

Wealth

Kirk Hamilton* and Cameron Hepburn**

Abstract Wealth is a stock, not a flow. The country with the highest flow of GDP in a particular year is not necessarily the richest country. The richest country has the highest capital stock, whether endowed or accumulated, implying a higher potential for *future* income and consumption. This should be obvious, yet concepts of wealth are often poorly understood or ignored. Many countries do not maintain adequate wealth accounts; those that do would admit that a great deal of work on national accounts remains to be completed. This is remarkable: investors would not accept corporate balance sheets of a quality akin to those of many countries. However, with progress on wealth accounting, including the accounting of natural wealth, this situation may be set to change, enabling the rate at which nations are becoming richer or poorer *per capita* to undergo popular examination. A focus on wealth, and changes in wealth, would lead to attention on investment in important assets and to sharper attention on sustainability. This paper, and this issue of the *Review* as a whole, provides an examination of wealth, its definition, constituent parts, geographical distribution, and change over time, and provides policy guidance on accounting and management. We also explore the degree to which successful wealth management may even make us happier.

Keywords: wealth, sustainability, GDP, national accounts, happiness, financial crisis, human capital, natural capital

JEL classification: E01, O40, Q01

I. Introduction

Wealth is a *stock* of assets that can generate future income and well-being. While the vast majority of economists understand that the goal of economics, broadly conceived, is to increase human well-being, it is striking that a measure of gross market-based output—GDP—is often used as a proxy for well-being. While GDP is indeed related to well-being, particularly in poorer countries, there are manifest differences. For instance, GDP can be increased by pollution and its (partial) clean up, even though this may kill vulnerable people. It is also possible to boost current GDP by running down current

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wealth—rapidly exhausting renewable resources such as fish stocks provides a good example. But flows, rather than stocks, and GDP in particular, have great political salience, because declines in production lead to idle enterprises and unemployed people today (Coyle, 2014).

The current obsession with flows is not inevitable. Indeed, it was not always like this, and the focus on GDP is actually a relatively recent phenomenon. As Hicks (1948) observed, the focus on flows of market-based gross output has occurred as a consequence of the coming of Keynesian economics and demand management. Before then, statisticians such as Giffen (1889) were as much concerned with stocks of capital as with flows of output and income.

Journalists, and even some economists, often embarrassingly forget the basic difference between stocks and flows. For instance, the Forbes (2012) ‘rich list’ is entirely constructed from GDP data:

If wealth is power, then Qataris have some serious muscle to flex. The Persian Gulf emirate of 1.7 million people ranks as the world’s richest country *per capita* . . . [with] an estimated gross domestic product *per capita* of more than \$88,000 for 2010.

The widespread confusion in the press and even in academic publications between stocks and flows is striking because the distinction should be clear from armchair observation. A wealthy aristocratic family, for instance, may have a low annual income despite holding substantial financial assets. A talented young sportsperson may have a very high income and yet little financial wealth. Properly understood, however, income and wealth are indeed correlated: the poor sportsperson may have little financial capital but substantial human capital—his or her high income may be seen as a return on that human capital. In contrast, the aristocratic family may have little human capital, hence minimal income from an otherwise substantial asset base. The flow of income is the return on the stock of wealth; the two are thus related. But returns on wealth can and do vary dramatically from one person and one country to another, so income and wealth need to be distinguished.

Suppose journalists and economists made the distinction, and genuinely discussed changes in national wealth, in addition to obsessing over GDP figures. Headlines such as ‘Average Briton £5,000 poorer’ or ‘Average American \$10,000 richer’ might accompany annual updates to national wealth accounts. Such numbers would be more intuitively comprehensible than, say, changes in the Human Development Index, the Measure of Economic Welfare, the Index of Sustainable Economic Welfare, or other indices promoted as ‘alternatives’ to GDP. Indeed, GDP is itself used as a proxy for wealth because people have a basic desire to understand who is ‘rich’ and who is not—the existence of ‘rich lists’, both for individuals and for countries, demonstrates this. People want wealth numbers, but they are not available. If wealth numbers were widely available, as a complement to GDP, it is our view they would be used, and they would provide us with a key tool in tackling a whole host of intertemporal and intergenerational problems, ranging from infrastructure provision, investment in education and innovation, and addressing environmental problems such as biodiversity loss and climate change.

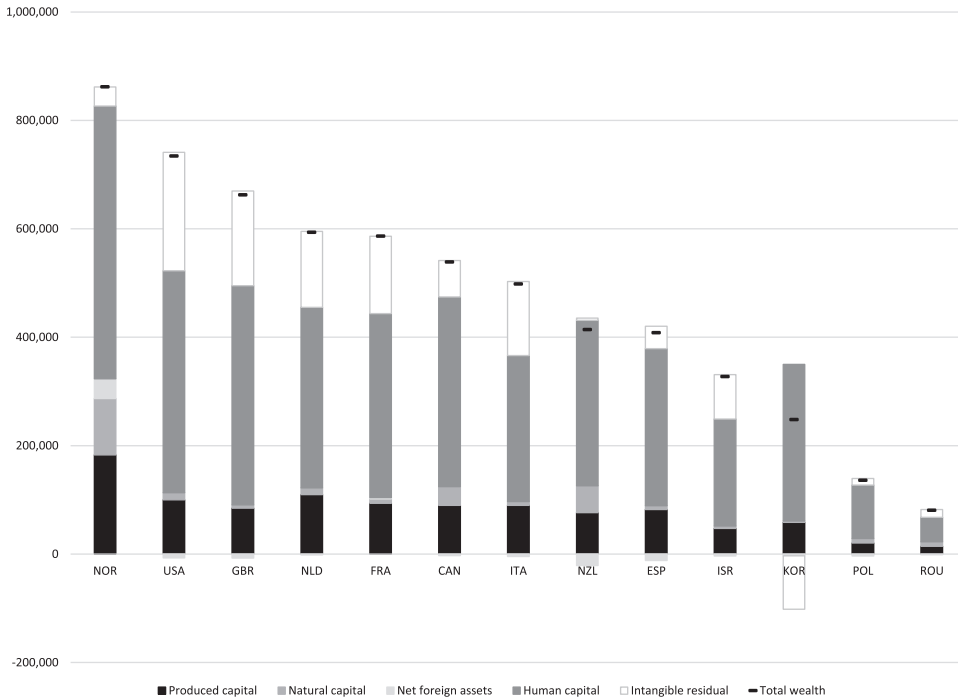
Because income is the return on wealth, the ‘league table’ of countries sorted by GDP *per capita* will have a very similar order to the ranking by total wealth *per capita*. But the development prospects of two countries with the same GDP *per capita* could be very different if one is actively consuming its wealth while the other is building new wealth for the future. Wealth composition also matters—the development problem for a poor country, with 40 per cent of its wealth in low-productivity agricultural land, is very different from a high-income country where 80 per cent of total wealth consists of human and institutional capital.

