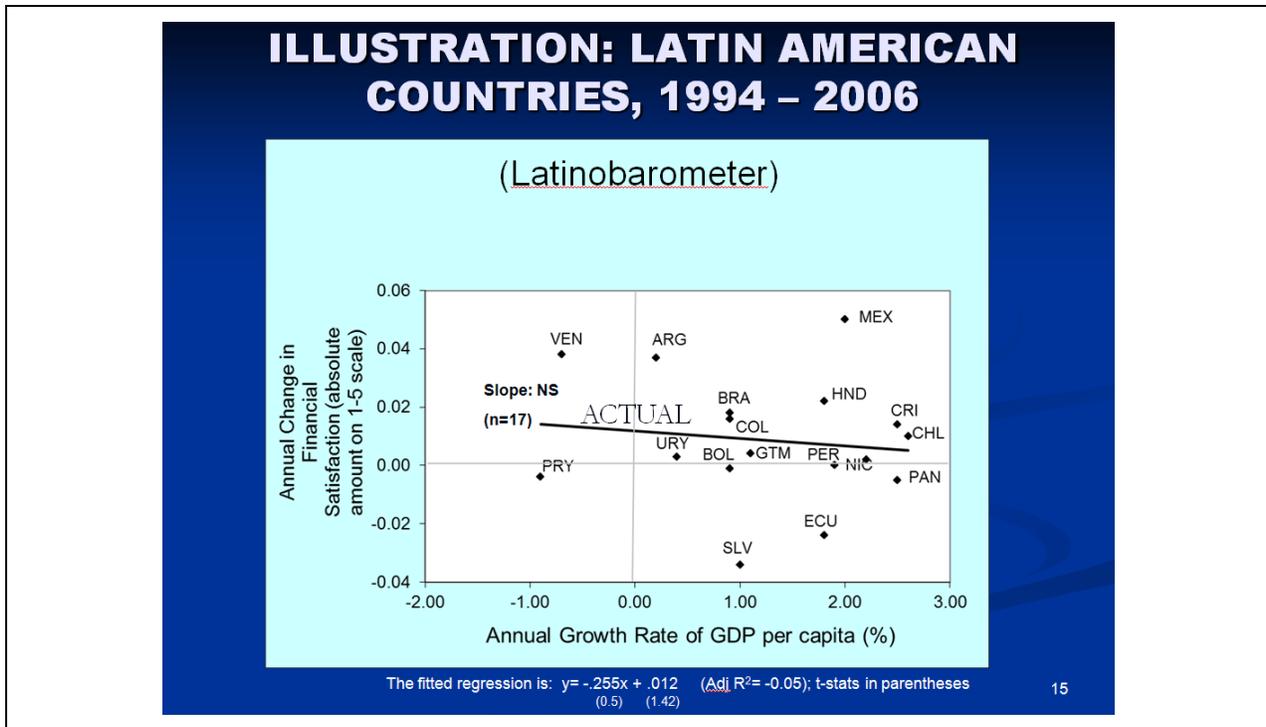


Figure 2-4 Trends in Financial Satisfaction and Annual Growth Rate of GDP per capita in Latin America

SOURCE:

There are policies that can increase a person's subjective well-being, however. Easterlin stated that there is evidence indicating that full employment and safety net policies may increase subjective well-being. In a comparison of European countries with the same GDP per capita, it was revealed that subjective well-being is greater in countries with more supportive and extensive social policies. Moreover, subjective well-being is negatively impacted in countries that have transitioned from socialism to capitalism, abandoning employment and safety net policies. For the purpose of this comparison, Easterlin compared "welfare states" (Denmark, Sweden, and Finland) with "semi-welfare states" (France, United Kingdom, Germany, and Austria) on the generosity of public policies (unemployment, sickness, pension, and overall benefits). Easterlin observed that the welfare states with more generous benefits also experienced higher reported values of satisfaction in work, health, family life, and overall than the semi-welfare states, despite similar GDP per capita. In the countries that are transitioning from socialism to capitalism, such as China, Easterlin's analysis demonstrated that unemployment rates and self-reported life satisfaction are inversely related. The final example comes from Costa Rica, which has the highest life satisfaction of any country, according to a Gallup World Poll Survey (Helliwell et al., 2012). Costa Rica has an extensive history of social development through generous policies, including an emphasis on literacy and health care, and Easterlin points to this as the cause of high personal satisfaction. While satisfaction may be high, Costa Rica has just one-fourth of the United States' GDP per capita, again substantiating Easterlin's argument that economic growth in itself does not increase subjective well-being.

SYNTHESIS AND RESPONSE

*R. David Simpson, Ph.D.
Environmental Protection Agency*

Simpson began his presentation by acknowledging that it is a challenge to follow the earlier presentations without repeating much information. His presentation took a brief, lighthearted turn toward two economics jokes to demonstrate the difficulty in performing accurate national accounting (Box 2-1 and 2-2).

