CES Working Paper 11/05

MEASURING PROGRESS?

A review of 'adjusted' measures
of economic welfare in Europe

Authors:
Tim Jackson and Nat McBride

ISSN: 1464-8083

MEASURING PROGRESS?

A review of 'adjusted' measures
of economic welfare in Europe

Tim Jackson and Nat McBride

ISSN: 1464-8083

Published by:
Centre for Environmental Strategy, University of Surrey,
Guildford (Surrey) GU2 7XH, United Kingdom
http://www.surrey.ac.uk/CES

Publication date: 2005

Measuring Progress?

A review of 'adjusted' measures
of economic welfare in Europe

Prepared for the European Environment Agency

Tim Jackson and Nat McBride

11th July 2005

Contact:
Professor Tim Jackson
Centre for Environmental Strategy
University of Surrey, GUILDFORD Surrey GU2 7XH
Tel: 01483 689 072
Email: **t.jackson@surrey.ac.uk**

Contents

Summary

The conventional equation of (economic) well-being with the gross domestic product (GDP) has dominated policy thinking for at least fifty years. In the last two or three decades however, the equation of societal progress with rising GDP has come under increasing scrutiny. A variety of authors have pointed to the (sometimes rising) social and environmental costs of economic development and called for more comprehensive and more representative measures of progress to be developed.

A variety of 'adjusted' indicators have been developed for a variety of different countries in the EU and elsewhere. The robustness and reliability of these indicators is still a contentious issue. But these attempts raise important questions about sustainable development and pose an important challenge to conventional thinking about the relationship between economic progress, well-being and sustainability.

This report provides a preliminary review of the state-of-the-art in the development of these adjusted indicators of (economic) well-being. The review is framed in the context of four different kinds of attempt to develop indicators of well-being. These are:

- physical quality of life indicator sets (such as the UK's Sustainable Development Indicator set);
- composite quality of life of well-being (such as the UN's Human Development Index);
- indicators of Subjective Well-Being (such as the reported life-satisfaction indices derived from World Survey data); and
- adjusted measures of economic welfare (such as Nordhaus and Tobin's Measure of Economic Welfare).

However, the primary focus of this review is on the final category: adjusted measures of economic welfare. The report outlines the rationale for such indicators – drawing in particular on the concept of Hicksian income, discusses early attempts to develop such measures, and reports on some depth on the biggest suite of studies to date to develop adjusted economic indicators at the national level: Daly and Cobb's Index of Sustainable Economic Welfare, and later variants of the same measure.

A significant part of the report is given over to reviewing recent national ISEW (and related) studies in European countries and elsewhere. In particular, studies are briefly reviewed from Australia, Austria, Chile, Germany, Italy Netherlands, Scotland, Sweden, Thailand, Wales, the UK and the USA. In spite of some differences, there are also some notable similarities between the studies. Specifically, a common pattern appears to emerge in which the trend in ISEW follows the growth in conventional GDP up to a certain point and then begins to diverge: while GDP continues to grow, ISEW (as measured by the indicator) appears to stabilise or decline in the later years of many studies.

These results appear to confirm the so-called 'threshold hypothesis' which suggests that economic growth ensures increasing welfare only up to a certain threshold of per capita income. Beyond that threshold, there appears to be a stabilisation or decline in welfare as the social or environmental costs of continued growth outweigh the advantages.

If this hypothesis is even partially correct, then it clearly poses some important challenges for conventional economic and social policy. In particular, it goes directly against the received wisdom that economic growth inevitably leads to improved well-being, and raises some serious doubts about the assumption that the best way of improving and maintaining quality of life is to pursue policies that will raise the nation's GDP.

The final section in the report discusses some criticisms which have been raised against the ISEW methodology, sets out some limitations of existing studies (including the fact that very few European study have reported results beyond the mid 1990s), and discusses the prospects for developing a more consistent, pan-European ISEW-type indicator.

In the final analysis, this review argues, achieving this would require a committed political effort, a systematic framework for collecting and collating relevant data, and considerably more resources than have been allocated to these tasks to date. Without such an effort, on the other hand, we may be no closer to measuring 'overall progress' towards sustainable development than we were a decade ago.

Acknowledgements
We are grateful to all those who have helped us compile this document, including various authors of ISEW-type studies who have provided documentation and data on recent national studies. Particular thanks are due to: Matthew Clarke, Clifford Cobb, David Gee, Sardar Islam, Nic Marks, Krishna Mazumdar, Terue Ohashi, Louise Rickard, Hetan Shah and Sylvia Tiezzi.

This report draws in part on work carried out by Prof Jackson under a research fellowship funded by the UK Economic and Social Research Council Sustainable Technologies Programme (RES 332-27-0001).

> 'Our Gross National Product… counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for those who break them. It counts the destruction of our redwoods and the loss of our natural wonder in chaotic sprawl… And if the GNP counts all this, there is much that it does not comprehend… It measures neither our wit nor our courage, neither our wisdom or our learning, neither our compassion, nor our devotion to our country. It measures everything in short, except that which makes life worthwhile.'
>
> Robert F Kennedy, March 18th 1968.

1. Introduction

In the last fifty years, long-term growth in the Gross Domestic Product (GDP) has become the principal policy objective for almost every country in the world. One of the reasons for this is the tendency to equate increasing GDP with improved well-being and a better quality of life. Rising GDP traditionally symbolises a thriving economy, more spending power, increased family security, greater choice, richer and fuller lives, more public spending and better public services.

Since GDP in Europe has risen more or less consistently over the last fifty years, the comforting logic of this position is that conventional development has been pretty successful in delivering improved wellbeing over recent decades. And if our concern is to ensure that quality of life continues to reach new heights, the conventional view provides a ready and familiar formula for achieving this end: namely, to ensure 'high and stable levels of economic growth'.[1]

There are, however, a number of reasons to view this simplistic equation of national income with well-being with caution. Perhaps most importantly, it is clear that personal and collective well-being is not wholly determined by economic consumption. Much depends on what we consume and how we consume it. Numerous authors have pointed to the (sometimes rising) social and environmental costs of material consumption.[2] Others have pointed to the potential detriments of materialism on our psychological well-being.[3] At the very least, it is clear that there are a number of factors - such as physical and mental health, family security, environmental quality and social cohesion - which contribute to well-being, but which are not captured by conventional economic measures at all.[4]

None of this has gone entirely unnoticed over the years, even by the original proponents of the GDP. The economist Simon Kuznets – one of the architects of the system of national accounts – declared that 'the welfare of a nation can scarcely be inferred from a measurement of the national income.' Former attorney general of the United States, the late Robert Kennedy echoed the same sentiment in a speech

---

1 'Ensuring high and stable levels of economic growth and employment' was one of the four overarching objectives of the UK Government's 1999 Sustainable Development Strategy (DETR 1999. A Better Quality of Life. London: HMSO).

2 The literature on this dates back to the early Club of Rome report (Meadows, D et al 1972. The Limits to Growth. A Report to the Club of Rome. London: Pan Books. It is beyond the scope of this paper to review this literature in detail.

3 For a summary of some of this evidence see Kasser, T 2002. The High Price of Materialism, MIT Press, Cambridge, Mass.

4 Diener E and M Seligman 2004. Beyond Money: towards an economy of well-being. *Psychological Science in the Public Interest* 5(1).

(cited above) to the University of Kansas shortly before his assassination in 1968. The 1993 revision of the System of National Accounts declared categorically that 'neither gross nor net domestic product is a measure of welfare'.[5] It is even possible to find criticism of the growth project in the 19th Century writings of John Stuart Mill – one of the principal architects of classical economics.[6]

In the light of such failures, economists and ecologists alike have been tempted to ask whether or not it might be possible to come up with a systematic revision of the conventional measure of GDP to correct for its shortcomings. According to its proponents, the resulting measure – often referred to colloquially as a 'Green GDP' – would provide a better indicator of the nation's quality of life. At the very least, by making such adjustments it might be possible to determine whether or not a non-declining GDP (or NDP) could after all be regarded as a robust indicator of sustainable well-being.

In the last decade in particular, various attempts have been made to construct 'alternative indicators' of progress to supplement, if not exactly to supplant, the GDP. The robustness and reliability of some of these indicators is still a contentious issue. But such attempts pose an important challenge to conventional thinking about the relationship between economic progress, well-being and sustainability. For this reason alone they are worth exploring.

The aim of this paper is to provide a short review of progress in the development of such 'alternative indicators'. In particular this paper will outline the state-of-the art in developing an 'adjusted' indicator of economic wellbeing – sometimes known colloquially as a 'green GDP'. The conceptual idea of such indicators is to start from an account of economic consumption (as for GDP). This basis is then adjusted (hence the name) to incorporate a variety of economic, social or environmental factors which are not included in the conventional measure.

Adjusted economic measures constitute only one amongst a number of different kinds of attempts to correct for the deficiencies of GDP. Section 2 of this paper situates the 'green-GDP' type measures amongst these various attempts to provide alternative 'quality of life' indicators and briefly discusses the advantages and disadvantages of each approach.