By World Bank estimates, an average British citizen was thought to have wealth of around US\$ 650,000 (GBP 400,000) in 2005 (World Bank, 2011). What are the components of this wealth? Answering this question personally, you might consider the value of your home, your car, your pension, investment portfolio, and other assets. However, the majority of your wealth is likely embodied in your ‘human capital’—your personal stock of knowledge, skills, and capabilities—along with your ‘institutional and social capital’—the rule of law, enforcement of property rights, a stable financial system, and so on in the society in which you live. Human capital enables you to generate income in the future; institutional capital provides the critical social underpinnings for income generation, along with protection of wealth from theft or destruction by others. Cash in bank accounts may be of questionable value if society descends into anarchy, or in the event of bank run, as customers of Northern Rock in the United Kingdom discovered during the financial crisis. These two components of wealth—human and institutional capital—form the vast majority of wealth in Great Britain and in other high-income countries, as shown in Figure 1 in section III of this paper.

Despite the fact that wealth creation is an important objective of nation states, wealth numbers are not always available. Modern national balance sheets started in the UK with the work of Jack Revell (1967) and have been continued by the Office for National Statistics (ONS). They have been used extensively in the annual estimates of the size distribution of personal wealth in the UK published by Her Majesty’s Revenue and Customs (HMRC). Relatively few countries compile national balance sheets at all, let alone comprehensively or consistently. This situation is far from ideal. It is also surprising, given that the essential framework for national balance sheets has been in place for decades. The core of the UN System of National Accounts (SNA) has been in place 1947, with incorporation of balance sheets in 1968, and with major updates in 1993 and most recently in 2008 (UN Stats, 2014). The three core principles of the guidance on balance sheets in the SNA are that we should measure economic value, estimated by exchange value (assuming a willing buyer and seller), and capture depreciation as a change in asset value. This is not necessarily perfect. For instance, consumer surplus is excluded from calculations of value, private-sector discount rates are employed, and asset depreciation does not lead to any adjustment to GDP. Net domestic product (NDP) deducts depreciation of produced assets from GDP, but this measure is not widely reported, and it still does not measure the depletion of natural resources.

The 1993 UN SNA made significant progress by including commercial natural resources in the balance sheet, and the 2008 SNA revision gives further guidance on measuring the national balance sheet. The new UN statistical standard for the System of Environmental-Economic Accounting (SEEA, 2014), provides practical guidance—in terms of concepts, definitions, classifications, accounting rules, and so on—for the measurement of environmental assets.

Figure 1: Wealth decomposition, 2005 (level in nominal US\$ *per capita* by market exchange rate), discount rate = 4.58 per cent for both natural and human capital



Source: Hamilton and Liu (2014).

An important change in the 2008 SNA is the standardized treatment of research and development expenditures as investment in the national accounts. This is combined with a more rigorous and comprehensive treatment of intellectual property. This provides a major step forward in accounting for the stock of knowledge. Furthermore, countries such as Australia are forging ahead with the inclusion of commercial natural resources in their national balance sheet accounts, and there is currently impetus for this to happen in Canada and the UK as well. These are positive developments, but it may seem surprising to a layperson that these advances did not happen decades ago.

What would change if policy-makers and politicians had up-to-date measures of wealth, could see how wealth had evolved from one country to another and over time, and if their performance were subject to scrutiny by journalists and the general public? It might trigger policies to maintain and increase wealth, such as infrastructure maintenance and upgrading rather than neglect and decay. Country wealth rankings, or rankings of changes in wealth, may shift the focus away from short-term consumption and towards long-term investment. Policies that drive wealth creation—education, innovation, entrepreneurship, infrastructure, health, and so on—tend to involve substantial investments today for returns that may be decades into the future. People might tolerate lower levels of consumption today if it is clear that this is to generate wealth, and thus higher consumption, in the future. In short, focusing on wealth might lead to greater investment in human, social, and physical infrastructure, innovation, and

the maintenance of underlying productive asset bases, including natural capital, and greater long-run welfare.

If governments are genuinely concerned with future well-being, then there is a strong argument to be made for the net change in real wealth (variously termed ‘genuine saving’ or ‘comprehensive investment’ in the literature) to be an indicator of equal importance to GDP growth in the suite of indicators that guide economic policy.

This issue of the *Oxford Review of Economic Policy* takes a serious look at wealth from several different angles. This editorial assessment is structured as follows. In the next section, we explore the definition of wealth and some of its conceptual challenges—wealth is a subjective notion that can be hard to pin down. In section III, we consider the different components of wealth—including human capital, produced capital, social capital and natural capital. Section IV examines the distribution of wealth globally and within countries, identifying the increase in wealth inequality that has underpinned the dissatisfaction of the so-called 99 per cent with the wealth of the 1 per cent. Section V looks at how we came to be in this position, both from a grand historical sweep of time, through the industrial revolution, to the impact of the great recession on wealth. Having established the conceptual definitions and a reasonable set of facts, but before proceeding to the policy considerations, in section VI we consider the objectives—why are we interested in wealth, and is more of it always a good thing? The future is explored in section VII, which considers the relationship between wealth and sustainability, and the policy implications for the management of both renewable and non-renewable natural capital. The concluding section sets out an agenda for economic research into wealth.

