



## Should We “Green” Gross Domestic Product?

*While the GDP and the rest of the national income accounts may seem to be arcane concepts, they are truly among the great inventions of the twentieth century.*

Paul A. Samuelson and William D. Nordhaus<sup>1</sup>

What exactly is GDP, or gross domestic product? Where did it come from? Why is it important? Does it measure what we want it to? How might it be improved to provide a more comprehensive measure of human well-being?

### A Really Short History

The modern concept of GDP is a product of the Great Depression (1929 to 1939) and World War II (1939 to 1945.) In crude form, however, it was actually first tested in 1665, during the war between the English and the Dutch over the control of sea and trade routes. The inventor, William Petty, was trying to find a way to show that the assets of England were sufficient to finance the war.<sup>2</sup> Some one hundred years later, in 1776, Adam Smith built on past very rough notions of national income by articulating a distinction between productive and unproductive labour in his landmark treatise, The Wealth of Nations. His definition of productive labour did not include the contributions to an economy from services; instead, he focused solely on

material production. At the time, countries had developed various methods for compiling data about their economies. The definitions and metrics used were fluid and not comparable, but the basic idea of trying to measure economy-wide income and production was catching on, in tandem with advances in economic theory and practice.

It wasn't until the period starting in the 1920s through the 1930s that two economists, one in the United Kingdom (Colin Clark)<sup>3</sup> and the other in the United States (Simon Kuznets),<sup>4</sup> almost simultaneously began the painstaking process of systematically improving the collection of economic data. The catalyst for both was the visible carnage associated with the Great

Depression, which called attention to the fact that governments needed a better grasp of the state of their economies.

The first official measure of “modern” GDP was published in 1942, in America. It was intended to allow policy-makers to see what the country could produce for the

war. Following World War II, GDP was critical for understanding how well the Marshall Plan<sup>5</sup> - the massive US aid program to rebuild Europe -

#### Statistics

*The word is derived from the Latin word 'Statis' which means a "political state".*

*Statistics is a plural noun which describes a collection of numerical data such as employment statistics, accident statistics, population statistics, births and deaths, income and expenditure, exports and imports etc. It is also a branch of applied mathematics, whose purpose is to provide methods of dealing with collections of data and extracting information from them in compact form by tabulating, summarizing and analyzing the numerical data or a set of observations.*

<sup>1</sup> Paul D Samuelson: an American economist, and the first American to win the Nobel Memorial Prize in Economic Sciences. William D. Nordhaus, Sterling Professor of Economics at Yale University.

<sup>2</sup> Of interest, Petty also invented double-entry bookkeeping.

<sup>3</sup> Macromasurement Before and After Colin Clark. Colin Clark pioneered the use of Gross National Product to measure economies.

<sup>4</sup> Simon Kuznets, Library Economics and Liberty.

<sup>5</sup> The Marshall Plan.

was being implemented. During the Cold War more attention was directed to GDP owing to the needs of the military and the strategic competition between NATO and the nations aligned with the former Soviet Union.

Today, the standardised system of national accounts, and the concept of GDP which lies at its heart, is widely accepted as providing a coherent framework for tracking economic performance at the national level, as well as globally. The United Nations published the first System of National Accounts (SNA) in 1953.<sup>6</sup> It has been updated periodically since then, most recently in 2008. A key advantage of the SNA is that it can be crosschecked in three ways – i.e., economic activity can be gauged by income (the total of wages, rents and profits), by final expenditures, and by production (the sum of value added in different sectors, net of duplication). The SNA framework can also be expanded to include measures of labour input and capital stock, as well as labour and total factor productivity. Over time, the SNA has become a valuable tool for analyzing and understanding the economy. But it's not perfect.

### **Challenges with GDP**

At heart, GDP it is a measure of economic production or output, not of human welfare. It is intended to capture the value of goods and services produced for final consumption, both current and future, and can be calibrated in nominal terms as well as after accounting for the impact of inflation.<sup>7</sup> GDP can be tracked across both time and different jurisdictions, making it very useful for comparisons of economic performance.

<sup>6</sup> [Historic Versions of the System of National Accounts](#).

<sup>7</sup> GDP includes output of investment goods, which provide a basis for future production and consumption.

While it has evolved through discussion and refinements in the way that data are collected and used, GDP still does not take into account the depreciation of assets, nor does it really consider changes to the balance sheet of a country or region. This is one of its limitations. In addition, in practice it has proven difficult for statistical agencies to count and pinpoint the economic contributions of the increasingly heterogeneous services sector, which now accounts for more than 2/3 of output in all advanced economies. GDP also largely ignores the “non-market economy,” such as economic-related activities that take place within households and the community (e.g., the provision of childcare and elder care within the home, other home-based tasks, and volunteer work). If no money changes hands, a transaction generally won't be included in the data used to compute GDP. Additional limitations of GDP are that it treats the depletion of natural resources as income rather than the depreciation of an asset, it attaches no value to ecosystem services, and it does not adequately measure the effects of innovation.

