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MEASURING SOCIAL WELFARE AND SUSTAINABILITY

Submitted by the World Bank[1]

ABSTRACT

Samuelson (1961) suggested that the best measure of social welfare would be a 'wealth-like' magnitude. This paper explains the approach to wealth measurement presented in *Where is the Wealth of Nations?* (World Bank 2006). We show how deriving a 'top-down' estimate of total wealth and 'bottom-up' estimates of produced and natural capital can reveal the importance of natural assets as a source of social welfare in low income countries. By measuring the real change in asset values ('genuine' saving) we can determine whether social welfare is increasing or decreasing as a result of current policies. Negative genuine saving indicates that future wellbeing will decline – i.e. that the economy is on an unsustainable path. We discuss the extensions to the SNA inherent in this approach.

INTRODUCTION

1. While economic decision-making is typically focused on the growth of GDP, economists have long understood the limitations of the System of National Accounts (SNA) when it comes to the measurement of wellbeing and social welfare. Almost since the inception of the SNA there has been a body of work aimed at increasing the scope and welfare-orientation of the accounts.

2. Among the more comprehensive attempts to extend the national accounts is the work of Robert Eisner, summarized in Eisner (1988). The 'Total Income System of Accounts' (TISA) imputes non-market production, including that in households, re-defines government expenditures on police and defense as intermediate consumption (as well as commuting and other costs associated with work), and expands measures of investment to include R&D, education and health. The TISA measure of income for the US in 1981 exceeded the standard measure of GNP by about 60%. Nordhaus and Tobin (1973) were the first to include adjustments for changes in the environment and natural resources in their Measure of Economic

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Welfare. Their approach has much in common with Eisner, including adjustments under the three broad headings of imputing non-market production, redefining intermediate production, and expanding measures of investment.

3. From the perspective of measuring social welfare these early approaches to expanding the national accounts embodied two key ideas: (i) adjusting the measure of consumption to more directly reflect wellbeing, and (ii) expanding the SNA boundary to include assets such as natural resources and human capital that underpin wellbeing. This paper is concerned with the second of these ideas.

4. When economists speak of 'social welfare' they are explicitly including an inter-temporal dimension. The issue, of course, is that measuring current wellbeing does not tell you whether this wellbeing can be sustained in the future. To take a concrete example, during the first half of the 1980s fish catch in Mauritania grew strongly from around 20,000 tons in 1980 to nearly 90,000 tons in 1987. Fisheries were expected to provide a key source of growth for this small African economy, generating jobs, foreign exchange earnings, and budget revenues. But the fishery collapsed from over-exploitation, with long-term consequences for growth – exports of goods and services grew at a real 7.5% per year over 1980-87, but shrank by -2.3% per year from 1987-2000. The wellbeing of Mauritanians benefiting from the export fishery could not be sustained.

5. In this paper we are concerned with the measurement of social welfare and sustainability. The outline of the paper is as follows. Section 2 starts by providing the conceptual basis for the measurement of social welfare. We then turn to the presentation of recent wealth accounts published in *Where is the Wealth of Nations?* (World Bank 2006). Section 3 describes the methods used to measure total wealth and its changes. Section 4 gives a bird's-eye view of the main results from the wealth estimates. Section 5 discusses the links between this work and the SNA. Section 6 concludes on how to interpret and use the wealth analysis.

THE LINK BETWEEN SOCIAL WELFARE, WEALTH AND SUSTAINABILITY

6. The fact that income or consumption does not have a direct welfare interpretation is highlighted in a seminal paper by Samuelson (1961). Assume you observe two countries, A and B. Both countries enjoy the same level of income, but while A consumes it all, B saves a part of its income and invests it in productive capital. Because of these investments, over time country B will be able to generate a higher level of income and increase its consumption possibilities beyond the level of country A. In order to compare social welfare between the two countries, current income provides a misleading signal, as does current consumption. The choice of a welfare measure has to be made "in the space of all present and future consumption…the only valid approximation to a measure of welfare comes from computing *wealth-like* magnitudes not income magnitudes" (Samuelson (1961), pp 50-57).