II. What is wealth?

A person’s wealth is commonly defined by economists as the expected present (discounted) value of their future stream of consumption.¹ How is the value of future consumption to be determined? One might simply multiply the quantity of the good or service consumed by its price.² If this method is employed, how should such prices be determined? Where markets exist, one is tempted to use market prices. In a marketplace, prices tend to be somewhere near the point at which sellers’ willingness to part with the good (often reflecting their cost of production) meets buyers’ willingness to pay for it.

Firms’ and consumers’ willingness to accept and willingness to pay emerge as the result of a large number of factors, many of which are subjective and context-specific. They often incorporate ‘biases’,³ and an entire literature within behavioural economics has developed to explore these problems in valuation. Furthermore, prices in markets

¹ Here we conceive of consumption in a general sense. So, for instance, consumption includes the enjoyment of environmental amenity, rather than being limited to produced goods and services.

² This does not necessarily capture the full willingness to pay (the area under the demand curve) for the good or service.

³ Given the pervasiveness of such biases, they are better understood as being inherent and normal aspects of human behaviour and decision-making.

only reflect the valuations of those participating in markets, and hence market prices do not reflect the values of future generations and other non-participants. Many markets are also riddled with ‘market failures’ (e.g. imperfect competition, externalities, asymmetric information, and so on), such that market prices are not always an accurate reflection of social value. And, sometimes, markets simply do not exist. Non-market valuation techniques can attempt to come to the rescue, and market prices can be ‘corrected’ for various market failures—here the relevant concept is the ‘shadow price’.

Non-economists often lament that this is all highly unsatisfactory, and that there must be a superior alternative to determining the ‘value’ that underpins estimates of wealth or prosperity (Hanauer and Beinhocker, 2014). Might there be a more objective ‘theory of value’? Economic processes use energy and human intelligence to rearrange matter into forms that are more valuable to humans. Our wealth comprises the capital stocks that enable us to rearrange matter (and information, in the case of services) and thus create value. Surely, it is asserted, there is some objective way to conceptualize and quantify this process?

However, the quest for an objective ‘theory of value’ is an intellectual challenge of Herculean proportions. Various economists and non-economists have attempted it over the past couple of centuries.⁴ It is fair to say that none of these efforts have succeeded thus far, and many economists now view an objective or ‘essentialist’ theory of value (Cottrell, 1981) as an impossible and ill-conceived goal. The value generated by the processes of using energy to rearrange matter and information into different forms is a function of the relevant context, time, and place. Any theory of value, to be useful, must aggregate subjective preferences, and these preferences will incorporate fashions, biases, and other context-specific factors.

Do these ‘problems’ undermine the case for using wealth as an aggregate economic indicator? If so, they also undermine the conventional indicators, too, as the same problems arise with statistical aggregates such as output, GDP, household incomes, and so on. Even indices designed to more closely approximate welfare, such as the Human Development Index, involve subjectivity. Further, as Kirk Hamilton and John Hartwick (2014, this issue) stress, the value of a particular set of capital assets should and will change as the context of human society changes. This is not, in fact, a problem, but a fundamental feature of value when correctly measured. To be useful, assessments of asset value and wealth must be a function of context. For instance, before the late 1800s, crude petroleum bubbling out of the ground was a problem for farmers on whose land this occurred; the liability became an asset with the discovery and introduction of the internal combustion engine. This is not to say that market values are always right—as noted above they are often dubious—but simply to clarify that defining an objective measure of value appears to be a near-impossible goal.

So problems of ‘subjectivity’ do not stop wealth being a useful indicator. More pragmatically, for a conception of wealth to be useful, it should be able to be converted into data for the national accounts. This requires that wealth can be estimated, ideally in its

⁴ The most widely known such theory of value is the labour theory of value, advanced by Marx (1865) and others, such as Aquinas in the *Summa Theologiae* (1265–1274), according to Russell (1946). Marx argued that value of goods and services was a function of the human labour required to generate those goods and services. Alternative ecological theories of value have been advanced, such as that of Georgescu-Roegen (1971). This approach looks at the embodied matter and/or energy/negentropy in goods and services. See Hepburn and Bowen (2013) for a discussion.

component parts (see section III). It turns out that this is difficult, even for the stock of accumulated material and physical capital (Schreyer *et al.*, 2011). Valuing the stock of human capital is also beset with tough choices: it is one thing simply to count the number of individuals of working age (the active population) within a country, it is another thing altogether to determine a measure the value of different generations of skills and education (Folloni and Vittadini, 2010; Kirk Hamilton and Gang Liu, 2014 (this issue)). Carl Obst and Michael Vardon (2014, this issue) provide a valuable tour of the issues, concluding that it is not the lack of data that has been preventing progress, but rather the historically limited desire and/or ability to integrate such information into useable accounting frameworks, through careful delineation of measurement boundaries and articulation of relationships between stocks and flows. But with the recent adoption of the SEEA as a UN statistical standard in 2012, the prospects for including natural resources in national wealth are, for once, looking up.

III. Components of wealth

With overall wealth defined as the net present value of future income, it is now helpful to explore the various sub-components. The wealth of a nation can be partitioned into its respective forms of capital, the most important of which include:

- (i) *physical or produced capital*, which includes physical infrastructure, buildings, machinery, and so on;
- (ii) *human capital*, which incorporates the education and stock of knowledge embodied in human beings within a country;
- (iii) *natural capital*, which includes the underground assets (minerals, fossil fuels), commercial land, fish stocks, and natural land including the ecosystem services that it provides;
- (iv) *intellectual property*, which includes the value of contracts, leases, patents, software, databases, and other intangible property;
- (v) *social/institutional capital* incorporates intangible factors such as the quality of institutions, the rule of law, and various forms of social capital that enable goods and services to be produced; and
- (vi) *net financial assets*, the measure of the net holdings of financial assets across national borders. Within national borders financial assets and liabilities cancel.