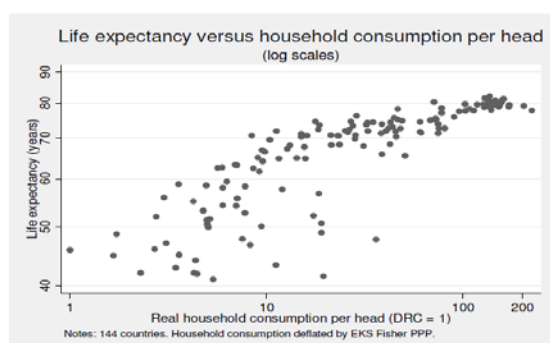
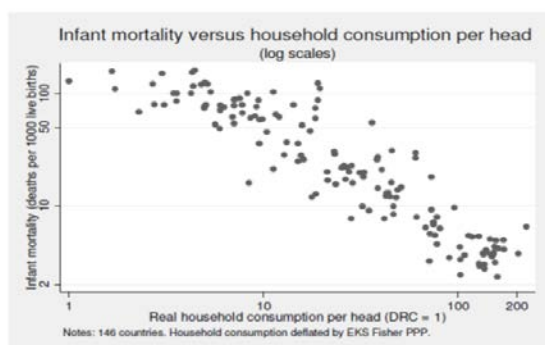
Productivity is for robots.  
Humans excel at  
wasting time,  
experimenting, playing,  
creating and exploring.  
That is why science and art  
are too hard to fund.  
But they are also the  
foundation of  
long term growth.

Kevin Kelly

These are significant weaknesses. Some analysts estimate that the value of ecosystem services alone is in the tens of trillions of dollars.<sup>8</sup> If ecosystem services were properly valued, some countries would be significantly better off than is suggested by looking just at their reported GDP. Canada is blessed with vast natural resources; the income and output generated from resource production is counted in Canadian GDP, but the depletion of these resources and the broad environmental effects of their development are not.

<sup>8</sup> [Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB \(UNEP\), Ecosystem Valuation, and Accounting for Nature's Benefits: The Dollar Value of Ecosystem Services](#), David C. Holzman, Environ Health Perspect, Apr 2012; 120(4): a152–a157.

Perhaps the most common criticism of GDP is that it does not provide sufficient information on human welfare or well-being. There is some truth to this claim, but no one can dispute that GDP is an important component of human welfare, with increases in GDP generally – and in *per capita* GDP especially – being positively correlated with improvements in overall well-being.<sup>9</sup> For example, infant mortality decreases and life expectancy increases with gains in GDP, as depicted in the figures below. Most surveys and academic studies suggest that richer people are happier than poorer people up to some point (although the impact of income distribution on well-being does not feature in these analyses).<sup>10</sup>



Some scholars believe that GDP does a poor job capturing innovation and productivity. Innovation is not necessarily limited or even

related to the tangible items that GDP has traditionally measured well – e.g., agricultural output, durable goods, consumer products, and other things that come from a physical plant. Today, innovation often involves “intangibles” that the internet and other advanced communications systems have enabled. The sheer variety and level of customization in the market has increased many-fold and is not easily represented in a data-gathering system designed to measure volume rather than quality. UK economist Diane Coyle, author of the 2014 book entitled *GDP: A Brief but Affectionate History*, argues that “the trend toward greater choice or even customization increases the wedge between [GDP and welfare].”<sup>11</sup>

What seems clear is that we still need GDP to understand both near-term economic developments as well as longer-term trends, but we need something else too.

### ***A Short History of Sustainability/ Green Accounting***

The 1970s was an era when awareness of social/environmental accounting began to take root. There was some experimentation with notions of sustainability, but not full adoption as a business practice or as an explicit focus of government policy.

The concept of Measure of Economic Welfare (MEW) was an early academic attempt to create a broad index that would include a more diverse mix of elements affecting human welfare.<sup>12</sup> It had four components: GDP plus the value of leisure time and of unpaid work in an economy, less the value of the environmental damage caused by industrial production and consumption. The concept was further refined in a subsequent initiative, the Index of

<sup>9</sup> [Hooray for GDP!](#), Nicholas Outlon, London School of Economics, June 2012.

<sup>10</sup> Betsey Stevenson and Justin Wolfers, “Subjective Well-Being and Income: Is There Any Evidence of Satiation,” *American Economic Review, Papers and Proceedings*, 2013, volume 103, number 3, pp. 598-604.

<sup>11</sup> Diane Coyle, *GDP: A Brief But Affectionate History*, Princeton University Press, 2014.

<sup>12</sup> [T William Nordhaus and James Tobin](#), Yale University and The Levy Institute of Economic Well-Being, 1989 to 2000, Edward N Wolf et al., 2003.

Sustainable Economic Welfare (ISEW), developed by Herman Daly and John Cobb in their 1989 book [A Common Future](#). They took MEW one step further by making adjustments to capture a broader array of impacts and by excluding expenditures on defence from the definition of well-being.