7. The notion that wealth-like magnitudes provide a correct measure of welfare constitutes the first building block of this paper. Equally important is the notion that wealth should be measured in a comprehensive way. Irving Fisher (1906) provided the original insight that current wealth equals the present value of future consumption[2]. For the relationship between future consumption and wealth to hold, it is important to ensure that the full range of assets

[2] Fisher's argument was motivated by the need to find a measure of comprehensive wealth. This led to the intuition that the value of an asset is the capitalization of the stream of future services expected to be produced by the asset.

which generate wellbeing are included in the analysis. Fisher identified three types of assets: immovable wealth, comprising of land and the fixed structures upon it, movable assets or commodities, and human beings.

8. Economic theory therefore suggests that social welfare should be measured as the present value of future wellbeing or, more narrowly, the present value of future consumption – this can be conceived as the measure of total wealth. If wealth is the correct measure of welfare, then changes in wealth can tell us about the prospects for welfare, which in turn can give important information about the sustainability[3] of development.

9. Pearce and Atkinson (1993) made a first approach to the problem of measuring sustainable development by employing basic intuitions concerning assets and sustainability. They argued that sustainability can be equated to non-declining values of all assets, including natural resources. Consequently, changes in asset values, measured by net saving, should signal whether an economy is on a sustainable path. Pearce and Atkinson presented empirical results on net saving for a range of developed and developing countries using values published in the green accounting literature.

10. More recent theoretical work on savings has firmly established the linkage between net savings, social welfare and sustainable development. Hamilton and Clemens (1999) tackle the problem for an optimal economy, and Dasgupta and Mäler (2000) for non-optimal economies (with suitable definition of shadow prices). Asheim and Weitzman (2001) show that growth in real NNP (where prices are deflated by a Divisia index of consumption prices) indicates the change in social welfare in the economy.

11. The basic theoretical insight of Hamilton and Clemens (1999) is that net (or genuine[4]) saving is equal to the instantaneous change in social welfare measured in dollars. Hamilton and Clemens go on to show that negative levels of genuine saving must imply that future levels of wellbeing over some period of time are lower than current levels – i.e. that negative genuine saving implies unsustainability. Similar implications hold for the approaches of Dasgupta and Mäler (2000) and Asheim and Weitzman (2001).

12. The strength of this approach to sustainability is that it provides a forward-looking guide to policy. Rather than trying to model or predict future wellbeing, decision-makers need only consider the sign and magnitude of current net saving in order to ascertain whether social welfare is increasing or whether development is unsustainable.

13. To the extent that the asset accounts underpinning the saving measure are incomplete, however, it is possible that a positive measure of saving does not imply rising social welfare – there may be unmeasured depreciation of assets which could tip the balance. However, if saving is positive – say 10% of GNI – then this puts a limit on how large the unmeasured depreciation would have to be in order to result in negative saving. The substitutability of assets may also be a constraint on sustainability – Pearce, Hamilton and Atkinson (1996) discuss ways this can affect the saving analysis.

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[3] Pezzey (1989) defines sustainability as a property of a development path: development is sustained along the path if wellbeing never declines. This accords with common notions of sustainable development, that current generations should not impose losses in wellbeing upon future generations.

[4] Genuine saving is the informal name for what is formally reported as 'Adjusted net saving' in the *World Development Indicators.*

MEASURING THE WEALTH OF NATIONS

14. The next two sections highlight the approach and selected results from *Where is the Wealth of Nations?* (World Bank 2006 – Appendix 1 provides detailed sources and methods). Estimates of wealth and saving for 120 countries are derived from internationally available data, employing the methods outlined below.

