

The World Bank's Genuine Savings Indicator: a Useful Measure of Sustainability?

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BRETTON WOODS PROJECT

Working to reform the World Bank and IMF

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This briefing aims to inform people about the Bank's Genuine Savings initiative, but also to generate discussion. Please send any comments or reactions to <awilks@brettonwoodsproject.org>. If commentators agree, we may post their views on our website (www.brettonwoodsproject.org) with links provided at the end of the web edition of this briefing.

Related reports

See the Bretton Woods Project website for a complete list of our briefings and a complete set of our quarterly *Bretton Woods Updates*. The most directly relevant reports are:

Questioning the World Bank/IMF Growth Model, 1999.

The World Bank and the State, a Recipe for Change?, 1998.

Drowning by Numbers: the World Bank, IMF and North-South Financial Flows, 1998.

Many reports by other organisations are listed in the endnotes to this document.

About the Bretton Woods Project

The Bretton Woods Project was established in 1995 by a network of 30 UK-based non-government organisations to support and take forward their work on World Bank and IMF issues. The Project monitors World Bank and IMF policies, projects and organisational trends in collaboration with NGOs, academics and others across the world.

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A useful tool for the holistic Bank, or “genuine nonsense”?

World Bank documents and speeches now emphasise the need to assess the links between social and environmental changes and macroeconomic performance. Bank President Wolfensohn's main current reform proposal is to refine and implement his Comprehensive Development Framework (CDF); an attempt to present an integrated, holistic analysis of the relationship between human, structural and environmental change and its traditional goals of macroeconomic stability and economic growth.¹

In this context the little-known work of the Bank's Environmental Economics and Indicators Unit is becoming more important. The Bank has long included numbers on environmental issues such as land use, deforestation and air pollution in its annual *World Development Indicators*, but is now developing methodologies to assess national-level environment/economy interactions and trends.²

The Bank plans to include a page of environmental indicators in Country Assistance Strategies — the documents drawn up to guide policy discussion with each client country — as well as in its cross-country analytical work. A key figure that is likely to guide Bank decision-makers, and by extension, policy-makers in many countries, is the new concept of “genuine savings”. Genuine savings figures aim to denote the rate at which national wealth (broadened to include human capital, and natural capital) is being created or destroyed. Figures on this will be published annually in the Bank's World Development Indicators and used in country policy discussions. Given the wide reach of the Bank's publications, and its increasing efforts to promote itself as a “knowledge bank”, the genuine savings concept is likely to spread to many other documents and policy fora.

It is therefore important to assess the strengths and limitations of this analytical tool. Whilst many people are welcoming the Bank's intentions to examine the links between economic and other issues, one leading analyst of alternative accounting systems recently cautioned that the Bank's new measures, if unchallenged, will “further muddy the waters of a flawed accounting system”.³ Environmental economist Professor Joan Martinez-Alier goes further, calling the Bank's approach “genuine nonsense”.⁴

What are 'genuine savings'?

Genuine savings is a simple indicator devised by Bank researchers to assess an economy's sustainability. It defines wealth more broadly than orthodox national accounts, and recalculates national savings figures based on this new definition.⁵ Genuine savings aim to represent “...the value of the net change in the whole range of assets that are important for development: produced assets, natural resources, environmental quality, human resources, and foreign assets”.⁶

The Bank explains that genuine savings figures differ from standard national accounts calculations in that they:

- a) deduct the value of depletion of natural resources (where forests, water and other assets are unsustainably managed);
- b) deduct pollution damages, including lost welfare in the form of human sickness and health;
- c) treat current expenditure on education (on books, teachers' salaries, etc.) as saving rather than as consumption, as it increases countries' human capital;
- d) deduct net foreign borrowing and add net official transfers;
- e) deduct the value of resource depletion.⁷

These calculations aim to illustrate whether *apparent* savings are being offset by other

considerations, thus revealing whether overall wealth is being created or consumed. Bank researchers argue that genuine saving measurements are useful because they “present resource and environmental issues within a framework that finance and development planning ministries can understand”.⁸ The genuine savings approach has the advantage over many other types of national environmental accounting that it gives countries a single, clear, positive or negative figure. Persistently negative results are interpreted to mean that a country is pursuing an unsustainable path that will have negative effects on welfare and development in the long run.