The SNA only measures three and a half of these six components, namely physical capital, intellectual property, net financial assets, and the commercial component of natural capital. It omits human capital, social/institutional capital, and all non-commercial natural capital. The challenges in measuring and compiling comprehensive wealth accounts are therefore considerable. While numerical estimates of overall wealth levels across countries could in theory be available in national wealth accounts, such accounts are incomplete at best. To get a sense of the problem, note that as income is the return on wealth, total wealth of each country might be expected to be a multiple of roughly 20–30 times GDP. Yet multiples of only roughly 3–5 are observed in wealth accounts. This rises to a maximum of 6.6 when natural capital is included. This suggests well over half of total wealth is missing from the national accounts. This is not surprising

given that the accounts focus primarily or exclusively on produced capital and commercial land. Hamilton and Liu (2014) note that human capital is a major omission. They provide estimates for human capital for 13 countries. The limited available evidence suggests human capital in high-income countries may be around four times as large as produced capital. Even once human capital is accounted for, an average (over the countries examined) of 25 per cent of total wealth remains unaccounted for—it is neither produced, nor natural, nor human capital. Hamilton and Liu (2014) argue that this residual intangible wealth is the ‘stock equivalent’ of total factor productivity—the value of assets such as institutional quality and social capital that augment the capacity of produced, natural, and human capital to support a stream of consumption into the future.

Pulling these numbers together gives *per capita* wealth estimates across several countries, shown in Figure 1. Total wealth is estimated (per World Bank, 2011) as the present value of future consumption. Consumption is derived from the SNA, and therefore excludes broader values such as environmental amenity. Individual values for produced and natural capital are built ‘from the ground up’—as sums of depreciated historical investment for produced capital, and as present values of resource rents in the case of natural capital. The difference between total wealth and the sum of produced and natural capital is the ‘intangible residual’.⁵ As Hamilton and Liu (2014) show, intangible wealth can be further broken down into human capital (the present value of future earnings, summed across education cohorts) and a final ‘residual of the residual’, which implicitly captures other intangible factors such as institutional quality and social capital.

The numbers are not perfect, but provide a useful guide. At the top, in 2005 Norwegians had wealth *per capita* of over US\$ 860,000, and one might expect wealth to have increased over the last 9 years. By comparison, the *per capita* wealth of Romania was a factor of 10 lower, at just over US\$ 80,000. The average Briton had wealth of around US\$ 650,000 (around GBP 400,000). The other striking feature of these numbers is the high proportion of wealth in human and institutional/social capital. For instance, in Great Britain in 2005, 61 per cent of wealth is in human capital, with another 26 per cent in intangible/social capital. Only 13 per cent was in produced capital and a mere 1 per cent was natural capital, with net foreign debts of 1 per cent. There is further research to be done—it is impossible for Korea to have a negative measure of institutional/social capital, and it is simply implausible for institutional/social capital to be roughly zero in New Zealand. Estimates of natural capital stocks also seem too low, given that without a stable climate and biosphere none of the other elements has any value at all. Ecosystem services are included in these figures, but only implicitly—forests provide water regulation services that boost the value of farmland, for example, but they are not broken out explicitly and, since they are provided as externalities, they do not boost total natural wealth. These problems notwithstanding, this sort of approach is informative.

Differences between the composition of wealth from one country to another indicate the policy challenges are different from country to country. Norway is a rich country with a large proportion of natural capital—largely oil and gas in the North

⁵ Hamilton and Liu (2014) present the wealth accounting methodology in detail.

Sea—and it has reacted to its unusual situation by creating a sovereign wealth fund in an attempt to avoid Dutch disease. The wealth of Singapore (not shown), is almost entirely in its human capital, running shipping and financial industries. The economic and sustainability challenges for Norway and Singapore are therefore very different, and their current stocks of wealth provide an initial condition for development in the future.

Those concerned by current environmental pressures may consider natural capital to have an importance that is not reflected in these numbers. Various questions might arise. Climate stability, for instance, is not valued explicitly—how would we value this? Or the availability of potable water? Are these numbers low because, at present, these assets are still not so scarce as to have high shadow prices? Are such prices likely to rise over time? One response is that the natural capital numbers—even allowing for omissions—are not actually all that low. In absolute terms, commercial values for natural resources range from over \$5k *per capita* in low-income countries to over \$10k *per capita* in rich countries (and much higher in oil states). In developing countries, natural capital is 25–40 per cent of the total wealth; it is only relatively low (2–3 per cent of total wealth) in rich countries because accumulated human and institutional capital is so much higher. All the same, one might reasonably expect scarcity and environmental pressures to drive natural capital values higher over time.

IV. The distribution of wealth

The previous section showed that, in 2005, the average Norwegian was around ten times wealthier than the average Romanian. And the average Romanian was around ten times wealthier than the average person in the poorest countries of sub-Saharan Africa. These average wealth figures reveal wide disparities of wealth *between* countries. The averages hide disparities of wealth *within* countries, which have been exacerbated since the Great Recession. Country averages also provide no indication of the remarkable reduction in global wealth inequality over the last decade, driven by the rapid increase in wealth in Asia, particularly China. This section reviews the distribution of wealth within and between countries, highlighting some of the dramatic recent changes that have given rise to the ‘Occupy’ movements and the slogan ‘We are the 99%’ (Alvaredo *et al.*, 2013; Mankiw, 2013).