15. To measure total wealth along the lines suggested by Fisher (1906), Hamilton and Hartwick (2005) show that the current value of wealth – measured by summing up produced, human and natural capital – is equal to the present value of future consumption if (i) asset prices are efficient (exhaustible resource prices follow the Hotelling rule, for example), and (ii) the economy exhibits constant returns to scale. Assuming a constant rate of growth of consumption and a specified rate of time preference, it is possible to calculate total wealth using a measure of current consumption.

16. Broadly speaking, total wealth is composed of produced, natural and intangible capital, where the latter is an aggregate including human, social and institutional capital. The estimation proceeds by first calculating total wealth as the present value of consumption. We then construct estimates of produced and natural capital. Finally we calculate intangible capital as the difference between total wealth and the sum of produced and natural capital – Table 1 outlines the basic approach.

Table 1: Estimating wealth in four steps

	(1) Total capital	(2) Produced capital	(3) Natural capital	(4) = (1)-(2)-(3) Intangible capital
Method used	Present Value of consumption	Perpetual Inventory Method	Present Value of rents Opportunity cost	Difference
Assets included	By definition, all assets that contribute to national consumption	Machinery, equipment and infrastructure Urban land	Sub-soil assets Forest resources (timber and non-timber) Crop and pasture land Protected areas	Human capital Governance Institutional effectiveness All other assets not measured in column (2) and (3)

17. There are a number of estimation methods available for the calculation of produced capital stocks. Some of them, such as the derivation of capital stocks from insurance values or accounting values or from direct surveys, entail great expense and face problems of limited availability and adequacy of the data. Other estimation procedures, such as the Perpetual

Inventory Method (PIM), are cheaper and more easily implemented since they only require investment data and information on the asset service life and depreciation pattern. The PIM is the method used here.

18. Natural capital is the sum of non-renewable resources (including energy resources such as oil, natural gas and coal, and mineral resources), cropland, pasture land, and forested areas (including areas used for timber extraction and non-timber forest products). These resources are valued by computing the present value of natural resource rents over the life span of the resource (which will be finite for exhaustible resources or renewable resources that are being exploited unsustainably). When data on rents (or benefits) are not available, the opportunity cost method is used instead – this is how protected areas are valued as part of natural capital.

19. By construction, intangible capital includes all assets that are not measured explicitly in the produced and natural capital estimates. It includes assets such as the skills and know-how embodied in the labor force – human capital. It also encompasses social capital, the amount of trust among people in a society and their ability to work together for common purposes. It includes those elements of governance, such as quality of institutions, which boost the productivity of the economy. Finally it includes net financial assets, but not explicitly – net receipts or payments of interest have the effect of raising or lowering consumption levels, and these flows are capitalized in the intangible capital residual.

20. Turning to changes in wealth, the following summarizes how the saving estimates are constructed:

Genuine saving	=	Gross national saving
	+	Education expenditure
	-	Consumption of fixed capital
	-	Depletion of energy resources
	-	Depletion of minerals
	-	Net depletion of forests
	-	CO_2 damages
	-	Particulate pollution damages

21. Here gross national saving and consumption of fixed capital are precisely as defined in the SNA.

22. Education expenditures are added to saving in order to estimate investment in human capital. This is a particularly crude assumption since it represents gross rather than net investment, and it assumes that each dollar of educational expenditure is in fact creating a dollar of human capital.

23. Estimates of resource depletion are based on the calculation of unit resource rents. For each type of resource and each country, unit resource rents are derived by taking the difference between world prices and the average unit extraction or harvest costs (including a “normal” return on capital). Unit rents are then multiplied by the physical quantity extracted or harvested in order to arrive at a depletion figure. World prices are used in order to reflect the social opportunity cost of depleting resources.

24. A positive net depletion figure for forest resources implies that the harvest rate exceeds the rate of natural growth; this is not the same as deforestation, which represents a change in land use. In principle, there should be an addition to savings in countries where growth exceeds harvest, but empirical estimates suggest that most of this net growth is in forested areas that cannot be exploited economically at present. Because the depletion estimates reflect only timber values, they ignore all the external and non-timber benefits associated with standing forests.