Section 3 outlines the rationale for green-GDP type measures in more depth. It illustrates some of the historical pedigree for this kind of indicator and discusses the methodological approach. Section 3 describes in particular a set of related indicators based on Daly and Cobb's Index of Sustainable Economic Welfare (ISEW),[7] including more recent variations such as the Genuine Progress Indicator (GPI) and the recent UK Measure of Domestic Progress (MDP) towards sustainable development.

Section 4 details the experience in developing ISEW-type measures in a variety of countries and regions over the last decade. It focuses in particular on experience

---

5 SNA 1993. System of National Accounts 1993. Prepared under the auspices of the Inter-Secretariat Working Group on National Accounts; Studies in methods - United Nations. Series F; 2:Rev.4. New York.

6 Daly for example cites Mill as arguing for a 'stationary condition of capital and population' in which there would be more likelihood of 'improving the art of living... when minds ceased to be engrossed by the art of getting on.' (Daly, H 1996. *Beyond Growth*. Washington, DC: Island Press, p3).

7 Daly H and C Cobb 1989. *For the Common Good*. Boston: Beacon Press.

from EU countries including Austria, Germany, Italy, the Netherlands, Sweden and the UK.

Section 5 draws together some of the lessons from the study. It highlights some of the similarities and differences between these various attempts, identifies some of the unresolved methodological issues, and discusses briefly the question of international comparability. It also summarises some of the main criticisms of the ISEW/GPI methodology and discusses briefly the feasibility of developing a pan-European 'green GDP' type measure.

'People are the real wealth of a nation. The basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives.'

UNDP 1990

2. Measuring Well-being

Concern over using GDP as a measure of social well-being confronts policy-makers and politicians with one fundamental question: how exactly are we to assess our progress towards an improved quality of life? 'Alternative' measurements of well-being have generally followed one of four quite distinct approaches in attempting to answer this question.

The first of these has been to develop extended indicator sets, measuring a wide variety of 'objective' physical or socio-economic factors which are deemed to contribute to or detract from personal or collective well-being. The second attempts to aggregate these 'objective' factors into some kind of composite social indicator of quality of life. Next, a variety of attempts have been made to capture the more subjective psychological aspects of people's quality of life by measuring reported life-satisfaction or 'subjective well-being'. Finally, attempts have been made to develop monetarised accounts of the factors deemed to impact on well-being and to use these monetarised accounts to adjust conventional consumption-based measures of economic welfare.

The ISEW-type indicators fall into the latter category. Before discussing these attempts in more depth however, it is worth outlining briefly the relative merits of each of the different approaches.

Quality of Life Indicator Sets

Periodic revisions of the System of National Accounts (SNA) have taken place over the last fifty years. Recognising the limitations of the conventional economic indicators, more recent revisions have attempted to widen the scope of the conventional national accounts to incorporate data and indicators relating to environmental and social factors. In 1993, the UN first proposed that countries should adopt integrated environmental and economic accounting.[8] The basis of this revision was to propose a set of 'satellite accounts' to complement the collection of conventional economic data.

The most recent revision of the SNA includes a detailed system of Integrated Economic and Environmental Accounting (SEEA 2003) which brings together economic and environmental information in a combined framework.[9] Its aim is to provide policy-makers with indicators and statistics to monitor the interactions

[8] UN 1993. Integrated Environmental and Economic Accounting, Interim version. Handbook of National Accounting, Series F, No.61. Dept.for Economic and Social Information and Policy Analysis, Statistical Division, New York, 1993.

[9] UN 2003. Integrated Environmental and Economic Accounting. Studies in Method: Handbook of National Accounting. Series F, No 61, Rev 1. New York: United Nations.

between economy and environment, as well as 'a database for strategic planning and analysis to identify more sustainable paths of development'.

SEEA 2003 incorporates four categories of accounts: flow accounts for pollution, energy and materials; an account of expenditures on environmental protection and resource management; an account of changes in the stocks of natural resources; and valuations of the environmental damage and resource depletion arising from economic activities. These accounts are intended to be an adjunct to rather than a modification of the core SNA. For the most part, there has been no systematic implementation of the SEEA across the EU. Individual countries have developed various kinds and types of satellite accounting, some of them based on the UN SEEA recommendations. These satellite accounts tend to incorporate a variety of different kinds of social and environmental indicators.

An example of the development of satellite accounts is provided by the UK Sustainable Development Indicator set. The UK's 1999 Strategy established a detailed set of 147 indicators measuring different aspects of quality of life.[10] These included factors such as adult numeracy and literacy, social investment as a percentage of GDP, river quality, levels of reported crime, air pollution levels, greenhouse gas emissions, waste arisings and populations of wild birds as well as the more conventional economic indicators such as GDP per capita and employment rates.[11]

The intention of the strategy was that these indicators should make up a 'quality of life barometer' which will be used to measure 'overall progress' towards 'a better quality of life for everyone, now and for generations to come'. The advantage of developing extended indicator sets of this kind is obvious. It allows Governments at any one point in time to assess progress towards key social or environmental policy targets, and to understand how trends in different factors are evolving.

One of the disadvantages is the unwieldiness of such a disparate set of indicators. Recognising this, the UK Government selected 15 representative 'headline' indicators to reflect different aspects of its strategic sustainable development objectives. But even 15 indicators can present potentially confusing policy messages to policy-makers. What does it mean if seven of the indicators go upwards, and eight go downwards? Is this better or worse than the case in which eight go upwards and seven go downwards? Does it depend on which go up and which go down? How, in fact, can we make a balanced assessment of 'overall progress' on the basis of this knowledge?

In addition, of course, the identification of a limited set of headline indicators also introduces an element of selectivity (if not arbitrariness) into the measurement of progress. This is not to suggest that having a comprehensive set of satellite accounts is a waste of time. Far from it. But it does not necessarily take us any further forward in determining the 'overall' direction of progress, nor allow us to investigate potential tradeoffs with economic growth.

---

[10] DETR 1999 (ref 1).

[11] A new indicator set incorporating many of the same features has recently been published as part of the revised (2005) UK Strategy. See DEFRA 2005. *Securing the Future – Delivering UK Sustainable Development Strategy*. London: HMSO.

Composite Quality of Life Indicators

One way of addressing the multiplicity of indicators is to aggregate separate components of satellite accounts into a single index. An early attempt to construct such a composite indicator was Morris's Physical Quality of Life Index (PQLI) which quite simply aggregated measures of infant mortality, literacy and life expectation into a single unweighted indicator.[12] Slottje's Multidimensional Quality of Life Index incorporates 20 attributes including civil liberty, life expectancy, infant mortality, percentage of women and children in the labour force, energy consumption per capita, national territory per square kilometre of road and per capita GDP.[13] Estes' Index of Social Progress aggregates 36 social indicators into a single measure.[14]

A very recent example of an attempt to construct such a composite index is provided by the Quality of Life index published by the *Economist*'s Intelligence Unit.[15] This exercise aggregated 9 separate factors affecting people's quality of life into a single indicator and reported the results for 74 separate countries. The factors were: GDP per capita, life expectancy at birth, political stability, divorce rates, community life, climate, job security, political freedom and gender equality. The results indicated that Ireland, Switzerland and Norway had the highest quality of life while Tanzania, Haiti and Zimababwe had the lowest. The EU-15 average score was around 15th place in the list of countries. A somewhat similar index involving 15 (mainly economic) variables has been developed at the Center for Living Standards in Ottawa, Canada.[16]

By far the most well-known and widely used attempt to construct a composite quality of life index is the United Nations Development Programme's Human Development Index.[17] Influenced heavily by the work of Amartya Sen, the UN argued that human development is the 'process of enlarging people's choices' and that the three essential things required for this process are 'for people to lead a long and healthy life, to acquire knowledge, and to have access to the resources needed for a decent standard of living'.[18]

A panel of experts was convened to develop a composite indicator reflecting these aims. The HDI is composed of three elements: income per head, life expectation at birth and access to education.[19] Reported annually for 177 countries in the world, the

---

12 Morris, D 1979. *Measuring the Changing Quality of the World's Poor: the Physical Quality of Life Index*. Oxford: Pergamon.

13 Slottje, D. 1991. *Measuring the Quality of Life Across Countries: a multidimensional analysis.* Boulder, Col: Westview. Some of these indicators offer mixed messages in environmental terms. For example, the indicator goes up if energy consumption per capita goes up and the number of square kilometres per and the number of roads per kilogoes of

14 Estes, R 1988. *Trends in World Social Development: the social progress of nations 1970-1987*. New York: Praeger.

15 The Economist 2004. 'The Economist Intelligence Unit's quality of life index', Economist Online, December 2004: http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf.

16 See: Osberg, L and A Sharpe 2002. An Index of Economic Well-being for Selected OECD countries. Review of Income and Wealth 48(3), 291-316.