(i) The distribution of wealth in the USA

Edward Wolff (2014, this issue) explores wealth inequality in the USA following the Great Recession. The major finding is that wealth inequality increased sharply between 2007 and 2010, after two decades of very little movement. Median wealth in the USA fell by an extraordinary 47 per cent over that period. Similarly, the distribution of wealth in the USA along racial and ethnic lines similarly shifted considerably; Hispanics, in particular, suffered major losses in their net worth as asset prices fell. Similar effects were observed in households headed by persons under the age of 45. Wolff traces these remarkable shifts in the distribution of wealth to the high leverage of middle-class families and the high share of homes in their portfolio as the property bubble burst.

Norton and Ariely (2011) find that despite these large changes in wealth inequality, people still do not realize just how unequally wealth is distributed in the USA.⁶ They surveyed a large, nationally representative sample of Americans, asking respondents to state their ideal distribution of wealth and to estimate the actual distribution of wealth in the USA. Whether Democrat or Republican voters, respondents considered the ideal distribution of wealth to be significantly more equal than their estimate of the actual distribution. Moreover, it turns out that wealth is vastly more unequally distributed than respondents estimated it to be. Wealth inequality in the USA is now at unprecedented levels: the richest 1 per cent of Americans now hold 40 per cent of the country's financial ('non-home') wealth, while the bottom 80 per cent hold merely 7 per cent (Wolff, 2010). The Gini coefficient for wealth in the USA rose from 0.83 to 0.87 over the Great Recession (Wolff, 2014). Preferences about 'ideal' wealth distributions, and erroneous estimates of the actual distribution, appear to be robust to political persuasion, gender, and other demographic variables. It is striking that Americans have such a skewed impression of the distribution of wealth. It is perhaps because consumption, rather than wealth, is visible, and greater levels of debt have, so far, allowed the consumption habits of the poorer quintiles to track those of wealthier quintiles. It remains to be seen whether this is sustainable.

(ii) The distribution of wealth between regions

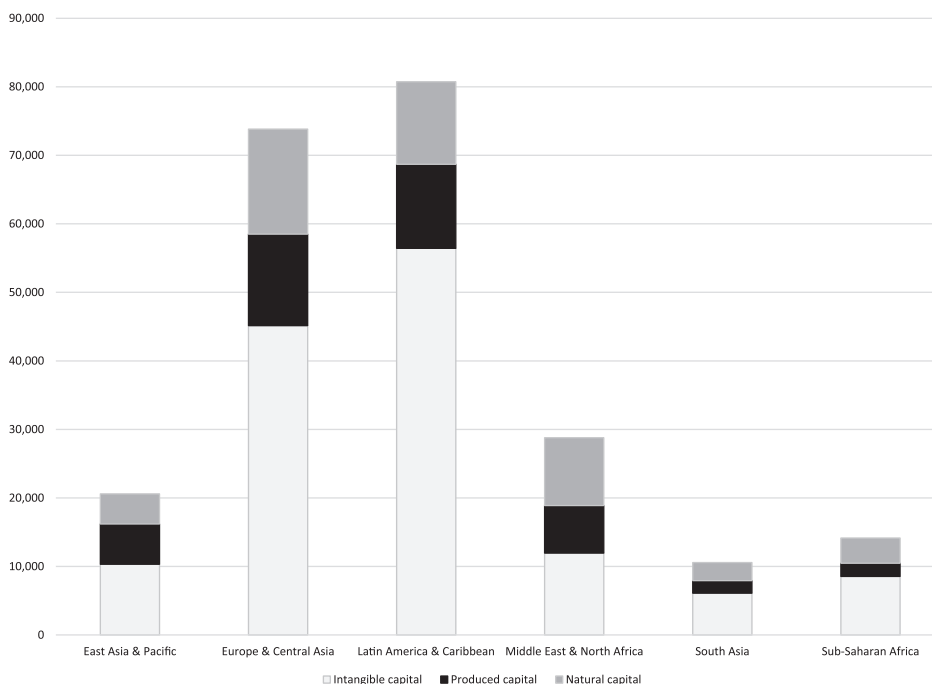
Wealth accounts developed by the World Bank (2011), and shown in Figure 2, indicate the large differences in wealth across world regions—Latin America and the Caribbean, for instance, has roughly six times the *per capita* wealth of South Asia. The composition of wealth across regions is of particular interest. For the Middle East and North Africa there is the expected dominance of natural capital as a share of wealth. And the share of produced capital in East Asia and the Pacific is the highest across regions, reflecting the capital-intensive nature of China's development.

But it is the level and share of intangible wealth that stands out in Figure 2. With the exception of the Middle East and North Africa, intangible capital is the largest share of wealth across the developing world. This stands to reason since it is human beings and their institutions that add value. But the total value of intangible wealth varies hugely across regions, with Latin America and the Caribbean having nearly 10 times the value *per capita* of South Asia. This reflects a variety of influences, including stronger institutions in Latin America and much higher investments in human capital per person over time. There are also complementarities in play at the level of marginal returns—higher values of human capital can increase marginal returns from produced capital, and *vice versa*.

(iii) Wealth inequality

The question of economic inequality has received renewed attention, as recent work at the International Monetary Fund (IMF) shows. Ostry *et al.* (2014) argue that: 'While

⁶ Their study has been popularized in a YouTube clip with over 14m views as of February 2014: <http://www.youtube.com/watch?v=QPKKQnijnsM>

Figure 2: Composition of total wealth in developing regions, 2005, \$ per capita⁷

Source: World Bank (2011).

the literature on [redistribution and growth] remains controversial, the notion of a tradeoff between redistribution and growth seems deeply embedded in policymakers' consciousness.⁷ Against this received wisdom their analysis concludes that, controlling for the level of distribution, lower net inequality is robustly correlated with faster and more durable growth.