Case Studies and Results

The Bank's study of Ecuador from 1970-1994 is the most quoted example of the implications of measuring genuine savings.⁹ Extended Domestic Investments (orthodox savings) for this period were consistently more than 20%, peaking at more than 30% in the early 1990s. However, once the drawdown of non-renewable natural capital in the form of oil was accounted for, genuine savings were found to be near zero or negative. Similarly striking results were found for a number of countries in Latin America and the Caribbean.¹⁰

Genuine savings measures tend to depress the savings rates of natural resource-rich countries, showing what the Bank researchers call an “opportunity not seized”, as receipts from resource depletion have not been wisely reinvested elsewhere to ensure a future income. In the Ecuador report in particular, under investment in education is presented as a priority issue: “if Ecuador's natural capital was replaced with human capital, negative rates of domestic investment in the 1980s would be less worrisome. However, human capital expenditures fell throughout the 1980s (in real terms)”.¹¹

Ecuadorian economist Fander Falconi has written an extensive critique of the approach taken by this Bank study of Ecuador's sustainability. He calls the clear finding that Ecuador is not reinvesting the proceeds of the petrol bonanza “useful”, but says that it is insufficient, and too general. He objects to both the study's data shortcomings, and the overall theoretical assumptions, especially in converting natural resource usage into monetary values.¹²

Genuine Savings: Shortcomings and criticisms

Self-criticisms and responses

The Bank's Environmental Indicators and Valuation team researchers recognise that there are shortcomings to their genuine savings approach as currently presented. The main difficulties they recognise are about the data used, which give an “inherent upward bias in the genuine savings measures, and thus in the resources estimated as available for future development”.¹³ The Bank's 1999 *World Development Indicators* sets out some of the problems with the data:

- figures for depreciation in the value of produced assets are either assumed without reference to real asset lifetimes or taken from unreliable tax records;
- depletion of exhaustible resource deposits is estimated by taking the difference between extraction values at world prices and the total cost of production (including depreciation of fixed assets and return on capital). Resources examined are bauxite, copper, gold, iron ore, lead, nickel, silver, tin, coal, crude oil, natural gas, phosphate rock, and timber. Water, fish and soil are not included for lack of information;
- estimates of net forest depletion are calculated as the estimated levels of unit resource rents times the difference between harvest rates and net natural growth of forests. Regional growth rate estimates are based on World Bank expert opinion;
- damage estimates for carbon dioxide emissions are controversial and pollution

- damage from local air and water pollutants are omitted entirely;
- human capital investment figures ignore capital spending on education and loss of capital through death and skills obsolescence.¹⁴

On the general methodology that lies behind the genuine savings concept, however, the Bank staff recognise some difficulties, but make a robust defence of their overall approach. Kirk Hamilton, the World Bank Environment Department's specialist on genuine savings, recognises, in an article with Michael Clemens of Harvard University, that "savings rules have been criticized because they are only concerned with *weak* sustainability".¹⁵ They respond that countries which fail on savings will also fail a test of strong sustainability (the concept that human welfare depends on maintaining certain natural resources, as other assets such as education or machinery cannot substitute for their functions). They do not go on to explain that a positive genuine savings score may conceal and distract attention from unsustainable trends (see below, under Environmental Thresholds). Indeed, using the metaphor that James Wolfensohn has taken up in his Comprehensive Development Framework proposal, they argue that governments should think of sustainable development planning as stockbrokers approach portfolio management. In drawing up "the national balance sheet" officials should consider natural resources as assets and pollution stocks as liabilities, and examine the appropriate mix of produced assets and human capital. They continue:

"Questions of the 'appropriate mix' of assets are inherently questions about returns on the marginal investment. This may be in better resource management, boosting the value of natural resources in the national balance sheet; it may be in pollution control, decreasing the size of the pollution liability to its efficient level; it may be in infrastructure, as traditionally has been the case, and it may be in primary education, as an essential building block in increasing human capital".¹⁶

In sum it seems that, whilst some further work will be done to improve data collection and reliability, the Bank is ready to promote the genuine savings methodology as a major part of its answer to critics who charge that the Bank promotes economic adjustments premised on a simplistic development model which overlooks environmental and social factors.¹⁷