17 Desai, M 1991. Human Development: concepts and measurement. *European Economic Review* 35, 350-357. See also UNDP, various years, Human Development Report. Oxford. Oxford University Press.

18 UNDP 1990, 9-10.

19 The income component of HDI is GDP per capita adjusted to reflect purchasing power parity (PPP). The original HDI used adult literacy to measure access to education. From 1991to 1994, the index used a weighted average of adult literacy and mean years of schooling. Since 1995 mean years of schooling has been replaced by the combined enrollment ratio for primary, secondary and tertiary education.

HDI has been very successful in raising the level of debate about the relationship between income growth and well-being. It has also helped to promote intelligent debate about health, education and poverty as related policy objectives in the World Bank and elsewhere.[20]

The main advantage of the composite quality of life indicators is to have a single point of comparison between different nations on the basis of a given set of factors. On the other hand, the absolute value (and relative ranking) of a nation's score will depend both on the composition of the index and on the weight assigned to the individual elements of the index. Some composite quality of life indices have been criticised for not including any account of environmental parameters.

A further problem is that composite quality of life indicators are expressed in mixed units, rather than in monetary terms. Like satellite accounts, they tend therefore to be regarded as 'secondary' to the SNA, and often unable to displace or even to critique the primacy of the GDP and other monetary measures. Nonetheless, the HDI has clearly been enormously influential in broadening modern debates about development and helping to focus poverty alleviation efforts.

Indicators of Subjective Well-being

A very different approach to the measurement of well-being derives from the understanding that economic resources are not in themselves final goods, but only intermediary in the 'production' of human well-being. Final welfare, according to one economist, 'consists of states of consciousness only and not material things' at all.[21] Another early economist argued that the services enjoyed by final consumers could be thought of as 'psychic income'.[22] From this perspective, it is legitimate to ask: can we measure this psychic income directly by inquiring about people's own perceptions of their quality of life.

This avenue of exploration has been developed widely over the last thirty to forty years on the back of an interest in how well people think they (and society) are doing. The most well-known indicators in this category attempt to measure reported life-satisfaction – or 'subjective well-being' – by using survey methods based around questions such as: 'taking one thing with another, how satisfied are you with your life?'. The most extensive international database on reported life-satisfaction is the World Database of Happiness compiled in the Netherlands by Ruut Veenhoven.[23] Though simple in concept, the results of this exercise can be useful in understanding trends in life-satisfaction in different countries and also in interrogating the relationship between per capita income and people's happiness.

An interesting pattern begins to emerge from this data. Figure 1 shows the results of comparing subjective well-being against GDP per capita for around 60 countries at different stages of development during the late 1990s. A clear relationship appears to persist between rising income and increasing life-satisfaction for when GDP per capita is less than $10,000. For countries with incomes between $10,000 and $20,000, there is still a correlation but it is less marked. For countries with per capita

---

[20] World Bank, various years. *Poverty Reduction*. Washington, DC: World Bank.
[21] As recognised, for example, by Pigou, A 1920. *The Economics of Welfare*. London, Macmillan.
[22] Fisher, I 1906. Nature of Capital and Income. New York: A. M. Kelly.
[23] Available at www.eur.nl/fsw/research/happiness.

incomes over $20,000 there is almost no increase in life-satisfaction as GDP per capita continues to increase.

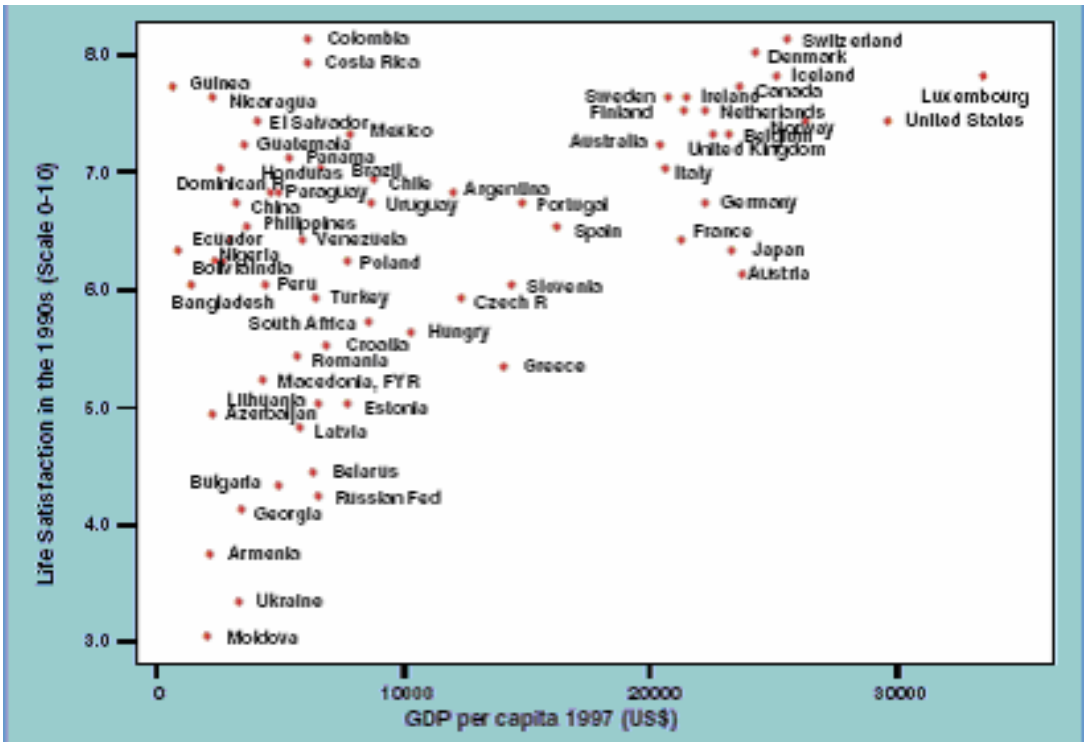

Figure 1: Subjective Well-being v GDP per capita in Different Nations[24]

This result appears to suggest that income is an important factor in improving people's well-being in poorer countries. But if improving well-being is the goal of development, then the importance of income diminishes as people get richer. At the level of the individual nation, the data appear to suggest a powerful 'life-satisfaction paradox'. Incomes in such countries have almost doubled in the last thirty years, but life-satisfaction has barely changed at all (Figure 2).

If rising consumption is supposed to deliver increasing levels of well-being, these data on stagnant 'life-satisfaction' pose a series of uncomfortable questions for modern society. Why is life-satisfaction not improving in line with higher incomes? Is economic growth delivering improved well-being or not? What exactly is the relationship between income growth and life-satisfaction?

Explanations for the life-satisfaction paradox have been sought in a variety of different places.[25] Some authors highlight the fact that relative income has a bigger effect on individual well-being than absolute levels of income. If my income rises relative to those around me I am likely to become happier. If everyone else's income rises at the same rate as my own, I am less likely to report higher life-satisfaction. Moreover, if my increase in income causes envy in those around me, my increased

[24] Reproduced with permission from **nef** 2004; data from the World Database of Happiness (ref 21).

[25] For more detailed discussions of this issue see (for example): nef 2004: A Wellbeing Manifesto for a Flourishing Society. London: New Economics Foundation; Layard, R 2005. Happiness – lessons from a new science. London: Allen Lane.

satisfaction is likely to be offset by dissatisfaction in others, so that aggregate life-satisfaction across the nation may not change at all.

Others point to the impact of 'hedonic adaptation'. As I get richer, I simply become more accustomed to the pleasure of the goods and services my new income affords me. And if I want to maintain the same level of happiness, I must achieve ever higher levels of income in the future just to stay in the same place.