While there is a large literature on *income* inequality within and across countries, the literature on wealth inequality is more sparse. However, a striking finding from [Davies et al. \(2010\)](#) suggests that the distinction may be important in considering global inequality (that is, inequality between individuals, independent of the country where they reside). They find that while the global wealth distribution is highly skewed, with a Gini coefficient of 0.802, the comparable Gini for income ([Milanovic, 2005](#)) is only 0.641. Globally, wealth is much more unequally distributed than income, which suggests that policies for redistribution of wealth within countries may need to focus on capital incomes (and inheritance taxes) as well as taxes on employment income.

However, recent work presented in [Atkinson and Piketty \(2010\)](#) and [Piketty \(2014\)](#) documents the precipitate rise in the employment income of the top 10 per cent in the US and other Anglo-Saxon countries over the last 30 years, an outcome that can be tied to the inflation of top pay and bonuses in these countries. The US has seen a huge increase in the share of pre-tax income going to the top 10 per cent of the distribution, reaching 51 per cent in 2012 ([Saez and Piketty \(2003\)](#), with data updated to 2012).

⁷ Note that human capital is not separately estimated, and is therefore aggregated into intangible capital.

Piketty (2014) documents the underlying dynamic of the concentration of wealth in the major developed economies—the stagnation of exogenous factors (technological change and population growth) at 2.5 per cent growth, combined with long-run real returns on capital holdings of 4–5 per cent—and plots the resulting rise in the concentration of wealth since the 1970s.

(iv) Location of wealth in different institutions

Financial wealth is held in a variety of institutions, including banks, insurance companies, and investment management firms (including mutual fund companies). These institutions manage wealth on behalf of households, trusts, private pension funds, and, in some countries, public pension funds.

An important feature of the early twenty-first century has been the growing role of institutions dealing in foreign financial assets. On the one hand, global macroeconomic imbalances have led to central banks becoming major investors in foreign financial assets—for example, the People's Bank of China's holdings of foreign exchange in the form of US Treasuries. A second recent phenomenon is the boom in commodity prices, which has led to the establishment in many countries of sovereign wealth funds (SWFs) to manage revenues from resource exports—Norway's Government Pension Fund is a leading example.

On SWFs in particular there have been concerns about whether their investment strategies are purely focused on financial returns, or whether their investments could be used to serve the geopolitical interests of their owners. To increase transparency concerning the holdings and investment strategies of SWFs, in 2008 the IMF helped to initiate voluntary efforts by SWFs to establish the 'Santiago Principles' which guide the legal framework, institutional and governance framework, and investment and risk management policies for SWFs. To date some 25 SWFs have agreed to implement these principles. IMF (2010) provides an up-to-date review of the economics of sovereign wealth funds.

V. Wealth over time

For most of human history, relatively little wealth was created or accumulated. If the 200,000 years since modern humans emerged were compressed into an hour, around 59 minutes and 56 seconds of this time is spent in poverty, with an explosion of wealth for most of humanity over the final 4 seconds.

Several important things changed around the 1800s in two important areas—investment and innovation. As Galor and Weil (2000) and others have noted, the incentive to invest in and accumulate human capital grew as infant mortality rates declined and families had fewer, but higher-quality children. Second, the emergence of a set of critical innovations, including iron production processes, machine tools, mechanized cotton spinning, the transition from biomass to coal, the steam engine, and so on, triggered unprecedented investments into physical and produced capital, marking the most exciting phase of rapidly increasing human wealth in human history (Beinhocker, 2006).

Eion McLaughlin, Nick Hanley, David Greasley, *et al.* (2014, this issue) look back into the past at the change in British comprehensive wealth (total capital) and its constituents from 1760 to 2000. The changes in components of total capital (human, produced, and natural) reveal that the economic development in Britain over that period

was a process of exploiting and converting an initial stock of natural capital, and accumulating stocks of human and produced capital.

McLaughlin *et al.* calculate the change in wealth, referred to as ‘genuine savings’, ‘adjusted net savings’, or ‘comprehensive investment’, as the change in each form of capital, valued using shadow prices which reflect the marginal contribution of each stock to welfare, defined as the present value of aggregated utility over time. Theory suggests that changes in total wealth should be a leading indicator of changes in future well-being—if wealth is declining, populations will have to endure lower levels of consumption at some point in the future. While immediate declines in consumption can be delayed by borrowing from the future, declines in wealth today imply that a day of reckoning will arrive in the future at which consumption must also decline.

McLaughlin *et al.* show, through empirical work on their 240 years of data, that the theory is borne out in practice—declines in wealth are leading indicators of subsequent declines in consumption. Sustainability, discussed further in section VII, does have a very close connection to maintaining wealth. Indeed, sustainable development as a whole can be seen as the process of wealth accumulation and management, once wealth is properly understood. So-called ‘developed’ countries were a factor of 8–30 times wealthier *per capita* than ‘developing’ countries in 2005—wealth is almost synonymous with development.⁸ From this perspective the ‘international development enterprise’ is a heroic effort—an attempt to achieve in a few decades what developed countries achieved over several centuries. And critical to sustainable development and to building wealth, is investment in building both human capital and the institutions that comprise intangible wealth.

VI. Why focus on wealth?

Previous sections of this paper have defined wealth, picked apart its components, and explored how it is distributed across time, space, and individual people. Before considering how we might better and more sustainably manage our wealth (section VII), with the associated policy considerations, it is first worth critiquing the objective. Why is wealth desirable? What is the question to which ‘more wealth’ is the answer?

Behind any discussion about the economics of wealth is the implicit assumption that more wealth is in some way superior to having less wealth. While most economists would consider it axiomatic that more wealth and more choice is preferable, some studies indicate that sometimes ‘less is more’ (Iyengar and Lepper, 2000; Schwartz *et al.*, 2002; Irons and Hepburn, 2007).

In development economics, as noted in the previous section, the point of more wealth is clear enough—the avoidance of misery, the reduction of poverty, the reduction of infant mortality, and the extension of life expectancy are all goals that are worthy almost irrespective of your philosophical perspective. These goals are much more readily achieved by wealthier nations, if indeed some of them are not effectively synonymous with being wealthier once the concept is properly construed.