Other problems with the genuine savings approach

1. Combined economy/environment measures oversimplify

All combined or "synthetic" measures which try to measure environmental and economic changes in one indicator can be dismissed as over-simplistic. Beyond this, however, there is also the serious question of how meaningful it is to try to produce an estimate of national sustainability rather than assess the benefits and impacts of particular activities within a country. Dealing with environmental issues at a high level of aggregation which produces a single, snapshot figure may well distract attention from the most pressing problems and conflicts which need to be the subject of political discussion.¹⁸

Genuine savings calculations cannot tackle broader questions about the nature of development. These may include doubts about environmental thresholds, distribution of property rights, intrinsic values of resources such as rivers or mountains to indigenous or religious groups, and the rights of future generations to have a range of assets, species, landscapes etc to enjoy. Tackling these questions may be both important in themselves, and *essential* if a political consensus is to be achieved on how to deal with complex long-term issues.¹⁹

2. Measurement Problems

The way that many neoclassical economists ascribe monetary figures to matters such as education, personal relationships, and the environment, and derive apparently scientific, universal formulae for how they interact is incomprehensible to many and the subject of much concern and debate.²⁰ Some analysts even argue that this accounting mindset, clearly expressed in the Hamilton and Clemens quote above, is a major cause of our environmental crisis as it demeans our views of our relationships with other people and with nature.²¹

As well as these difficulties with putting money values on such issues, and the data and measurement problems acknowledged in *World Development Indicators, 1999* there are a number of other omissions in the calculations for genuine savings. The World Bank's natural resource accounting uses only *market-valued* non-renewable and renewable natural capital. Many other factors are excluded, either because of measurement uncertainties or because resources are viewed only as inputs to production. Omissions include:

- ecological and life-support functions of natural resources, ie biodiversity, watershed protection, nutrient cycling, and carbon storage and other indirect benefits;
- option values (the value of retaining the choice to use a resource in future), and existence values (the value people place on the existence of assets regardless of their consumption).

3. Rooted in GDP, validating Northern consumption

Weishang Qu, head of modelling at the Millennium Institute, Washington DC, has examined the World Bank's new sustainability indicators, including genuine savings, and found that they "are very much GDP dependent". As genuine savings calculations start with GDP figures before adding and subtracting certain values, they will tend to justify increasing real GDP/economic growth as the central measure of development/progress.²²

Nations with strongly positive GDP are far less likely to obtain a weak or negative genuine savings result. In *Expanding the Measure of Wealth* 'high-income OECD' countries emerge with consistently strong positive results, whilst those for 'Middle East/North Africa' are consistently negative. Countries with stronger economies tend also to invest more in education, and so including education investments in savings figures shows rich countries as still more sustainable.

The effect is to leave the North with positive rates of genuine savings, and many resource-rich Southern countries with negative or near-zero rates. This distracts attention from analysis of the 'environmental space' occupied by economies with strong, traditionally-defined economic growth — and excessive consumption of the world's resources.²³ Many people argue that reducing Northern consumption levels is central to curbing excessive resource depletion and pollution and reducing global inequalities in energy use and other forms of consumption. At the same time heavily indebted economies are under pressure, not least from International Financial Institutions promoting structural adjustment programmes, to earn foreign exchange by selling their resources to rich countries as fast as possible.²⁴

The compensation or return theoretically due to or actually gained by a country's citizens when a country's resources such as oil or forests are exploited for export has always depended on complex social institutions, property rights and power relations. In an era of increasing trade, investment and financial liberalisation, the relationship between the exploitation of resources and the accrual of benefits to poor citizens is even more difficult. Many analysts of globalisation argue that transnational corporations are able to play countries off against each other to bid down concession prices and corporate taxes when negotiating rights to exploit resources. Thus the implication in genuine savings calculations that there is a clear, direct relationship between exploitation of a country's resources at market prices and government spending on developmental benefits such as education seems very dubious.²⁵

4. Investment quality

Further, the Bank studies thus far do not deal adequately with investment *quality*. This question is only very briefly treated in *Expanding the Measure of Wealth*, which asserts that human capital often represents the highest quality area for public investment. This matter needs more serious treatment; if reinvestment is key to promoting weak sustainable development, then good investments are urgently required and analysis must be performed to assess the impact of spending.²⁶ As well as the impact of budget outlays on education and other services it is also important to assess how equitable is the service delivery and outcomes.