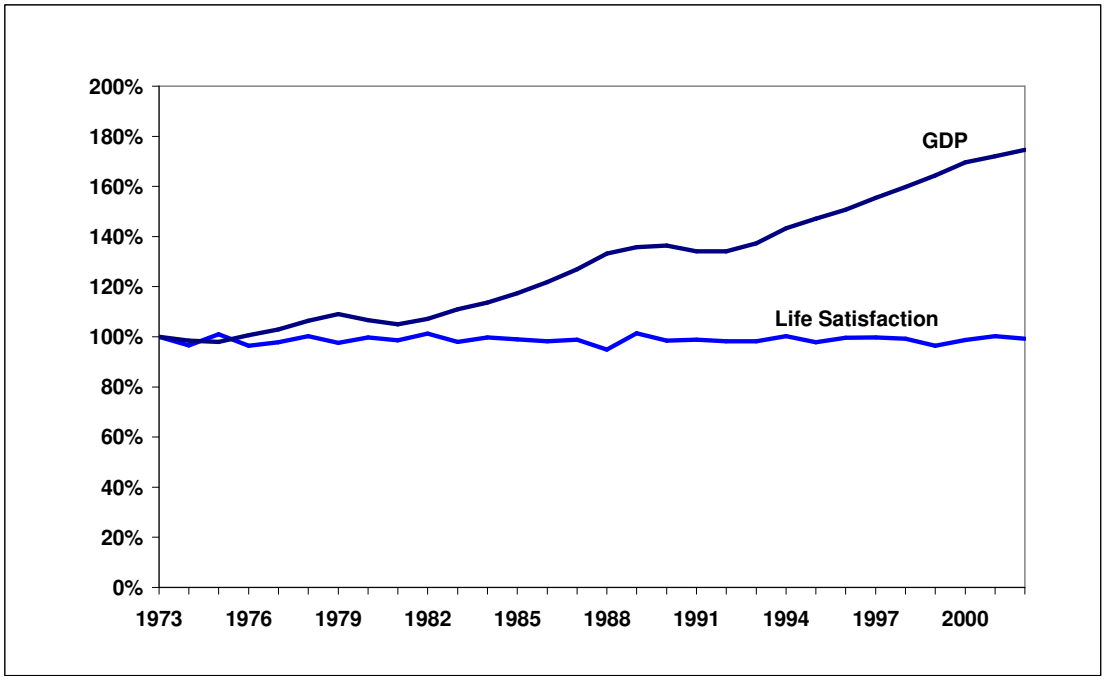

Figure 2: UK GDP v. Life-Satisfaction 1973-2002[26]

Humanistic psychologists (and some ecologists and philosophers) have argued that the entire project of income growth rests on a misunderstanding of human nature. Far from making us happier, according to this critique, the pursuit of material things damages us psychologically and socially. Beyond the satisfaction of our basic material needs for housing, clothing and nutrition, the pursuit of material consumption merely serves to entrench us in unproductive status competition, disrupts our work-life balance and distracts us from those things that offer meaning and purpose to our lives.[27]

Others again have suggested a different – but equally radical – explanation for the life-satisfaction paradox. In their examination of quality of life in 74 different countries, *The Economist's* Intelligence Unit suggested the explanation for the paradox was that 'there are factors associated with modernisation that, in part, offset its positive impact' They argue that:

---

[26] Drawn from GDP data taken from the UK National Accounts and life-satisfaction data taken from Veenhoven, R 2004. States of Nations, World Database of Happiness: http://www2.eur.nl/fsw/research/happiness.

[27] See, for example: Csikszentmihalyi, M 2000. The Costs and Benefits of Consuming. Journal of Consumer Research 27, 267-272. de Boton, A 2004. Status Anxiety. Oxford: OUP. Kasser, T 2002. *The High Price of Materialism*. Cambridge, Mass: MIT Press. Wachtel, Paul 1983. The Poverty of Affluence – a psychological portrait of the American Way of Life, New York: The Free Press.

> '[a] concomitant breakdown of traditional institutions is manifested in the decline of religiosity and of trade unions; a marked rise in various social pathologies (crime, and drug and alcohol addiction); a decline in political participation and of trust in public authority; and the erosion of the institutions of family and marriage.'

The point about these changes – which have occurred hand-in-hand with the rise in incomes and the expansion of individual choice – is not that income growth is irrelevant to individual quality of life; all the evidence suggests the contrary. Rather it is that the pursuit of income growth appears to have undermined some of the conditions (family, friendship, community) on which we know that people's long-term well-being depends.

If this hypothesis is even partly true it is clearly important to be able to interrogate further the relationship between income growth and the well-being derived from it. Though the composite quality of life indicators and the subjective well-being indicators provide one means of achieving this, they still do not answer the vital question: how much of our economic well-being is being eroded by the negative social and environmental impacts associated with income growth? It was largely in answer to this question that adjusted economic indicators such as the ISEW were first constructed.

Adjusted Economic Indicators

The rationale for developing adjusted economic indicators has several dimensions. In the first place, it flows from a recognition of the limitations of GDP as a coherent measure of economic welfare even in its own terms.

One of the first people to highlight some of the reasons for this was the US economist Robert Eisner. The basis of his argument was that the GDP fails to distinguish appropriately between intermediary and final goods and cannot therefore be regarded as a consistent measure of economic welfare. It counts investment in roads, for example, as a final good rather than an intermediary. It fails to account for some things – such as unpaid household labour – that clearly contribute directly to economic welfare. It includes work-related spending by households (commuting costs, eg) as a final good, even though they are clearly only intermediary in the production of other aspects of economic welfare.[28]

The result of Eisner's critique was the development of a new accounting framework – the Total Income System of Accounts (TISA) designed to correct for some of these deficiencies. Though wide-ranging and impressive in its attempt to impose coherence on economic accounting structures, TISA was also notable for the absence of certain important aspects of well-being. For example, it fails to deal with the question of income distribution and it takes no account of the depreciation of natural assets or the loss of environmental quality.

Nonetheless, Eisner's attempt to correct – in economic terms – for the deficiency of the SNA was clearly one of the inspirations for others to attempt the same task. In particular, if it were possible to incorporate some of the environmental and social costs associated with income growth into a single measure of economic welfare, it was argued, this would provide a powerful way of understanding whether or to what

[28] See Eisner, R 1978. Total Incomes in the United States 1959 and 1969. *Review of Income and Wealth* 21(2), 153-181. Eisner, R 1989. The Total Incomes System of Accounts. Chicago: Chicago University Press.

extent growth was really contributing to overall progress in society. As we shall see in the next section, this provided the inspiration for the development of a variety of adjusted economic measures including the ISEW.

'The last hundred years have seen a massive increase in the wealth of this country and the well-being of its people. But focusing solely on economic growth risks ignoring the impact – both good and bad – on people and on the environment... in the past, governments have seemed to forget this. Success has been measured by economic growth – GDP – alone. We have failed to see how our economy, our environment and our society are all one. And that delivering the best quality of life for us all means more than concentrating solely on economic growth.'

Tony Blair, 1999[29]

3. Greening the GDP – a conceptual overview

GDP may be viewed (and is conventionally calculated) in three different, but formally equivalent ways. It may be seen firstly as the total of all *incomes* (wages and profits) earned from the production of domestically-owned goods and services. Next, it may be regarded as the total of all *expenditures* made either in consuming the finished goods and services or investing for future consumption. Finally it can be viewed as the sum of the *value added* by all the activities which produce economic goods and services.

Of these three formulations, it is the second which provides (arguably) the strongest foundation for a welfare-based interpretation of GDP. Specifically, the expenditure formulation sums all private and public consumption expenditures and adjusts these to account for net exports and the formation of fixed capital (ie gross investment). Since the sum of consumption expenditures is equivalent (under certain conditions) to the value placed by consumers on consumption goods, the GDP can be taken – according to the conventional interpretation – as a proxy for the well-being derived from consumption activities.

In formal economic terms however, the equivalence of consumption expenditures with consumer values is valid only in perfect, equilibrium markets, and it is well enough known that in practice, markets are not perfect. Consumer preferences are not always the result of free, informed choice. Perfect information is particularly problematic in a message-dense society such as the one we live in. Consumers often find themselves 'locked in' to specific patterns of consumption by a combination of perverse incentives, inequalities of access, social norms and expectations, marketing pressures and sheer habit.[30] To make matters worse, it is clear that public expenditure does not take place in equilibrating markets at all; government spending is not allocated according to market forces but according to the political and social priorities of the day.

Throughout much of the latter part of the 20th Century, the response advocated by economic and social theorists – and in particular by right-wing economic and social theorists – to these market 'failures' was to strive for fewer market distortions: reduced taxation, improved information, lower public expenditure, less government intervention; in short to pursue hands-off, laissez-faire government. Since this strategy also has the consequence of placing more disposable income in the pockets

[29] DETR 1999, ref 1, Foreword.

[30] For a fuller discussion of these issues see Jackson, T 2005. Motivating Sustainable Consumption: a review of evidence on consumer behaviour and behavioural change. A report to the Sustainable Development Research Network. London: Policy Studies Institute.

of the electorate and reducing the drain on the public purse, it has had a strong appeal across the political spectrum.[31]

But the welfare-theoretic interpretation of GDP falls heavily at a number of hurdles other than those associated with simple market failure.[32] Even conventional economic theory recognises that it is not sufficient to attend only to current levels of consumption. Well-being today, it is understood, consists at least in part in feeling secure about our own (and our children's) well-being in the future. Future consumption possibilities must also play some part in any account of sustainable well-being. This realisation has a long pedigree and has formed the basis for numerous attempts to revise or adjust the GDP as a well-being measure.

Hicksian Income and the Net Domestic Product

The point was raised long ago by the economist John Hicks that 'the purpose of income calculations in practical affairs is to give people an indication of the amount which they can consume [in the present] without impoverishing themselves' in the future. Thus, 'true' income should be calculated as 'the amount that a community can consume over some time period and still be as well off at the end of the period as at the beginning'.[33] Being as well off at the end of the period depends *inter alia* on having the same consumption possibilities in the following period. Since these consumption possibilities flow from income streams which are generated by capital investment, this requirement has often been translated into a demand to maintain capital intact. On one interpretation therefore, 'true' income is the income in the period minus the net depreciation of capital during the period.