25. Pollution damage from emissions of carbon dioxide is calculated as the marginal social cost per unit multiplied by the increase in the stock of carbon dioxide. The unit damage figure represents the present value of global damage to economic assets and to human wellbeing over the time the unit of pollution remains in the atmosphere – roughly 100 years in the case of CO_2.

26. Pollution damage from particulate emissions is estimated by valuing the human health effects from exposure to particulate matter pollution in urban areas. The estimates are calculated as willingness to pay to avoid the mortality and morbidity from cardiopulmonary disease and lung cancer in adults and acute respiratory infections in children.

WEALTH AND SAVING ESTIMATES: MAIN FINDINGS

27. Country-specific estimates of total capital and saving rates are presented in *Where is the Wealth of Nations?* (World Bank 2006). Table 2 summarizes the wealth estimation results by region, income group and for the world as a whole. High energy and mineral exporters are treated as a separate group (denoted 'oil exporters') because of their unique characteristics.

28. As Table 2 and Figure 1 show, intangible capital is the preponderant form of wealth, an insight that goes back to the very origins of economic thinking[5]. The share of intangible capital rises across income classes, as expected.

29. The world's poorest countries – particularly in South and East Asia – depend heavily on natural resources (column 6 in Table 2). For low income countries overall, natural resources constitute 26 percent of total wealth, a share that is larger than produced capital. The natural resource share falls to 2% of total wealth in high income countries, but this is a fall in relative terms – figures in *Where is the Wealth of Nations?* show that the total value of natural capital per person actually rises with income.

[5] In *An Inquiry into the Nature and Causes of the Wealth of Nations*, Adam Smith wrote: "The annual labour of every nation is the fund which originally supplies it with all the necessaries and conveniences of life which it annually consumes". Smith recognized "the skill, dexterity, and judgment with which […] labour is generally applied" as a precondition for generating supply "whatever be the soil, climate, or extent of territory of any particular nation".

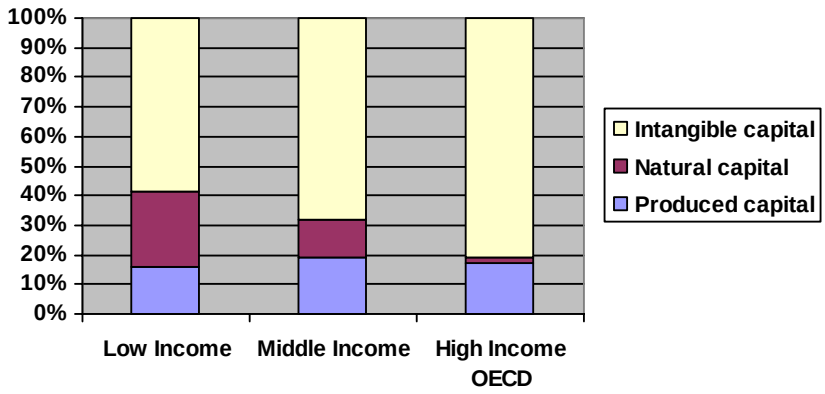
Table 2. Estimates of total wealth and its components by region and income group in 2000 (US$ per capita and %)

Group	Dollars per capita				Percent share of total wealth		
	Total Wealth	**Natural Capital**	**Prod Capital**	**Intang. Capital**	**Natural Capital**	**Prod Capital**	**Intang. Capital**
Lat. Am. and Carib.	69,145	7,018	10,677	51,451	10%	15%	74%
Sub-Saharan Africa	13,631	1,816	1,628	10,187	13%	12%	75%
South Asia	6,906	1,749	1,115	4,043	25%	16%	59%
East Asia and Pacif.	11,958	2,511	3,189	6,258	21%	27%	52%
Mid. East and N.Africa	23,920	2,764	4,075	17,080	12%	17%	71%
Eur. and Central Asia	41,964	3,795	8,446	29,722	9%	20%	71%
Low Income	7,532	1,925	1,174	4,434	26%	16%	59%
Lower Middle Income	22,674	2,970	4,187	15,517	13%	18%	68%
Upper Middle Income	76,538	8,706	16,831	51,001	11%	22%	67%
High Income OECD	439,063	9,531	76,193	353,339	2%	17%	80%
World (excl oil)	***95,860***	***4,011***	***16,850***	***74,998***	***1%***	***17%***	***82%***
Oil exporters	22,952	12,656	7,937	2,359	55%	35%	10%
World	90,210	4,681	16,160	69,369	5%	18%	77%

