both electricity generated within the pilot region and imported from outside. Pilot regions were given leeway in how to design the schemes, including which industries would be affected, how much they would cut, who would be allocated permits and where the energy would be sourced. Hence, effects varied significantly across regions. But they have been generally successful, giving China impetus to introduce a national carbon market.

Until a fully-fledged national ETS is established, China's regional schemes will be expanded and continue to function in parallel. In the national scheme, the threshold for an emissions source to be covered will be set at 26,000 tons of carbon dioxide equivalent annually. This means the market will involve an estimated 2–3 billion tons of carbon dioxide emissions a year, making it the world's largest scheme. This nationwide carbon market will become fully functional after 2019.

CHINA'S green push is not completely new. Former leaders Hu Jintao and Wen Jiabao recognised the seriousness of environmental degradation in China and insisted that encouraging economic growth at the expense of the environment had to end. But there is now an imperitive to push efforts further to meet global goals. It is in China's interest not only to sustain its economic growth but also to ensure its standing in the world. If Xi Jinping and Li Keqiang can make China 'green', history will indeed record their contribution as equal to that of Mao Zedong and Deng Xiaoping. EAFQ

ZhongXiang Zhang is a distinguished university professor at the College of Management and Economics, Tianjin University, China.

INTERGENERATIONAL WELLBEING

Wealth accounting is critical for measuring sustainability

KEVIN J. MUMFORD

SUPPOSE you are an investor evaluating a company, but you only have its income statement. There you have revenue, expenses, profit and profit growth. If the company has experienced high profit growth then this may indicate future growth, and imply a sound investment. But if you can't tell whether the company is simply selling off its assets, as shown on the balance sheet, then you will not have a good idea of the company's potential for future growth. This same logic applies for measuring the wellbeing and development of nations and communities.

Just like profit on an income statement, GDP is useful, but has its limitations. For measuring wellbeing, these limitations arise because GDP only measures current economic activity and not the potential for future growth. Just like a company's balance sheet, national wealth accounting provides a measure of a country's potential for future economic growth. This is a strong analytic basis from which to judge intergenerational equity and the sustainability of development.

When economists study development, the focus is usually on income. The most common measure of income for an entire country is GDP, a measure of the value of all market goods and services produced in the county in a year.

This focus on goods and services when trying to measure development may seem restrictive. What about family, friendships, safety, meaningful work, recreation and other factors that determine human happiness? These are important outcomes of genuine progress, but they are not simple goods or services that can be purchased.

The typical retort from economists is that these outcomes still depend on goods and services. For example, educational services help us to find meaningful work, develop friendships and become the kind of person we want to be. Economists thus feel justified in measuring progress by the consumption of goods and services because these produce human wellbeing, even if only indirectly.

GIVEN that the end goal is wellbeing, one might ask why we do not dispense with all the counting and valuation and just directly measure happiness. Happiness surveys essentially ask people to report their happiness by selecting one of a few ordered categories such as 'very happy' or 'somewhat happy'.

PICTURE: NARENDRA SHRESTHA, EPA/AAP

Nepalese pupils hug trees to celebrate World Environment Day at the forest of Gokarna near the capital Kathmandu. Natural capital like forests and fisheries and human capital in the form of skills and creative faculties are key elements of the productive base of an economy.

One can assign numerical values to these categories and then report how the average level of happiness in a country changes over time or in response to a certain policy.

But it is not possible to rank the overall happiness of two groups from a survey of this type without imposing some dubious assumptions. This makes happiness surveys of limited value in measuring development and progress.

WITHOUT some revolutionary advance in how we directly measure wellbeing, we are resigned to inferring it from measures of the quantity and social value of each good and service.

One issue on which we can make progress is measuring the potential for economic growth, the physical

> This focus on goods and services when trying to measure development may seem restrictive. What about family, friendships, safety, meaningful work, recreation and other factors that determine human happiness?

and human forms of capital that produce goods and services. Growth in a measure of consumption like GDP means that people are better off, but it does not mean that people will continue to enjoy the higher standard of living in the future. Sustainability means that comprehensive consumption can be at least as high in the future as it is now. An increase in the productive base today implies an increase in potential inter-generational wellbeing.

We could attempt to directly forecast intergenerational wellbeing without measuring wealth, but we can't know what future consumption will be. The term is thus more of a conceptual object than something that we have any hope of directly measuring. It is not surprising then that governments, development agencies and most economists focus on income growth along an optimal growth path when discussing sustainability.

THIS is a mistake. We do not need to assume optimal income growth to assess sustainability. Sustainable development is not the same thing as optimal growth. Sustainable development simply requires that intergenerational wellbeing not be declining. Critically, high growth rates as traditionally measured may actually be harmful to intergenerational wellbeing where such growth undermines the productive base.

We may not be able to directly measure intergenerational wellbeing, but we can measure the productive base that is used to produce the goods and services that determine current wellbeing. The productive base includes all built, natural, human and social capital. A comprehensive measure of the productive base is preferable to a narrow measure as there are many goods and services that are not counted in GDP but still provide wellbeing, such as ecological services like air purification provided by forests and other natural capital.

Intergenerational wellbeing increases if and only if the productive base increases. Just as consumption is defined comprehensively to include all non-market goods and services that provide wellbeing, the productive base must be equally comprehensive and include all forms of capital that provide these goods and services. Measuring all these forms of capital and their social values would allow them to be aggregated into a single measure of wealth, referred to as inclusive or comprehensive wealth.

At present, there is too much emphasis on GDP and other measures of national income and not enough emphasis on national wealth. There have been adjustments to GDP—like green GDP or the human development index, which combines a set of social indicators and GDP with arbitrarily chosen weights. But these are still primarily measures of the current flow of wellbeing rather than measures of the stock of capital assets that make up the productive base. Without measuring how the comprehensive wealth of a country changes over time, we cannot evaluate if economic development is sustainable.

In particular, GDP growth does not necessarily indicate growth in wealth. For example, recent GDP growth in Cambodia has at times been accompanied by declines in inclusive wealth—a pattern seen in many countries in the region at various times over the past 25 years including Australia, India, Indonesia, Malaysia, New Zealand, and Papua New Guinea. This has obvious implications for sustainable development policy, as growth is of little value if its fruits are fleeting.

Those countries with a decline of inclusive wealth per capita are typically extracting more from the environment than they are investing in other forms of capital—like education (human) and infrastructure (built).

Wealth accounting is also useful for analysing the transformation of assets in the productive base over time. In particular, most Asian countries have recently seen large decreases in natural capital offset to some degree by large increases in built and human capital. An exception is South Korea, where natural capital is actually increasing, driven by renewable natural resources including forests.

RATHER than replacing GDP, a measure of national wealth would serve as a complement. Flow variables, like GDP, are more related to current wellbeing. Stock variables, like inclusive wealth, are instead related to potential intergenerational wellbeing. An increase in inclusive wealth implies that future citizens will inherit a larger productive base and will therefore be able to enjoy higher levels of wellbeing. Regularly produced national wealth statistics would reduce the obsession with GDP and would place greater focus on the importance of environmental and educational investment and long-term sustainability. EAFQ

Kevin J. Mumford is an associate professor of Economics at Purdue University.

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