At the national level, this would lead us to compute first the *Net* Domestic Product (NDP) by subtracting the depreciation of all capital assets from the GDP. Hicks' argument suggests that the NDP provides a better representation of national well-being than does the GDP. In fact, in a seminal paper in welfare economics, Martin Weitzmann argued that the NDP can be regarded as a proxy for sustainable national welfare in the sense that (under certain conditions at least) it is proportional to the present discounted value of all future consumption.[34]

In particular, therefore, a non-declining NDP can be taken as an indication of non-declining consumption possibilities into the future. Conversely, of course, the pursuit of NDP growth assumes (under this interpretation) a welfare-theoretic justification. Though GDP may be flawed as a measure of societal well-being, an appropriate correction for capital depreciation is (according to Weitzmann and others) a suitable proxy for sustainable welfare.

It is clear that a correction of the kind outlined in the previous section requires only a marginal adjustment to the conventional picture. In 2000, for instance, NDP in the UK, as conventionally calculated, would have differed from GDP by less than 3%. The orthodox view, in which increasing quality of life is correlated with economic growth, might be regarded as surviving this kind of adjustment more or less in tact.

---

31 For an insightful discussion of this point see (eg) Christie and Warpole 2001.

32 The limitations of this strategy are also discussed in Jackson 2005 (op cit, ref 30).

33 Hicks, J 1939. *Value and Capital.* Oxford and New York: Oxford University Press

34 Weitzmann, M 1976. On the Welfare Significance of the National Product in a Dynamic Economy. *Quarterly Journal of Economics*. 90, 156-62.

Adjusted Net Savings (Genuine Savings)

One very obvious extension of the Hicksian approach would be to account for the depreciation not just of physical (human-made) capital, but also of natural capital (the natural resource base) and human capital (the skills and capabilities of the population). This is the basis for an indicator called the Adjusted Net Savings – developed originally as the Genuine Savings Index by World Bank economist Kirk Hamilton.[35] In principle, Adjusted Net Savings measures the 'true rate of savings in an economy' after taking into account investments in human capital, depletion of natural resources and damage caused by pollution.

In practice, Adjusted Net Savings are calculated as the gross savings in the economy net of four[36] important factors: the depreciation of physical capital (as in NDP); the net depletion of energy, mineral and forestry resources[37]; expenditure on education (as a proxy for investment in human capital), and the estimated cost of annual carbon emissions (as an indicator of environmental damage).[38] Adjusted Net Savings are now calculated by the World Bank for around 150 countries and reported annually in the World Bank Indicators report.[39]

It is in principle possible to calculate a 'Green Net National Product' (GNNP) by replacing the gross investment component of GDP with Adjusted Net Savings. The resulting index would clearly be an improvement over GDP as a measure of welfare in an economy. At the same time, the Adjusted Net Savings measure has been criticised for being over-restrictive in its methodology – for example in relation to calculating resource depletion. It is also clear that in practice, GNNP does not entirely exhaust the kinds of criticisms traditionally levelled against GDP. It is therefore worthwhile to explore some more systematic attempts to construct adjusted measures of economic welfare.

Early Adjusted Measures of Economic Welfare

Amongst the earliest attempts to address the shortfalls of GDP as a measure of economic welfare was a landmark paper published in 1972 by Nordhaus and Tobin, entitled *Is Growth Obsolete?* In that paper, the authors constructed a 'measure of economic welfare' (MEW) by adjusting GDP to account for certain economic and social factors not normally included in the GDP. The original MEW was less concerned with the environmental factors affecting economic welfare. The results of

---

35 Bolt, K, M Matete and M Clemens 2002. Manual for Calculating Adjusted Net Savings, Washington DC: World Bank; Hamilton, K 1994. Green Adjustments to GDP. *Resources Policy* 20(3): 155-168.

36 The earliest version of the Genuine Savings index incorporated depreciation of human-made capital, depletion of natural resource and expenditure on education. Later versions also incorporated some of the costs associated with environmental damage.

37 The calculation of net depletion of natural capital is complex. It involves calculating 'resource rents' for resources extracted during the period and subtracting the net resource discoveries during the period.

38 Currently, this calculation is made using a marginal social cost of $20 (taken from Fankhauser 1995) per tonne of carbon emitted.

39 See for example World Bank 2001. World Development Indicators. Washington DC: World Bank, 180-183; .

the exercise indicated that between 1929 and 1965, economic welfare – as measured by the Nordhaus and Tobin index – increased consistently; but that the growth rate in MEW was somewhat slower than the growth rate in GDP. The authors concluded from this analysis that growth was not obsolete; that, on the contrary, it continued to deliver increasing levels of welfare; and that as an indicator of well-being, GDP could still be regarded as robust.

When Nordhaus examined the same question from an environmental perspective in 1992, in a paper entitled *Is Growth Sustainable?*, he discovered that his (revised) MEW began to diverge more substantially from GDP in the later years of the study. Nordhaus attributed this increased divergence to 'conventional sources' such as declining productivity growth and dwindling savings rather than to the unsustainable use of natural resources. But the importance of the study was already clear enough: by making certain economic, social and environmental adjustments to the conventional measure, it had been possible to show that GDP could not necessarily be regarded as a robust indicator even of economic welfare, let alone of social well-being or quality of life.

A more radical attempt to incorporate environmental and resource effects into an adjusted economic indicator for the US was pioneered by Zolotas.[40] Even in the mid 1970s Zolotas was able to demonstrate that his index of the Economic Aspects of Welfare (EAW) rose more slowly than GDP. Zolotas argued that there would come a time – as the quotation at the top of this section suggests – when an increment of economic output would produce no increase in welfare at all.

In the concluding section, we shall return briefly to this hypothesis which appears, at one level, to have been reinforced by the broadest set of studies to attempt to construct an adjusted economic measure – the Daly and Cobb Index of Sustainable Economic Welfare (ISEW).

The Daly and Cobb Index of Sustainable Economic Welfare (ISEW)

The Index of Sustainable Economic Welfare (ISEW) was first developed for the United States for the years 1950 and 1988 by Herman Daly and John Cobb and printed as an appendix to their landmark book *For the Common Good*.[41] A slightly revised version of the index, updated to 1990, was published by Clifford Cobb and John Cobb in a collected volume of papers on the *Green National Product* which also incorporated some early criticisms of the ISEW methodology.[42]

Daly and Cobb's aim was to develop an indicator capable of reflecting the range of criticisms which had been directed at GDP as a welfare measure. They wanted for example not only to incorporate a correction for the depreciation of natural and human-made capital, but also to account for reduction of welfare associated with the unequal distribution of incomes.[43] They aimed to include the contribution to welfare from the 'informal' economy,[44] correct for the social and environmental costs of

---

40 Zolotas, X 1981. *Economic Growth and Declining Social Welfare*. Athens: Bank of Greece.

41 Daly, H and Cobb 1989.

42 Cobb C and J Cobb 1994 The Green National Product.

43 See Stymne, S and T Jackson 2000. Intra-generational equity and sustainable welfare. *Ecological Economics* 33, 219-236

44 The integration of unpaid housework into GDP was recommended for example by the closing Nairobi Conference of the United Nations Decade for Women. Agenda 21, the Rio Earth Summit's

production, and take account of so –called 'defensive' expenditures: 'expenditures necessary to defend ourselves from the unwanted side-effects of production'.[45] As Robert Kennedy's Kansas speech pointed out, the GDP includes a variety of these kinds of expenditures. An increasing proportion of the national income may be spent on cleaning up environmental damage resulting from the production of goods and services, or on treating illnesses arising from impaired environmental quality or social degradation. These 'defensive expenditures' may be vital to maintain our quality of life against the adverse welfare impacts of other expenditures. But it is surely then inappropriate to count both sets of expenditures as positive contributions to welfare.

The Daly and Cobb ISEW starts out from the standard economic measure of private consumer expenditure or 'personal consumption'. For various reasons, many of which are discussed elsewhere,[46] this measure may not in itself provide an unassailable basis from which to account for welfare in the nation. Nevertheless, it is clear that personal consumption provides some indicator of the amount of money which consumers are willing to pay for (and hence the value they assign to) the goods and services through which welfare may be provided.

Using this basis in personal consumption, the ISEW then makes several specific kinds of adjustment to reflect the various elements discussed above. These adjustments fall into six broad categories.

- Firstly, the total personal consumption is adjusted to account for inequalities in the distribution of incomes in the economy.

- Secondly, an account is made of the non-monetarised contributions to welfare from services provided by household labour.

- Thirdly, account is taken of the environmental costs arising from the annual emission of certain types of air and water pollution and noise pollution.

- Fourthly, account is taken of certain 'defensive' expenditures: specifically private expenditures on health, education, commuting, car accidents and personal pollution control are subtracted from the account, and government expenditures are included in the index only to the extent that they are regarded as *non*-defensive.