Source: World Bank, 2006

30. The oil exporters stand out as a special case in Table 1, with only 10% of total wealth composed of intangible capital. As argued in *Where is the Wealth of Nations?* this almost certainly reflects the low returns on all assets that characterize these economies – resource rents of more than 20% of GNI (in some cases much more) are highly distortionary. The 'resource curse' literature explores these issues more fully.

Figure 1. Wealth composition by Income Group



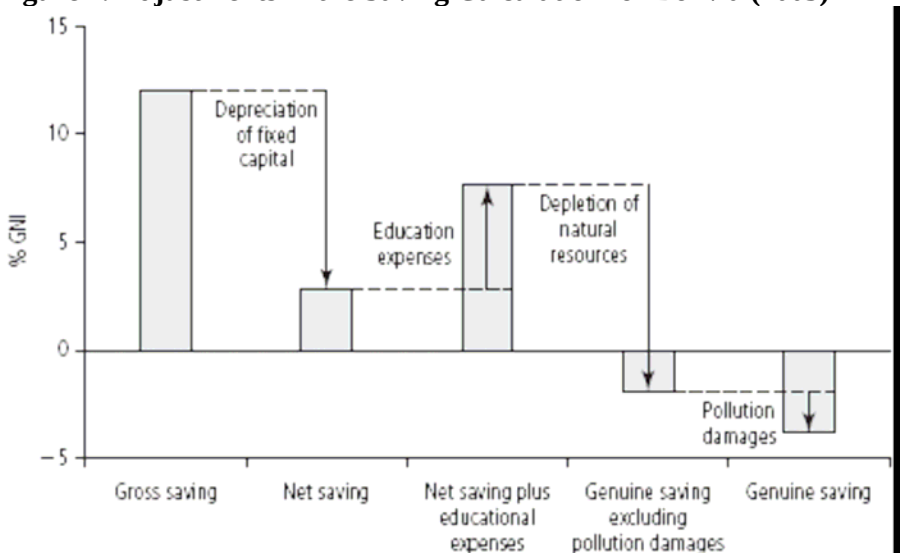
Source: World Bank, 2006

Saving estimates

31. Figure 2 shows the steps in calculating genuine saving for Bolivia, one of the poorest countries in Latin America, with GDP per capita below $1,000. Bolivia is endowed with a wealth of natural resources, including minerals, oil, and huge deposits of natural gas discovered at the end of the 1990s.

32. The first column in Figure 2 shows the traditional measure of gross national saving in Bolivia, 12 percent of gross national income (GNI) in 2003. Deducting the depreciation of produced capital reveals a much lower net saving rate, less than 3 percent. Investments in education are estimated to be around 5 percent of GNI, bringing the saving rate up to nearly 8 percent as shown by the third column in Figure 2. Following this, adjustments are made for depletion of natural resources. Resource rents from Bolivia's extraction of oil and gas are deducted, as well as the rents from gold, silver, lead, zinc, and tin. Depletion of energy, metals, and minerals amounts to over 9 percent of GNI. As a result of these deductions for resource depletion, Bolivia's genuine saving rate is negative. Finally, the deduction for pollution damages leads to a bottom-line estimate of Bolivia's genuine saving rate of minus 3.8 percent of GNI. Bolivia is currently on an unsustainable development path.