⁸ See Figure 2 and Table 2 in Hamilton and Hartwick (2014), on the level and composition of wealth across developing regions.

Beyond certain threshold levels, however, does more wealth actually deliver greater capabilities for human flourishing? More narrowly, and more tractably, does more wealth deliver higher levels of happiness? Claudia Senik (2014, this issue) addresses the question. *A priori*, one might expect wealth to be a driver of happiness through the flows of income (and thus consumption) that it generates, and also through the security it provides as a buffer against shocks, as potential collateral for risk-taking and other freedoms, and as a source of social prestige. Almost all of the ‘happiness economics’ literature is focused on the connection between income and happiness, so this is the obvious place to start. But the evidence on income and happiness remains controversial. The only clear finding is that incremental increases in happiness drop off substantially as income increases—but whether the utility of income simply follows an approximately logarithmic function or whether marginal utility effectively declines to zero beyond some income level remains disputed (Easterlin, 2001; Stevenson and Wolfers, 2013).

The impact of wealth on happiness mediated through the provision of greater security, freedom, or status, is more interesting, but more difficult to explore. A very small number of studies have used individual level data to find a positive association between overall household wealth and happiness, independent of income (Headey and Wooden, 2004; Smith *et al.*, 2005; Guillen-Royo *et al.*, 2013). There is less than complete clarity on the channels, although security—for instance from home ownership—appears to be important (Senik, 2014). At the aggregate level, however, there is a remarkable lack of evidence to date, which is partly due to methodological challenges (Inglehart *et al.* 2008), but also perhaps a relative lack of attention that may be indicative of a valuable future research agenda. Senik provides an indication of the future research that may be valuable in this area.

Another major reason to focus on wealth derives from the insight that changes in wealth, measured sufficiently comprehensively, can signal whether current well-being can be sustained in the future. We turn to this in the next section.

VII. Sustainability and wealth management

Changes in wealth and sustainability are closely intertwined, as is apparent from previous sections. This is because wealth is a measure of the net present value of the *future* stream of consumption from an asset. If real wealth is declining (increasing), the expected present value of that future stream of consumption is also declining (increasing).

This leads to several basic prescriptions to ensure sustainability. Given that physical and human capital have increased dramatically in most countries over the last century, concerns about sustainability focus on the depletion of natural capital, including the exploitation of exhaustible resources (e.g. minerals and fossil fuels) and especially the destruction of renewable resources (e.g. ecosystems, fisheries, forest, climate stability). For exhaustible assets, Hartwick (1977) showed that wealth can be preserved and sustainability ensured if the rents generated from resource extraction are reinvested in other forms of capital (physical, human, etc.). The Hartwick result fails, however, if either of the following is true (Hartwick, 1977; Dasgupta and Heal, 1979): (i) produced

capital depreciates at a constant rate, or (ii) the elasticity of substitution between factors of production is less than 1. The first of these is likely to be true, while there is some evidence that produced capital and energy resources are substitutable with an elasticity that is not statistically different from 1 (see, for example, [Markandya and Pedrosa-Galinato \(2007\)](#)). To offset depreciating capital and potential limitations on the substitutability of factors, investment in knowledge capital to deliver technical progress is a prudent component of savings policies, if sustainable development is to be achieved.

The original [Hartwick \(1977\)](#) rule is a prescription for constant consumption with fixed technology and a finite exhaustible resource stock. What might be termed ‘minimal’ sustainability is therefore feasible, subject to the concerns about fixed capital depreciation and the substitutability of production factors. But a prescription for zero growth would never be attractive to finance ministries in extremely poor countries. [Hamilton and Hartwick \(2014\)](#) have generalized the Hartwick rule to show that increases in wealth can be assured provided that countries maintain positive net (genuine) saving.

Rick [van der Ploeg \(2014, this issue\)](#) goes into some more detail and provides a set of valuable policy-relevant guidelines for finance ministries of countries with substantial natural resources. These guidelines apply the Hotelling and Hartwick rules and general economic insights on the permanent-income hypothesis. For instance, van der Ploeg notes that the extraction of natural resources should be accompanied by net investment, with consumption responding only to the ‘equivalent permanent value’ of natural resource income. He also notes that resource-rich countries should set up an intergenerational sovereign wealth fund to smooth consumption across generations, a liquidity fund to manage commodity price volatility, and an investment fund to park part of the windfall until the country is ready to absorb extra spending on domestic investment. His paper provides helpful, policy-relevant advice on the management of exhaustible natural capital.

Equivalent guidelines for renewable natural capital are also urgently required. Unlike exhaustible resources, whose value will inevitably decline towards zero as they are exploited, renewable natural capital could potentially provide an annuity of value into the long-distant future. Indeed, our entire civilization and economic systems rely upon the existence of such renewable natural capital—a habitable climate, drinkable water, edible food from sustainable management of land and the oceans, materials for construction of shelter and other infrastructure. It is patently obvious that with population and economic growth, this form of renewable natural capital is under substantially more pressure than non-renewable capital, not least because establishing prices reflecting scarcity has been more difficult for such assets ([Helm and Hepburn, 2014](#)). As one example, we will run out of ‘atmospheric space’ for carbon-dioxide emissions (the renewable natural capital) well before we will run out carbon embodied in fossil fuels (the non-renewable natural capital) ([Meinshausen *et al.*, 2009](#)).

But the fact that there is pressure on renewable capital does not necessarily mean that it should all be preserved. The value of renewable natural capital is the discounted stream of income it generates. For most of the last two centuries, it has made economic sense for humanity to deplete and, indeed, entirely destroy many renewable assets. This has contributed to vast increases in living standards and reductions in poverty, and has been part of a process of development that has enhanced human well-being. This is because some of these renewable natural assets have a very low total economic

value—greater benefits to human societies are available by felling forests for wood, or for agricultural crops or pasture land. Liquidating renewable assets and reinvesting the value elsewhere—potentially in physical or human capital—has enhanced wealth, consistent with a ‘weak sustainability’ approach.