The [Human Development Index](#) (HDI) is a United Nations tool introduced in 1990 as a way to assess progress in improving well-being. It has three components: health, education and income. The HDI is intended to highlight the role of people and their capabilities in driving economic and social development. Calculations use data that are internationally comparable and sourced from reputable statistical agencies. The HDI is updated annually and is now widely cited by policy-makers and researchers.

Currently 187 countries are represented in the Index. Interestingly, in 2010 an inequality-adjusted Human Development Index (IHDI) was introduced, which seeks to account for the effects of inequality on well-being. As IHDI falls below HDI, societies are deemed to become less equal. Canada ranks 11<sup>th</sup> on both metrics, with an HDI of 0.911 and an IHDI of 0.832.<sup>13</sup>

The 1987 Brundtland Commission report established the foundation for subsequent global conversations about the linkages between the economy and the environment. Together with Marilyn Waring's seminal 1988 book, [If Women Counted](#), which highlighted the seeming invisibility but undoubted importance of women's work (i.e., non-market economy) and also emphasized the value of nature, this helped to "persuade the United Nations to redefine gross domestic product, [and] inspired new accounting methods in dozens of countries."<sup>14</sup> Ultimately, this way of thinking led to the current United Nations System of

Environmental-Economic Accounting (SEEA),<sup>15</sup> the first international framework for environmental-economic accounting. Its main benefit is methodological standardization that allows for cross-country comparisons.

Much like the evolution of GDP, the SEEA reconciles different approaches and relies on agreed concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics on the environment and its relationships with the economy. It is updated regularly and fits within the similar accounting structure found in the System of National Accounts. However, the SEEA is still not widely used for policy or business purposes.

Over the past few years, there has also been an increasing level of activity and discussion,

both in the media and academically, about "subjective well-being," often referred to as the economics of happiness. In her book [The Pursuit of Happiness](#), Brookings scholar Carol Graham describes this field of study as aligned with research and empirical work in behavioural economics, which in turn is closely tied to psychology.<sup>16</sup> While the average person equates happiness with an emotional state, there is also an evaluative aspect with respect to life satisfaction. Australia's Bureau of Statistics was one of the first public entities to publish these kinds of well-being measures in 2002 – [Measure of Australia's Progress](#). Other countries with similar initiatives in place include the United Kingdom Office of National Statistics,<sup>17</sup> Austria, France, Italy, Mexico and Portugal. The OECD has released its second "How's Life"<sup>18</sup> publication; it has also developed a "Better Life Index," which seeks to link material life conditions (income and wealth, jobs and

Reported happiness is strongly positively linked with the change or growth in GDP per capita from year to year.

*Diane Coyle,*

[GDP: A Brief But Affectionate History](#)

<sup>13</sup> [Table 3: Inequality-adjusted Human Development Index](#).

<sup>14</sup> <http://www.webcitation.org/6HU4a0KMI>.

<sup>15</sup> [United Nations Statistics](#).

<sup>16</sup> Carol Graham, [The Pursuit of Happiness: An Economy of Well-Being](#), Brookings Institution, 2011.

<sup>17</sup> [United Kingdom Office of National Statistics](#).

<sup>18</sup> [OECD How's Life](#).

earnings, housing) with often harder-to-quantify quality of life factors (health status, work-life balance, education and skills, social connections, civic engagement, environmental quality, personal security, etc.). Not only does the OECD consider current measures of well-being within its framework, but it also attempts to forecast well-being over time according to various subjective and objective criteria.

Overall, sustainability is multi-dimensional and interdisciplinary, requiring trade-offs among numerous objectives that are based on economic, biological, chemical and physical interactions within ecosystems and communities. Trying to reduce and convert complex social and environmental impacts to dollar amounts and to shoehorn this kind of analysis into an economics-based accounting framework that was built for a different purpose is problematic. This helps to explain the slow pace at which broader measures of well-being, including those that include environmental consequences and sustainability considerations, have been incorporated into the basic national income and production accounts that statistical agencies rely on to monitor and report on economic activity.

### ***A Way Forward?***

We are less than 30 years into work on the subject area of environmental accounting. Measuring GDP has been evolving for 200 plus years. The System of National Accounts and its core concept of GDP has served us well and continues to form the bedrock of the statistical frameworks used by governments and international agencies to track the economy. That said, the SNA must evolve as the economy and the society change; for example, over time, the statistical data series collected through the SNA will focus less on “things” and more on knowledge, intangibles, and information. Eventually, the SNA may come to include more direct measures of sustainability as well, although so far that is not the case.

In the meantime, many public agencies today monitor and seek to quantify various dimensions of environmental performance, without doing away with GDP and the other economic statistics that are produced along with it. Most countries and international agencies (OECD, UN, World Bank, etc.) present annual information on the “state of the environment.” Viewed alongside measures of GDP and other standard economic indicators, this could be a first step towards more integration of the economy and the environment. There are already common standards for data collection, which means that countries’ environmental performance can be compared and we can acquire a better understanding of local, national and global environmental and resource use trends.

GDP was never intended to be an all-encompassing proxy for human well-being. It is a partial measure, one that primarily focuses on a society’s material standard of living and how it changes over time. Used for this limited but crucially important purpose, the concept of GDP retains its value.

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