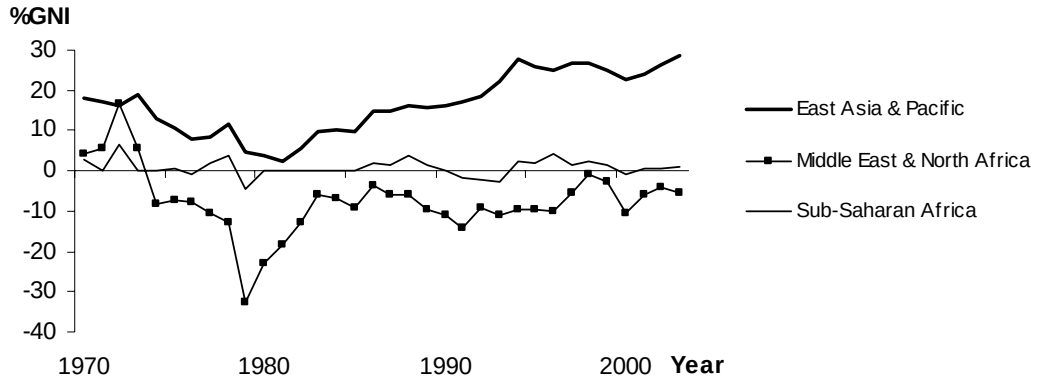
Figure 2. Adjustments in the Saving Calculation for Bolivia (2003)

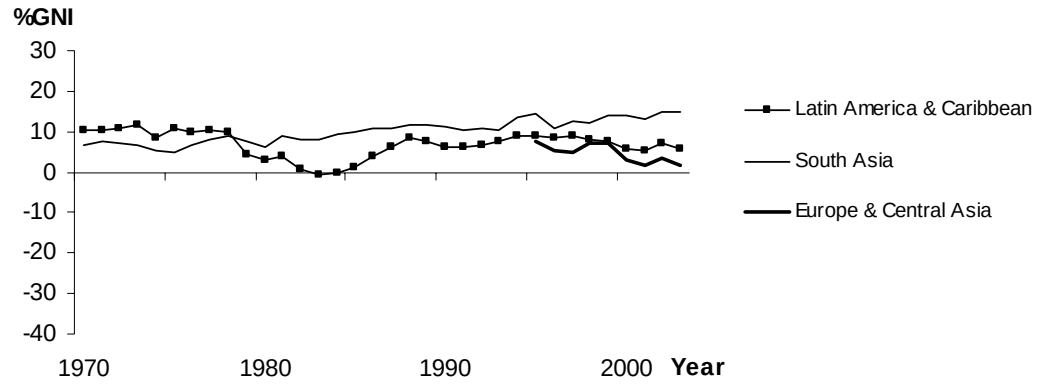


Source: World Bank, 2006

33. As Figure 3 shows, aggregate savings for the developing regions of the world display distinctive levels and trends.

Figure 3. Trends in Genuine Saving by Region





Source: World Bank (2006)

34. The Middle East and North Africa stands out for its consistently negative saving rate, reflecting high dependence on petroleum extraction. Regional genuine saving rates are highly sensitive to changes in world oil prices. This is clearly shown in Figure 3 – genuine saving rates dropped in 1979, largely owing to the consumption of sharply increased oil rents following the Iranian revolution.

35. East Asia and Pacific, and to some extent South Asia, stand in stark contrast, with recent aggregate genuine saving figures nearing 30 percent, driven largely by China. The boom in economic performance from the second half of the 1980s until the Asian financial crisis in 1997 is reflected in the genuine saving numbers, largely driven by increases in gross national saving.

36. Genuine saving rates have been hovering around zero in Sub-Saharan Africa. Positive saving in countries such as Kenya, Tanzania and South Africa is offset by strongly negative genuine saving rates in resource-dependent countries such as Nigeria and Angola, which have genuine saving rates of minus 30 percent in 2003.

37. Latin American genuine savings rate have remained fairly constant throughout the 1990s. The large economies in the region, Mexico and Brazil, have positive genuine saving rates in excess of 5 percent. However, like many oil producers, Venezuela's genuine saving rate has been persistently negative since the late 1970s.