However, Dieter Helm (2014, this issue) argues that this process has now gone on for long enough. While it will be difficult ever to know when we will have converted the ‘optimal’ amount of natural capital into other forms, Helm argues that in wealthy countries at least, we are now close to or beyond the point of optimality. Hence policy should now focus on maintaining the total stock of natural capital that currently exists, if not gradually restoring and enhancing it. Helm therefore proposes a ‘renewable natural capital maintenance’ approach. He acknowledges that investment may be required just to maintain these valuable natural ecosystems in their current state. Furthermore, he argues that if renewable natural assets are to be depleted in one location, renewable natural assets of an equivalent value should be created or regenerated in another location—as with notions of ecological or biodiversity offsetting.

VIII. Conclusion

The eight papers in this issue examine wealth from several important different perspectives, including: the relationship between wealth and happiness (Senik), the evolution of wealth over time both in the USA (Wolff) and the UK (McLaughlin *et al.*), the estimation of human and institutional capital (Hamilton and Liu), progress on national wealth accounting (Obst and Vardon), the connection between wealth and sustainability (Hamilton and Hartwick), and targeted, practical policy advice for the management of exhaustible (van der Ploeg) and renewable (Helm) natural capital.

Overall, the papers provide a picture of wealth that is significantly greater than the sum of the parts. In our view, the three most important insights to emerge from the issue as a whole are the following.

- Once wealth is correctly defined and measured, the process of economic development can be understood as the accumulation and management of wealth.
- Wealth is closely connected to sustainability, and declines in real wealth imply declines in future well-being.
- Wealth has exploded over the last few centuries by the generation and application of ideas. Human and institutional capital have skyrocketed, while natural capital has been converted into other forms of capital—simple rules for improved management of natural capital may contribute to future wealth and sustainability.

Notwithstanding the broad coverage of topics in this issue, there are still several important areas that were not fully addressed. One important open question is the relative role of the state and the market in generating wealth. It is fashionable for politicians to point to the private sector as the ‘engine of innovation and wealth creation’. But the decomposition of wealth presented in this issue suggests that a great deal of it has been (necessarily) created by state and public institutions—including the rule of law, public education, public health, support of research and innovation, and market creation and regulation.

None of the papers determines the proportions of wealth historically created by the state and the private sector. Perhaps this is an ill-posed question, given the likely complementarity of contributions, but connecting this literature with thinking on the role of the state (e.g. Helm, 2010) may yield intellectual dividends. Understanding these dynamics may have important implications for continued development in poorer countries.

There are other intriguing research questions, especially connected to sustainability, but the practical implementation of the wealth agenda provides as much or more promise of progress. Australia, Canada, the UK, and several other countries are now measuring assets in balance sheets. These countries and others are gearing up for implementation of the SEEA, and the UK might serve as a leader in this respect. The next volume of the SEEA (SEEA, 2013) focuses on nature as a provider of external services to the economy (regulation of water flows by forests and wetlands, for example). And the WAVES Partnership (Wealth Accounting and Valuing Ecosystem Services) (WAVES, 2014) aims to combine traditional wealth accounting with specific efforts to identify, measure, and value the services that natural areas provide to the rest of the economy—as a result, values of farmland as a type of wealth can be shown to comprise intrinsic factors (soils and climate), technology and agricultural practices, and the services provided for free by natural areas. This effort to account for ecosystem services is particularly important because many of these services are provided as externalities to the broader economy—as a result, development decisions may undervalue natural areas, leading to excess damage and conversion of these areas.

Consistently and regularly estimating national wealth, and putting the resulting numbers to use, is the next important step in this agenda. Our view is that this could trigger some important changes. GDP occupies an important and useful place around the world, much to the disgruntlement of Greens and other heterodox economists, because it is a standardized and useful measure of market-based output, it correlates to some degree with other variables of interest (employment, welfare), and it is a valuable yardstick for comparisons across countries. Its flaws have been well publicized. But attempts to supplant it with indicators of ‘welfare’ of various descriptions have all failed because they are not widely adopted, are non-standard, and require just as many subjective judgements (e.g. how to combine the components of relevant indices) that are potentially even more *ad hoc* than the judgements required to develop annual GDP estimates that emerge from national statistical agencies.

One challenge to the use of wealth estimates is that they are too uncertain, or perhaps too volatile. On the first challenge, we would argue that deriving a set of numbers, on a consistent basis, is significantly better than doing nothing. This is, after all, the same principle behind calculations of GDP which are also far from precise. On the second challenge, total wealth numbers are, by construction, likely to be less volatile than GDP. This holds because total net savings in any given year are a small fraction of the total stock of wealth. Some components of wealth (oil wealth, in particular) are admittedly more volatile, given fluctuations in asset prices. This is simply because asset values in the market are necessarily contingent on expectations about the future. But this does not render them erroneous or unusable, and many of the relevant assets (e.g. infrastructure) are less subject to such fluctuations.

Supplementing GDP by an orthodox measure of the change in wealth, based on the accounting methods recently agreed at the United Nations, does not seem impossible. It is not implausible that the popular media will find these numbers interesting and worth

reporting, and that this will direct the attention of publics, and thus presidents, prime ministers, and ministers of finance, to the annual change in *per capita* wealth rather than just market-based output. One can speculate about the impact on opinion polls of politicians needing to explain why wealth was declining year on year.

On the flip side, publics might tolerate lower levels of consumption in a given year if it was clear that it was producing an increase in *per capita* wealth. In short, focusing on wealth might lead to more of the things that increase it—higher investment into human, social, and physical infrastructure, innovation, and the maintenance of underlying productive asset bases, including natural capital. Correcting biases toward under-investment will also require a refinement of the measurement of public debt—current measures generally do not distinguish between debt which finances productive investment and debt which simply boosts public-sector consumption expenditure.

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