- Next, the index makes several adjustments to account for changes in the sustainability of the capital base. Specifically, it includes a 'net capital growth' adjustment to account for changes in the stock of human-made capital.[47] It also includes the net transactions in overseas assets and liabilities in order to

---

'blueprint for sustainability', declares that 'unpaid productive work such as domestic work and child care should be included, where appropriate, in satellite national accounts and economic statistics'.

45 Daly and Cobb 1989.

46 See for example discussions in Daly and Cobb 1989, various contributions to Cobb and Cobb 1994, and Jackson and Marks 1999.

47 The term human-made capital refers to the stock of conventional economic capital assets, and should not be confused with the term 'human capital' which refers to the stock of human resources. It might be noted that the GDP already includes a measure of gross fixed capital formation. The capital adjustment in the ISEW differs from the GNP adjustment in two specific ways: firstly it takes account of capital depreciation as well as formation; secondly it includes only that capital growth which is net of a basic capital requirement to maintain changes in the workforce.

provide an indication of the robustness (and sustainability) of the economy in international terms.[48]

- In addition, the index attempts to account for the difference between annual *expenditure* on consumer durables and the *services* flowing in each year from the stock of those goods.

- Finally, the index attempts to account for the depreciation of natural capital as a result of the depletion of natural resources, the loss of habitats and the accumulation of environmental damage from economic activity.

Taken together the adjustments which comprise the ISEW can be expressed in the following equation:[49]

ISEW = Personal consumer expenditure
- adjustment for income inequality
+ non-defensive public expenditures
+ value of domestic labour
+ economic adjustments
- defensive private expenditures
- costs of environmental degradation
- depreciation of natural capital.

The results of applying this methodology to the United States revealed a trend in sustainable economic welfare which differed markedly from the trend in GDP over the period examined (1950-1990). While GDP in the United States increased substantially over the period, the ISEW began to level out, and even decline slightly from about the mid-1970s onwards (Figure 3).

[48] In the conventional expenditure-related calculation of GDP, there is also an assessment of net international trade (export minus imports). The difference entailed by the ISEW methodology is the inclusion of the capital aspects of overseas trade.

[49] Appendix 1 presents a more detailed account of the composition of the Daly and Cobb ISEW and subsequent variations on it.

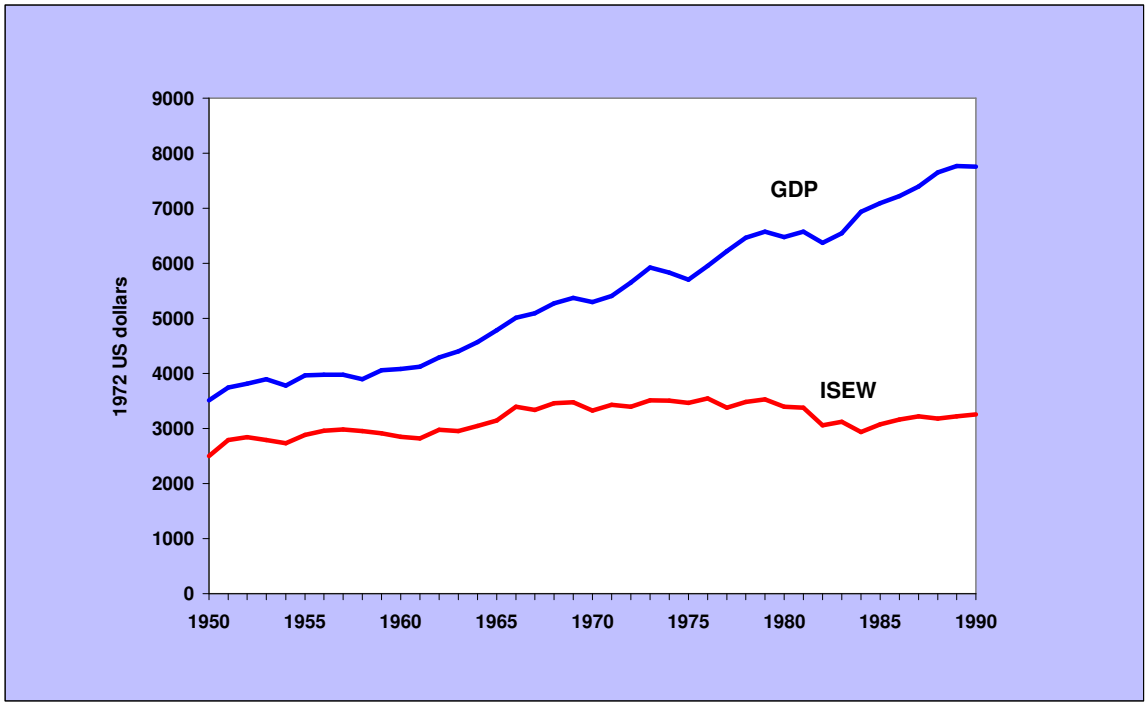

Figure 3: US Index of Sustainable Economic Welfare (ISEW) 1950-1990[50]

Genuine Progress and Beyond

Since the publication of the original US ISEW, several similar studies have been carried out – both in the US and in other countries. Many of these studies have incorporated some additions or revisions to the original methodology. One of the less significant but potentially more confusing revisions of the ISEW has been a kind of 'rebranding' of the original idea.

In 1995, Clifford Cobb and his colleagues at an organisation called *Redefining Progress* decided that the terminology of ISEW was not particularly accessible in to ordinary people and published instead an index – based substantially on the ISEW methodology – called the Genuine Progress Indicator (GPI).[51] The idea of the 'rebranding' was quite specifically to have a short acronym, more accessible to a lay audience, which specifically identified the index as a better indicator of national progress than the GDP.

At the same time, the GPI also introduced certain additional factors that had been left out of the original ISEW. These included adjustments for crime, divorce, changes in leisure time and unemployment – all recognised as factors affecting the level of well-being in the nation. Some later versions of the ISEW or GPI have extended this set of

[50] Re-drawn from data in Cobb and Cobb 1994 (ref 41)

[51] Cobb, C, E Halstead and J Rowe 1995. The Genuine Progress Indicator – summary of data and methodology. Washington, DC: Redefining Progress.

factors to include the psychological and social costs associated with under- and over-employment.[52]

Finally, the New Economics Foundation (**nef**) recently published an updated ISEW variant for the UK which was again re-branded, this time as a Measure of Domestic Progress (MDP).[53] The aim of this work was to cast green GDP measures more specifically in terms of measuring a country's progress towards sustainable development. The various components of the index were related explicitly to the different dimensions of sustainability: economic, social and environmental.

The **nef** document explored the potential for trade-offs between these different objectives and to raise the question of how we should measure overall progress towards sustainable development. In particular, the paper raised the uncomfortable question of whether the continued pursuit of economic growth might be structurally reliant on factors which undermine long-term environmental and social well-being – a possibility that cannot entirely be ruled out by the continuing rise in GDP.[54]

In summary, the last decade has seen a variety of attempts to construct adjusted measures of sustainable economic welfare, based on the Index of Sustainable Economic Welfare developed initially by Daly and Cobb. Subsequent variations on this index have incorporated both revisions to the methodology and a certain 'rebranding' of the index to make it's relevance clearer to a lay public or to relate it more closely to current debates about sustainable development. In the following section we survey some of the ISEW-related studies that have been built on the back of Daly and Cobb's early initiative.

---

[52] These adjustments were first made in the Australian GPI. See Hamilton, C and H Saddler 1997. The Genuine Progress Indicator: a new index of changes in well-being in Australia. Discussion paper 14. Canberra: The Australia Institute.

[53] Jackson, T 2004. Chasing Progress? Beyond measuring economic growth. London: New Economics Foundation.

[54] As noted in Section 2 above, a similar question has been raised by a recent article from the *Economist's* Intelligence Unit.

> '[B]eyond a certain point, economic growth may cease to promote social welfare. In fact, it would appear that, when an industrial society reaches an advanced state of affluence, the rate of increase in social welfare drops below the rate of economic growth, and tends ultimately to become negative.'
>
> Xenophon Zolotas, 1981.

4. 'Genuine Progress' in Europe and Elsewhere

The geographical evolution of ISEW studies would make a fascinating social research study in its own right. The original US study was published in 1989 as an Appendix to Daly and Cobb's book *For the Common Good*. The book itself was highly influential in emerging debates about sustainable development. But the ISEW very quickly began to develop a life of its own. Its message seemed to resonate with emerging concerns about conventional models of development and the index itself illustrated graphically the apparent gap between economic success (as conventionally measured) and sustainability.

Of course the index also attracted considerable criticism, mainly from economists. Even those who had made attempts to revise the SNA themselves – such as Robert Eisner – were critical of some of the constructions in the original index. In 1994, Clifford and John Cobb collected together some of these critical views and published them in a book called *The Green National Product* alongside a version of the US ISEW that had been updated to respond to some of the critics and a pilot ISEW developed for Germany.