38. This is the broad picture that emerges from the cross-country analysis of wealth and savings: Intangible wealth, including human and institutional capital, is the most important share of wealth, and this share increases with income. In low income countries natural resources are the next most important share of wealth. Genuine saving rates are negative in many of the most resource-dependent economies, and have been effectively zero in Sub-Saharan Africa over the last three decades.

LINKS TO THE SYSTEM OF NATIONAL ACCOUNTS

39. The wealth and saving estimates presented in *Where is the Wealth of Nations?* fall within a long tradition in economics of attempts to extend the System of National Accounts. In this section we look at some of the similarities and differences between our approach and the SNA. The main differences include:

- Following Hamilton and Hartwick (2005), we have exploited the accounting identity which follows from efficient asset pricing and constant returns to scale: the sum of individual asset values is equal to the present value of future consumption. There is no equivalent accounting identity in the SNA.

- We have extended the asset boundary of the SNA to include everything that is implicitly included in 'intangible' capital – human capital, governance and quality of institutions, social capital, and so on.

40. The balance sheet accounts in the SNA show the value of the stock of assets and liabilities held by the institutional agents or sectors of the economy at the beginning and at the end of the accounting period. Assets in the balance sheets are defined as *"entities that must be owned by some unit, or units, and from which economic benefits are derived by their owner(s)"*. The definition clearly encompasses machinery, equipment and structures, as well as natural assets such as land, mineral deposits, fuel reserves, uncultivated forests and wild animals, provided that institutional units, including the government, exercise ownership rights over these assets.

41. The SNA balance sheet accounts and our wealth accounts largely overlap for tangible assets. The big divergence is for intangible capital. To take one example of an intangible asset, the SNA documentation (United Nations 1993) offers careful arguments about the difficulties in assigning values to human capital. Our approach to the problem is not to suggest that the SNA is incorrect, but rather to show how much of the wealth of nations is omitted when we stay within the strict SNA boundaries – this has important consequences for development policy.

42. Changes in the stock of financial and non-financial assets are related to the income accounts of the SNA by the fact that saving must be used to acquire financial and non-financial assets. Gross saving in the SNA is calculated as disposable income that is not spent on consumption of goods and services, while net saving deducts consumption of fixed capital, but not the depletion of natural resources or damage to assets from pollution emissions – the latter two items are recorded in the 'other changes in assets' accounts.

43. Genuine saving builds on the SNA measure of net saving by carrying out three sets of adjustments:

- Re-classification of education expenditure as investment in human capital
- Deduction of the depletion of non-renewable natural resources and net depletion of renewable natural resources
- Deduction of pollution damages owing to CO_2 and particulate emissions.

44. On the depletion of natural resources we believe that the SNA is inconsistent – there appears to be no good reason (other than the usual concerns about the quality of estimates) to exclude resource depletion from net saving figures in the SNA. The SNA approach has major consequences for a country like Bolivia, where the Finance ministry is arguably working with the wrong figures when it considers development policy.

45. On balance, therefore, we see some elements of our saving analysis that could be included in any revision of the SNA – this would appear to be tractable in the case of natural resource depletion. Conversely, on adjustments for human capital investment the measurement problems are severe and the conceptual difficulties are non-trivial.

46. Our broad approach to measuring total wealth as the present value of future consumption will always lack the precision required for inclusion in the SNA. But we would argue that it is a useful extension of the core SNA when considering the problems of developing countries, giving a more complete picture of the contribution of different assets to social welfare.

CONCLUSIONS

47. The wealth and saving estimates appearing in *Where is the Wealth of Nations?* are motivated by two key questions: Where, in fact, is the wealth of nations? And is social welfare rising or falling in individual countries? In carrying out this analysis we have extended the SNA precisely because neither of these questions has a satisfactory answer within the standard SNA framework.