BOX 2-1

Albert Einstein was coming across the Atlantic in the 1930s. Einstein was, of course, a Nobel Prize recipient and world famous, but there was such a demand for transport, that even he had to share a cabin with three other cabin mates as he came over on the ocean liner from Germany. Anticipating a long trip, he comes to the first cabin mate and says, "Tell me, sir, what is your IQ?" The first cabin mate says, "My IQ is 170." Einstein says, "That's wonderful. We can talk about the prospects for a unified field theory explaining all natural phenomena." Einstein comes to the second cabin mate and says, "Sir, what is your IQ?" The second cabin mate says "140." Einstein says, "That's great. We can talk about the prospects for world peace in nuclear technology." Einstein comes to the third cabin mate and says, "And tell me, sir, what is your IQ?" The third cabin mate says, "70." Einstein scratches his head for a second, thinks about it, and says, "What's your projection for GDP?"

BOX 2-2

Three people go on a camping trip. They have a can of beans, but they have brought nothing along with which to open it. The first person is a physicist, and she suggests that they get a large rock and open it by smashing the cans. The economist in the group says, "That's the dumbest thing I've ever heard. You're going to ruin the food if you do that." The second person is an engineer. He says, "Let's build a fire and put the can of food on the fire. The pressure will build up inside, and the can will explode." The economist says, "That is just as dumb as the first suggestion. If the can explodes, the food gets out, but it's all over the place and we're never going to be able to eat it." The other two are exasperated, and they say to the economist, "Okay, you're so smart. What's your suggestion?" To which the economist replies, "Assume a can opener."

Simpson related these jokes to the actual practice of national accounting: much of what is calculated makes assumptions, like can openers, and interpreting these numbers requires caution.

Economists begin with the supposition that the population's objective is to achieve things that we want, a notion that has roots in the beginnings of economics. Success is measured by the amounts of things that we presume we want to eventually have. Economists discuss this in terms of a person's utility that they obtain from what they consume, said Simpson. Consumption can

be defined broadly, and does not necessarily mean that things are destroyed during consumption, but they are also things that we can enjoy repeatedly, such as forests.

Accounting is typically concerned with changes in totals from year to year, or from one time period to another. Measuring well-being would require measuring the utility derived from the things that are consumed and enjoyed. The change in utility from year to year would be the additional happiness. Simpson revisited the economic principle that states that the ratio of marginal utilities is equal to the ratio of prices, and from that relationship, one could say that the change in well-being from year to year is a change in the amounts of things we consume from year to year, weighted by the price that is paid for it. The observed market price would typically be the value to consumers.

However, this is measurement on a gross basis, not a net basis, stated Simpson. Only consumption is considered, not capital investment. Capital investment is the consumption that people forego in order to afford more consumption later. The worth of this capital investment would need to be determined. In economic theory, investment is typically assumed to be worth the value of things that could have been purchased instead of putting aside money to invest or save. The procedures followed in national accounting do follow this logic in how things are added up, said Simpson.

There are measurement challenges when considering changes in quality of things we consume. Market goods like cars and computers undergo product evolution, e.g., cars today are safer and more economical than cars produced in the 1950s. It is an even greater challenge to make qualitative adjustments when considering nonmarket goods like the environment, crime, and health. These are the types of things that would provide a more complete picture of how a country is doing, said Simpson, and are not currently measured. This challenge revolves primarily around the fact that most of these things are public goods, which is something which, when one person provides it, is provided to and enjoyed by everyone else. Improved environmental quality benefits everyone. Because the provision of public goods is not compensated, such prices are not reflected in the market value of goods. Typically, when economists discuss the value of public goods or valuing year-to-year changes in quality, they refer to the willingness to pay an imputed, or shadow, price, said Simpson.

Flows, stocks, and anomalies also factor in to national accounting. Consumption is a flow, so environmental effects can often be captured in flows – for example, the effects of the Deepwater Horizon were reflected in flows of services like fishing and tourism. What isn't captured, stated Simpson, are the changes in natural capital, e.g., from stocks of fish that aren't caught in the future. According to Simpson, accounting is not always complete and can seem counterintuitive. For example, the way that accounts are currently calculated, GDP increases if more health services are consumed due to pollution. Instead, Simpson suggested that the accounts should be offset by the willingness to pay to avoid being sick. Environmental accounts may omit resource depletion, household production, illegal or "off the book" activities, production in the public sector, education, and health.

Another problem brought up by Simpson is equity concerns. Millions of dollars can be spent to either buy a yacht, or to buy vaccines for impoverished children in a developing country. Although the money is arguably better spent on the vaccines, accounting may not capture that long-term good.