Around about the same time, several other European countries (including Austria, the Netherlands and the UK) were also building national ISEWs on the Cobb and Cobb model. Some of these studies began to introduce revisions to the model, driven partly by the methodological criticisms levelled at the original index and partly by local priorities or data limitations. The general tendency at first, however, was to stick relatively closely to the Cobb and Cobb model, particularly as a critical mass of similar European studies began to emerge.

Meanwhile in the US, the first re-branding of the ISEW began to take place. On the back of the original studies, Clifford Cobb and colleagues formed a new NGO called Redefining Progress whose principal aim was to use the illustrative power of the ISEW to focus attention on the failures of conventional development in addressing people's concerns about sustainable well-being. Fearing that the ISEW terminology was too obscure for lay consumption, they re-branded the index as the Genuine Progress Indicator (GPI). At the same time they also incorporated some additional social factors that had not been present in the ISEW. These included an account of changes in leisure time and some additional social costs such as unemployment, crime and divorce.

Subsequent studies have not been consistent in following the US revisions. Some have more or less echoed the early Cobb and Cobb methodology. Others have picked up specific revisions made to that methodology by others. Some have followed the GPI revisions. In a number of cases, poor data quality has led to the omission of key columns. In other cases, idiosyncratic additions have been made on the basis of local priorities.

In the following subsections we summarise very briefly each of the ISEW-type studies carried out to date (in alphabetical order of country) and highlight any significant

methodological differences that are relevant to each case. More detail on each of these studies is provided in the analysis matrix in Appendix 1.

A comprehensive analysis of differences in method between the various studies is beyond the scope of this document. Bearing in mind that ISEW-type measures consist of around 25 or 30 different adjustments, each of which involves some computation of extensive time-series data sets, such a task is daunting to say the least. Nonetheless, it is clear that methodological differences can play a large part in comparing the results from this kind of exercise.

To take a simple example, the decision whether or not to use a time-varying or constant shadow wage rate for services from household labour can have a profound impact on the overall shape of the adjusted measure – and this is only one of many such parameters impacting on trends over time. Moreover many studies neither carry out sensitivity analyses on such choices nor report in sufficient detail to compare assumptions.[55]

For illustrative purposes however, we have attempted in what follows to identify individual country responses to three critical decisions in the ISEW methodology. These are:

1) what methodology to use for calculating the welfare loss associated with income inequality: the original Daly and Cobb ISEW used a Gini coefficient indexed to 1950 to adjust personal consumption; Cobb and Cobb used an index based on share of income received by the bottom quintile; in response to criticisms of this method, Jackson et al based this component on the Atkinson income inequality index which measures 'directly' the welfare lost through an unequal distribution of incomes;
2) whether to use annual or cumulative carbon emissions as the basis for accounting for the costs of long-term environmental damage: the original Daly and Cobb index argued strongly that the damage costs associated with climate change should accumulate through the period; this has been criticised by others and the Genuine Savings index for example uses a damage cost based only on annual carbon emissions; subsequent ISEW-type measures have taken a variety of positions on this issue;[56]
3) which method to use for calculating resource depletion: the original Daly and Cobb method was to subtract the entire value of resource extraction in each year; Cobb and Cobb changed to a replacement cost method which estimated the costs of replacing all fossil fuel consumed in a given year with renewable energy; later studies have variously used one of these two methods or else have employed more conventional economic accounting methods such as El Serafy's 'user cost' method or the Hotelling rule.[57]

---

55 See Jackson et al 1997 for a variety of sensitivity analyses on different parameters in the UK ISEW, including this choice.

56 The question of whether to account cumulatively for these damages is considerably more influential on the overall index than the precise shadow price chosen to reflect the marginal social cost of carbon (Jackson et al 1997).

57 See El Serafy, S 1989. The proper calculation of income from depletable natural resources. In Ahmad, Y, S El Serafy and E Lutz (eds). Environmental Accounting for Sustainable Development. Washington, DC: World Bank, 10-18; Hotelling, H 1931. *The Economics of Natural Resource Use.* New York: Harper and Row.

Australia

Two distinct attempts have been made to construct an ISEW type measure for Australia. Clive Hamilton at the Australia Institute has constructed an Australian GPI for the years 1950 to 1996, based closely on the US GPI measure.[58] Philip Lawn at the Flinders University of South Australia in Adelaide has constructed an index called the Sustainable Net Benefits Index, based largely on the early Cobb and Cobb ISEW.[59] Since it covers a longer time frame we focus here mainly on Hamilton's GPI.

With respect to the parameters highlighted in the introduction to this section, the Australian GPI makes the following choices: 1) income distribution is calculated by weighting personal consumer expenditure on the basis of in index of the share of total income in the lowest quintile (as in the original Daly and Cobb index); 2) the long-term damage from climate change is calculated using annual carbon emissions; 3) costs of depleting natural resource use the same replacement cost method as in the revised Cobb and Cobb ISEW. However, it applies these costs only to oil and gas depletion and not to coal. Hamilton also augments the value of household labour with the value of community work and accounts for the psychological costs of unemployment and underemployment.

Per capita GPI broadly follows GDP until the early 1980s (Figure 4), after which it begins to diverge substantially. GPI in 1996 is virtually unchanged from its 1981 value. Lawn's SNBI departs earlier and more graphically from GDP. This may be because he accumulates long-term damage from climate change.

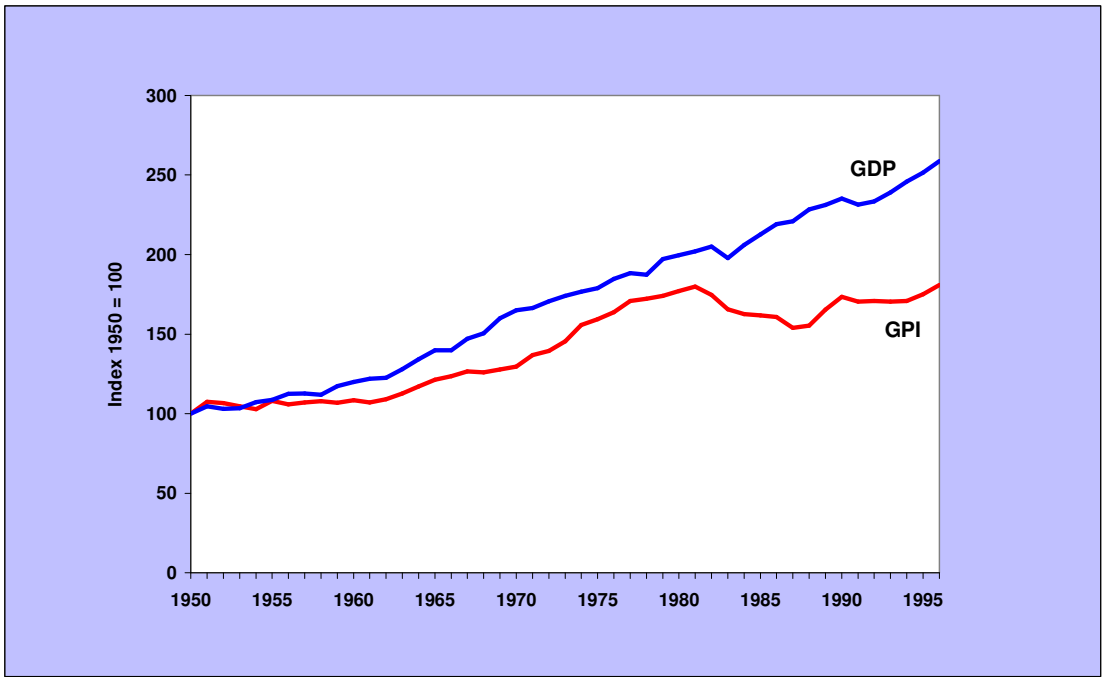

Figure 4: GPI and GDP per capita in Australia 1950-1996

[58] Hamilton, C 1999. The Genuine Progress Indicator: methodological developments and results from Australia. *Ecological Economics* 30, 13-28.

[59] Lawn, P and R Sanders 1999. Has Australia surpassed its optimal macroeconomic scale? Finding out with the aid of 'benefit' and 'cost' accounts and a sustainable net benefit index. *Ecological Economics* 28, 213-229. Lawn makes the interesting point that ISEW type measures should be regarded not in the light of Hicksian concept of income, but rather from the point of view of Fisher's concept of net 'psychic income' (cf ref 22).

Austria

The Austrian ISEW was developed for the years 1955 to 1992 by Engelbert Stockhammer and colleagues at the University of Economics and Business Administration in Vienna and later published in Ecological Economics.[60] In spite of a claim that the Index was 'revised and entirely reformulated', it does broadly incorporate most of the features of the original Cobb and Cobb ISEW.