48. Samuelson (1961) and Fisher (1906) pointed the way forward – to measure social welfare we are looking for wealth-like magnitudes which can be measured as the present value of future consumption. The more recent literature on sustainable development (Hamilton and Hartwick 2005) has shown that under assumptions of efficiency and constant returns to scale, the present value of consumption is just equal to the sum of the individual assets, including natural resources and human capital, supporting domestic product.

49. We can therefore interpret the figures on the composition of wealth appearing in Table 2 as an indication of the relative contribution of different assets to social welfare. Across all regions and income classes, intangible wealth – human, institutional and social capital – contributes 59-80% of social welfare, and the relative contribution rises with income. In low income countries natural capital contributes 26% to social welfare, compared with 16% for produced assets.

50. Although it is estimated as a residual, intangible wealth is not entirely a black box. Preliminary analysis in *Where is the Wealth of Nations?* suggests that over 90% of the variation in intangible wealth across countries can be explained by human capital and institutional quality, with roughly equal shares of intangible wealth for each. A society investing in skilled workers, trusted institutions and efficient government is building the very basis of welfare creation.

51. Whether social welfare is increasing or decreasing should, arguably, be a matter of fundamental importance to decision-makers. Genuine saving measures the change in dollar-valued social welfare and so can tell ministers of finance and development whether their policies are leading to increased social welfare.

52. The linkage between genuine saving and sustainability derived in Hamilton and Clemens (1999) also hinges directly on the fact that genuine saving is equal to the change in dollar-valued social welfare. If genuine saving is negative then not only is social welfare decreasing, but the economy is on an unsustainable path. In any given year the *World Development Indicators* reports 10-30 countries with negative genuine saving rates.

53. The important story for development in the wealth and saving figures is not the ‘league table’ listing who is richest, who poorest. Because of the way the wealth figures are constructed, the ranking by total wealth is virtually identical to the ranking by GDP. The key story concerns the composition of wealth and the sign and magnitude of the change in wealth.

54. The composition of wealth tells policy makers which assets are crucial for welfare. As noted above, in low income countries natural resources represent a much larger share of wealth than produced assets, so natural resource management will have a significant impact on social welfare in these countries. Note that this is not the same as saying that these resources will produce growth, although boosting the profitability of agriculture was arguably the engine of early growth in Southeast Asia.

55. The saving figures tell policy makers whether social welfare is rising or falling and, in the latter case, whether the economy is on an unsustainable path. Maintaining positive genuine saving in economies that are highly dependent on exhaustible resources requires considerable saving effort to ensure that the decline in wealth inherent in depleting natural resources is offset by productive investments in other assets such as produced or human capital.

56. The saving figures also provide the link to growth – it is only by generating net new wealth that countries can place themselves on a path of rising social welfare. Hamilton and Hartwick (2005) point the way to a generalized rule for sustainable growth: maintain positive genuine saving, and ensure that it grows at a sustainable rate[6].

57. An admonition to policy makers to 'maintain positive genuine saving' is not very operational, however. The key to sustainability policy is to decompose saving into its components, similar to what appears in Figure 2 for Bolivia. The set of policy questions then becomes: Do monetary and fiscal policies (particularly with respect to government dissaving) foster strong gross national saving? Is investment in human capital adequate? Can rule of law be strengthened (as an example of investing in institutional quality)? Do resource sector policies encourage efficient extraction of exhaustible resources and sustainable harvest of living resources? Is there adequate rent capture on resource extraction and harvest? Are resource rents being reinvested in financial, human or produced capital? And does environmental policy approach efficient levels, where the marginal costs and benefits of abatement of emissions are equalized?

58. This is not a trivial set of questions for developing countries. But countries such as Botswana have shown that it is possible to get these policies spectacularly right.

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[6] Hamilton and Hartwick (2005) show that if genuine saving is positive but growing at a rate higher than the interest rate, then current wellbeing will actually fall. The policy prescription is therefore to ensure that the growth rate of (positive) saving is less than the interest rate.

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