5. Environmental thresholds

The Bank assumes that the four types of capital it identifies are substitutable, in other words that the economy is a self-sufficient system, rather than a subsystem of a finite ecosystem, dependent upon the latter for inputs, sinks and life-support functions. The “weak sustainability” approach which forms the basis of genuine savings calculations assumes that there are no ecological limits, only moments when the economy may stumble a little before adapting (for example by inventing new technologies or finding new raw materials) without critical damage occurring.

The alternative, widely-held view, that physical thresholds to economic and human development are set by critical resource limits, levels of biodiversity, or atmospheric carbon concentrations, for example, is ignored.²⁷ Such limits may impact gradually, or suddenly, perhaps once a critical level has been reached and it is too late to reverse the chain of resulting impacts. Sustainability by this definition involves leaving equivalent resources and options for future generations, following a 'precautionary principle' and erring on the side of caution where we may cause irreversible or very costly damage.²⁸

6. Discount rates and resource rents

Weishuang Qu has pointed out that the Bank's calculations for resource drawdown use a discount rate of four per cent per year. This fixed figure “neglects the fact that alternative usage scenarios influence the present value of the reserve ... the resource conservation scenario is discouraged by the Bank's algorithm”.²⁹

Eric Neumayer of the London School of Economics points out a number of technical problems with the Bank's measurements of resource rents. Recalculating resource rents for 14 countries in Sub-Saharan Africa, North Africa and the Middle East using a well-known alternative method (the El-Serafy method), he finds that “almost all countries either stop exhibiting signs of unsustainability or their unsustainability can be explained without having recourse to resource accounting”.³⁰

Conclusion

The genuine saving indicator marks a step forward by the Bank to move away from simple GDP per capita calculations and introduce some human and environmental considerations into mainstream national accounting. Because of its simple and striking nature it looks set to be a major factor in key Bank documents and policy advice. Perhaps it will even become the figure which represents the combined total of the two sides of the “national balance sheet” outlined in Wolfensohn's CDF proposal.

However, it suffers from flawed data and methodology. The exclusion of key factors, the assumption of “weak sustainability”, and the oversimplifications involved in the data collection and manipulation make it likely to mislead politicians, officials, the media and the public about the key problems they face. The effect of this type of indicator, Fander Falconi points out, is: “to conceal the unequal relationships between regions and countries: sustainability should be seen as a global issue”.³¹

The limitations of the genuine savings approach are perhaps not surprising, as the Bank's environmental researchers work in an institution which prioritises quantification and aggregation approaches which can produce figures that are readily comparable across countries. The Bank's

culture is in general sceptical of qualitative, multidisciplinary, and tailored approaches whilst, because of its political make-up, Bank reports tend not to directly confront issues of North-South inequality. For those outside the Bank, however, the wisdom of using and legitimising this approach which cannot inform the most vital debates about sustainability and equity seems very questionable.

If the Bank moves forward, as seems likely, to promote genuine savings as its measure of national sustainability, it may crowd out other indicators or models which allow diverse audiences to examine and debate policy priorities more clearly.³² Now that the Bank claims to be embracing a holistic approach to development analysis and planning which incorporates human, social, structural and environmental issues alongside economic ones — all through participatory discussions — it should think very seriously about whether to continue producing genuine savings figures.

ENDNOTES

1. *A Proposal for a Comprehensive Development Framework*, January 1999, James Wolfensohn, World Bank, mimeo, also on www.worldbank.org. See also: *The Bank's New Framework: Opportunities and Omissions*, Bretton Woods Project, mimeo, September 1999, also on: www.brettonwoodsproject.org. Other Bank initiatives have similar aims, for example the Country Assistance Strategies and Environment Initiative.

2. See the website of the Environmental Economics and Indicators Unit: www-esd.worldbank.org/eei.

3. Mark Anielski, pers. comm., February 1999.

4. Joan Martinez-Alier, pers. comm., October 1999. He clarifies his position: because many environmental losses are not known (like losses of biodiversity), much less can they be given a money value. Weak sustainability not only makes the doubtful assumption that human made capital can be substituted for natural capital it is also based on calculation methods for the depreciation of natural capital which produce magic numbers. Thus the economy of Japan appears at the top of the league in tables on weak sustainability because savings are very high and more than compensate for depreciation of human made capital and depreciation of natural capital there. But how is depreciation of natural capital caused by the Japanese economy around the world counted? See also: 'The Environment as a Luxury Good or "Too Poor to be Green?"', *Ecological Economics*, 13 (1), Joan Martinez-Alier, 1995.