It may be impossible to be able to include the price of everything in national accounts, said Simpson, and there is debate as to how much effort should be devoted to capturing as much as possible. Simpson advised that while economists attempt to determine prices for things not traded in markets, their values should be taken with a grain of salt and recognize that techniques for these determinations will improve over time.

DISCUSSION

Questions were submitted via the chat feature from the online audience. The first question asked Easterlin, how do the tradeoffs between the different components that make up subjective well-being get captured for developing policy or allocating resources? Easterlin responded by using China as an example, where income increased fourfold but there was no impact on life satisfaction over the past 20 years, demonstrating that income increases alone do not help subjective well-being. Jobs, however, allow people to support a family and take care of their health. Easterlin reiterated that the welfare states with extensive social programs exhibit higher overall well-being, and could only speculate so far as to say that policies that deal with concerns like health and family do more for well-being than just economic growth.

A second audience question asked how could the true cost of goods (including e.g., the cost of production, extraction, or waste handling) be incorporated into indicators like GDP or subjective well-being? Simpson answered that there are a variety of ways that economists try to put values on non-market goods. For instance, longevity has increased over the last century. To measure the value of that increase in longevity, economists use a technique called the “value of a statistical life”, which is typically inferred from the risks people are willing to take (e.g., living in dangerous places). Simpson pointed out that there could be controversy in assigning a dollar value like \$6 million to a statistical life, which is the value of the probability that someone will die early, and the estimate would not be precise, which is why it’s so difficult.

Mumford addressed a follow-up question that asked how the cost of depletion of long-term resources is reflected in an indicator like GDP or another index of economic growth derived from negative impacts. He reminded the audience that GDP is simply the measure of income, and that it may not be right to adjust GDP in a way that counts some incomes less than others if it produces an added cost to society. Mumford said that a more realistic way to look at the issue is to recognize the flow of income and the simultaneous depletion of capital stock. For example, the cost of harming wetlands is not a cost that comes from income flow, rather it is harming capital stock that could have provided future valuable services. Mumford said that although modified measures of GDP could be useful, it is unclear if it is worthwhile to devote all of our effort into it. He suggested instead incorporating costs into a broader wealth measure.

Moderator John Balbus asked a follow-up question: if GDP is limited and wealth measures are better suited to incorporate these externalities, what are the prospects for more reliance on a wealth measure in international settings, in conjunction with or in distinction to GDP? Balbus continued by asking if these wealth measures are already being included, and if there is any known opposition to them. Simpson replied that there is a lot of interest in including different wealth and well-being factors, and that progress has been made on several fronts. He noted that in the case of Mumford’s example with the wetland, in order to regard that as a depletion of capital, the wetland’s services would need to be quantified. The wetland could serve as a waterfowl nesting habitat, a water purification source, or a tool in flood protection. That

would create three difficult non-market valuation exercises, and following that, the appropriate discount rate to convert these values or yearly values into net present value of the lost asset would need to be determined. Simpson stated that incorporating those factors into national accounts would be the right thing to do, though it would be very difficult and require many assumptions. Duraiappah added that one possible way to go forward is not to determine a point estimate of values, but rather upper and lower bands that are based on the best information we have. The band would be the difference in stock changes over time. Duraiappah stated that this would possibly be helpful for policymakers. Mumford added that the focus on GDP is due in part to how much more solid the methodology for measuring GDP is, and that the measurement for income is more exact and precise than it will be with wealth. He also pointed out that measuring wealth alone would likely not be sufficient, and that GDP would still be useful for answering certain questions related to income. He expressed hope that both types of measures would be used, and that only recently has there been a strong demand for using wealth accounting frameworks to evaluate sustainability. Past efforts include the United Nations' IWR and the World Bank's efforts to measure net savings.

Balbus shared a comment from the webinar audience. The audience member stated that from this presentation, we can understand how the cost of education and health can generate well-being and happiness, in the same way that they can be included in the budget and address in public policy within a health-in-all-polices framework. Following this comment, Balbus read aloud a question from the audience, asking for the speakers' opinions about an unconditional citizen income and its impact on personal and social well-being. Simpson responded by stating that there is a longstanding and irresolvable controversy referred to as the tradeoff between equity and efficiency; it would be ideal if the least advantaged members of society were assured a minimal level of well-being, but if we don't allow for some prospects of inequality, then the incentives for creation of wealth are reduced. Duraiappah added that unconditional citizen income could be conceptualized as unconditional access to instrumental freedoms, rather than looking at a restricted income base, which would make a distinction between one's access to opportunities versus endowments. He mentioned that Amartya Sen's work as a resource for this idea.

Balbus closed the webinar and thanked the speakers for excellent presentations and discussions. He noted that this topic will be very interesting and pertinent to the discussions surrounding the Millennium Development Goals post-2015 and the Sustainable Development goals.

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