5. Environmental economists David Pearce and Giles Atkinson first developed the principle of applying environmental accounting methods to net savings measurements ('Capital Theory and the Measurement of Sustainable Development: an Indicator of Weak Sustainability', in *Ecological Economics*, 8(2), 1993). However it was World Bank environmental economist Kirk Hamilton, formerly with Statistics Canada and a PhD student of David Pearce, who introduced the term 'genuine saving' ('Green Adjustments to GDP' in *Resources Policy* 20 (3) 1994).

6. *Expanding the Measure of Wealth*, World Bank, 1997. This is the Bank's main most important publication on genuine savings and full wealth accounting.

7. The formula for genuine savings (technically Genuine Savings II — the same as its predecessor minus pollution damage) is given in *World Development Indicators*, World Bank, 1998, as the following equation:

$$\text{GDP} - \text{public and private consumption} - \text{Net foreign borrowing} - \text{depreciation of produced assets} + \text{current spending on education} - \text{resource depletion} - \text{pollution damage}.$$

8. *Environmental Indicators, An Overview of Selected Initiatives at the World Bank*, updated 8 March, 1999.

9. *Accounting for Natural Resources in Ecuador*, John Kellenberg, World Bank, September 1996.

10. *World Development Indicators*, World Bank, 1998.

11. *Accounting for Natural Resources in Ecuador*, John Kellenberg, World Bank, September 1996, p.17.

12. See 'Indicadores de Sustentabilidad Débil: un Pálido Reflejo de una Realidad más Robusta y Compleja', ('Indicators of Weak Sustainable Development: a Pale Reflection of a More Robust and Complex Reality') *Ecología Política*, (Barcelona) No. 18, forthcoming December 1999. Falconi criticises not only Genuine Savings, but also other indicators, such as the Index of Sustainable Economic Welfare.

13. *World Development Indicators*, 1999, World Bank, p. 117.

14. *World Development Indicators*, 1999. p. 117. See also *Environmental Indicators, An Overview of Selected Initiatives at the World Bank*, updated 8 March, 1999, Attachment A.

15. 'Genuine Savings Rates in Developing Countries', *World Bank Economic Review*, Vol. 13, No. 2, 1999, p. 351.

16. 'Genuine Savings Rates in Developing Countries', *World Bank Economic Review*, Vol. 13, No. 2, 1999, p. 352.

17. See for example James Wolfensohn, letter to Bretton Woods Project, 17 February 1999, reproduced in *Questioning the World Bank/IMF Growth Model*, Bretton Woods Project and BothENDS, August 1999.

18. Compare other approaches to environmental national accounting such as the "GreenStamp" approach developed through research undertaken for the European Commission. This uses dynamic scenario modelling, based on an iterative discussion process. It recognises that sustainable development can only be defined and achieved through political choices, based on negotiations between parties and interest groups. See "GreenStamp": Report on an EU RTD Project, Defining an Approach which is Theoretically Consistent, Policy-Relevant, and Statistically Reliable', Walter Radermacher, in *From Research to Implementation: Policy-Driven Methods for Evaluation Macro-Economic Environmental Performance*, European Commission (DG XII), 1999, p.15. In the same volume (p. 32) Jean-Louis Weber comments that, under GreenStamp: "one does not seek any more to calculate a 'sustainable income', but the income that one can obtain under sustainable environmental conditions. The consequences of this reorientation are considerable. First of all, the determination of the sustainable conditions and the interactions economy-environment leave a broad space for the physical accounting of the environment, both quantitative and qualitative. Then, the aggregated monetary indicator that may be compiled does not result any more from a mere subtraction 'all things equal', but from a true modelling integrating constraints and potentialities of the use of natural resources, intensity and structure of demand and adaptability of supply."

19. National sustainability indicators produced outside the Bank, such as the Index of Sustainable Economic Welfare (ISEW), or the Genuine Progress Indicator (GPI) or the program of the Commission for Sustainable Development on indicators have tried to deal with many of the issues raised above as beyond the scope of genuine savings. They estimate for example, the value of environmental services such as biodiversity and water quality, and the contribution of unpaid work in the household, as well as the costs of crime, underemployment, and family breakdown, and losses in leisure time. See: www.foe.co.uk for more information and an interactive demonstration of the Index of Sustainable Economic Welfare concept. See also: *Indicators of Sustainable Development: Framework and Methodologies*, United Nations, New York, 1996, and chapter 8 of *Expanding the Measure of Wealth*, World Bank, 1997.

The Bank's *World Development Indicators* and the UNDP's *Human Development Index* and *Human Poverty Index* provide substantial non-monetary data sets. This raises an important question of the weight which the Bank will attach to these compared with genuine savings numbers.

20. See for example, *Valuing Nature?*, John Foster (Ed.), Macmillan, 1997; *The World Bank and Social Capital, Bursting the Bubble*, Ben Fine, paper given at 'Reinventing the World Bank' conference, North Western University, May 1999; 'Can Environmental Problems be Subject to Economic Calculations?', Samir Amin, in *World Development*, Vol.20., No.4., 1992, pp.523-530.

21. *Markets and the Environment: the Solution is the Problem*, John O'Neill, 1999, paper presented at 'The Cost-Benefit Analysis Dilemma: Strategies and Alternatives' conference, Yale University, October 1999.

22. *Comments on the Bank's Total Wealth Algorithm*, Weishang Qu, March 1999, communication with Bretton Woods Project. For more on the Threshold 21 model developed by the Millennium Institute, see: www.igc.apc.org/millennium.

23. See, for example, 'Africa's Environmental Crisis: Challenging the Orthodoxies', Ray Bush in *Review of African Political Economy*, No 74, pp. 503-513, 1997, *Mortgaging the Earth*, Bruce Rich, Earthscan, 1994, *Whose*

Common Future?, The Ecologist, Earthscan, 1994. The September 1999 United Nations Environment Programme report *Global Environment Outlook 2000* urges developed countries to cut their use of natural resources by 90% to give the rest

of the world a chance of emerging from poverty. Experts from over 100 countries concluded: "The present course is unsustainable, and postponing action is no longer an option. A ten-fold reduction in resource consumption in the industrialised countries is a necessary long-term target if adequate resources are to be released for the needs of developing countries."

24. See for example, *Structural Adjustment, the Environment and Sustainable Development*, David Reed, Earthscan, 1996, p. 356.

25. "Ecological and Economic Distribution Conflicts", Martínez Alier, J. y O'Connor, M. 1996 in R. Costanza and O. Segura (Eds.), *Getting down to Earth: practical applications of Ecological Economics*. ISEE, Island Press, 1996. Other reasons for doubt were pointed out by participants at the 'Questioning the Growth Model' meeting, March 1999, include capital flight. If "national" savings disappear to Swiss bank accounts they will make no contribution to poverty alleviation.

26. Government statistics can often not be relied upon. Participatory surveys are needed to understand services that are provided formally (whether sold or free) and those provided by the community, often by women. See report of *Questioning the World Bank, IMF Growth Model* workshop, BothENDS and Bretton Woods Project, August 1999.

27. See, for example, *Beyond Growth*, Herman Daly, Beacon Press, 1996.

28. See, for example, 'Sustainability is an Objective Concept', Roefie Hueting and Lucas Reijnders, in *Ecological Economics*, 27 (1998).

29. *Comments on the Bank's Total Wealth Algorithm*, Weishang Qu, March 1999, communication with Bretton Woods Project. Fander Falconi also discusses the arbitrary judgements which have to be made to set a discount rate for calculating environmentally-adjusted national accounts pointing out the circular relationship between setting a discount rate and producing environmentally-adjusted national accounts. See endnote 12.

30. 'Resource Accounting in Measures of Unsustainability: Challenging the World Bank's Conclusions', Eric Neumayer, mimeo, *Environmental and Resource Economics*, forthcoming. Neumayer's article makes further criticisms of the Bank's approach, as set out in *Expanding the Measure of Wealth*. He complains that it does not take into account the likely beneficial effects of future technical progress, and "more fundamentally, it is highly contested whether reliable measurements of unsustainability are possible at all with a genuine savings concept that depends on a dynamic optimisation framework when a country's economy is likely to develop along a non-optimal path".

31. See endnote 12, p. 22 in original mimeo version.

32. See, for example, the "GreenStamp" approach discussed under endnote 18 or the work of the Millennium Institute referenced under endnote 22.