Perhaps the most significant change to the methodology relates to the first (1) of the features highlighted in the introduction to this section. The adjustment for income inequality – using a Gini like measure indexed to the base year – is carried out after all the other additions and subtractions have been made.[61] In relation to (2) resource depletion, Stockhammer and colleagues use the method used in the original Daly and Cobb ISEW rather than the Cobb and Cobb revision. Costs of climate change (3) are based on cumulative emissions.

The results of the Austrian ISEW are typical of many European ISEW studies. ISEW follows GDP for the early years of the study, but begins to diverge significantly from the late 1970s onwards. By 1992, ISEW is around 200% of the initial value, while GDP is almost 350%. Importantly, ISEW per capita declines in the later years.

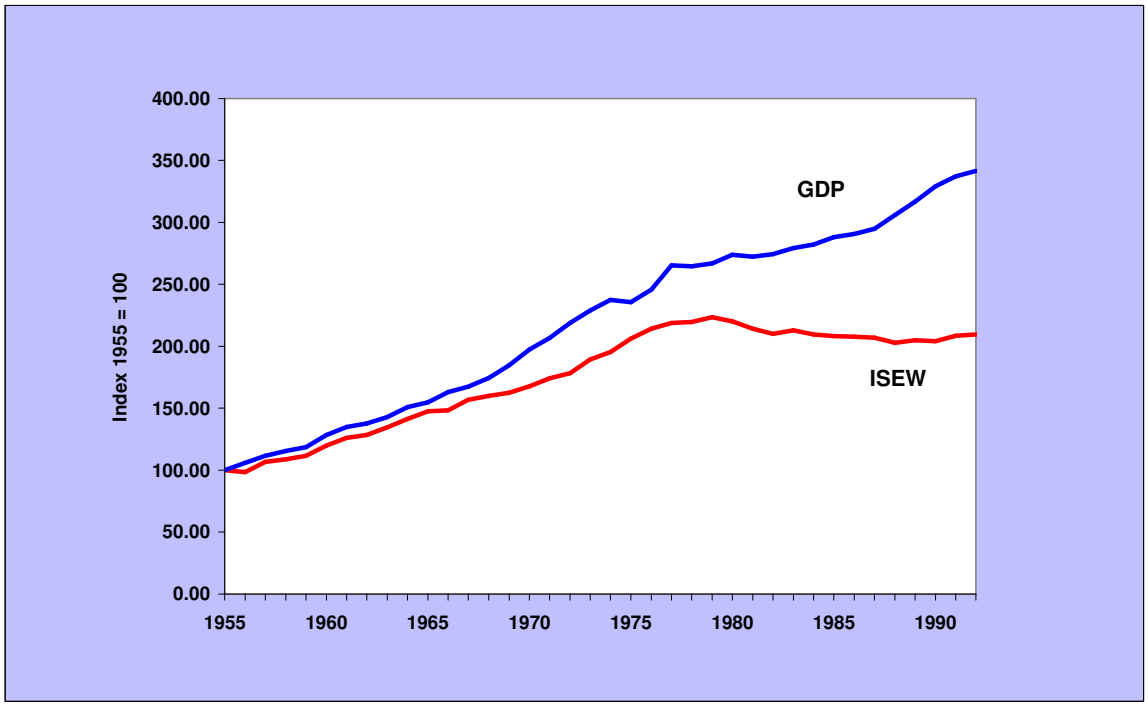

Figure 5: ISEW vs GDP per capita in Austria 1955-1992

[60] Stockhammer, E, H Hochreiter, B Obermayr and K Steiner 1997. The index of sustainable economic welfare (ISEW) as an alternative to GDP in measuring economic welfare. The results of the (revised) ISEW calculation 1955-1992. *Ecological Economics* 21, 19-34.

[61] It is by no means clear that this revision is justified. It assumes essentially that the welfare losses associated with defensive expenditures are distributed in the same way that incomes are. In other words those with higher incomes incur higher welfare losses from pollution and social costs. Recent evidence from the environmental justice debate (Lucas et al 2004, eg) suggests that the opposite might often be the case. Those with lower incomes typically bear the brunt of environmental and social costs. If this is the case, the adjustment for income distribution has a perverse effect if it is carried out after the adjustment for welfare losses is made.

Chile

The first adusted economic measure to be constructed for a less developed economy was the ISEW prepared for Chile by Beatriz Castañeda while she was working as an MSc student under Robert Costanza's tutelage at the University of Maryland. The study was published in the journal Ecological Economics in 1999.[62]

The Chile ISEW omitted some of the columns incorporated into the original Cobb and Cobb methodology. In particular, insufficient data were available to account for loss of wetlands, costs of ozone depletion and net international position. However, the Chile ISEW is notable for its inclusion of two new columns: the depletion of renewable resources and the costs of crime.

In relation to the three key columns highlighted in the introduction, the Chile ISEW takes the following decisions: 1) income inequality is factored in using the Gini coefficient indexed to 1965; 2) the costs associated with climate change are accounted on a cumulative basis; 3) resource depletion costs are calculated using a Hotelling rent method, rather than using the Cobb and Cobb replacement cost method.

The results (Figure 6) are remarkable in that they mirror the kinds of results from studies in more developed economies. The ISEW per capita declined by almost 5% over the period, while GDP increased by 88%. As in other countries, ISEW followed GDP relatively closely for a while, beginning to depart from GDP during the 1980s in much the same way as had been observed in the more developed economies.

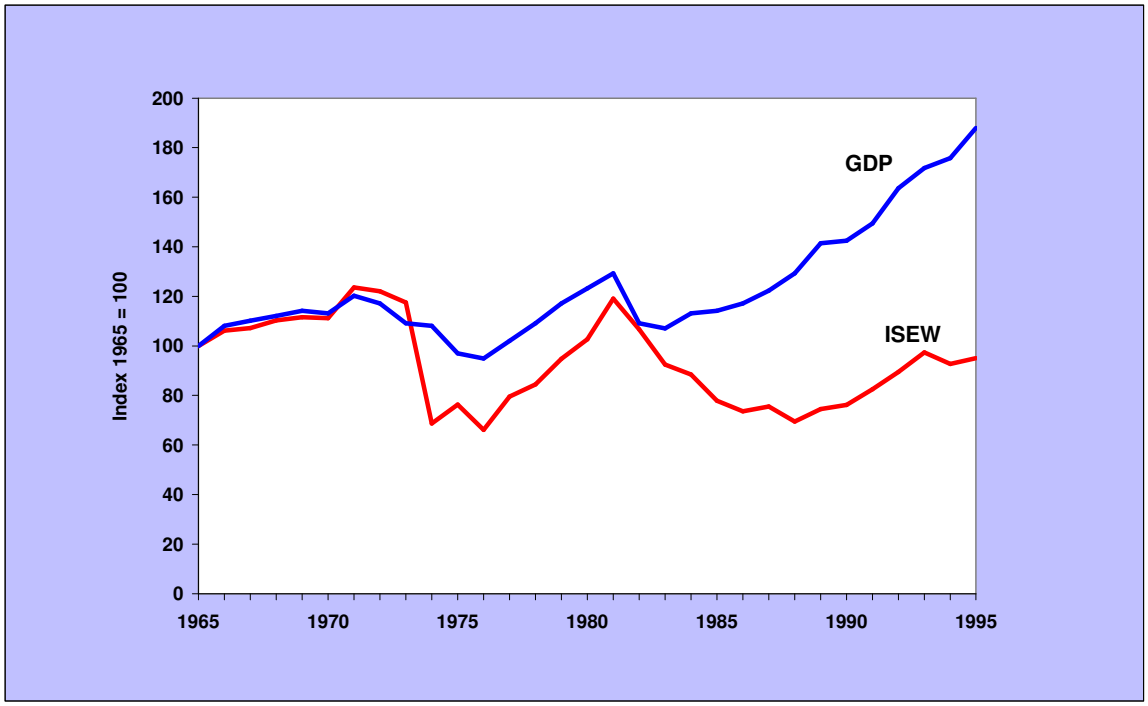

Figure 6: ISEW and GDP per capita in Chile 1965-1995

[62] Castañeda, B 1999. An Index of Sustainable Economic Welfare (ISEW) for Chile. *Ecological Economics* 18, 231-244.

Germany

One of the earliest European countries to develop an ISEW was Germany. Developed originally in 1992 by Hans Diefenbacher at FEST, the German ISEW was formally published in Cobb and Cobb's 1994 book *The Green National Product*.[63]

The methodology follows that of the early Daly and Cobb study in most details. In relation to the three highlighted parameters the following decisions were made: 1) in the absence of a Gini index, Diefenbacher constructed an inequality index using the ratio of wage-earnings to national income; this was then indexed to 1950 and applied as in the Daly and Cobb ISEW; 2) cumulative carbon emissions formed the basis for the consideration of long-term environmental damage; 3) the index used the replacement value of energy consumed as considered by the revised Cobb and Cobb index. In addition, the German index subtracted 50% of advertising spend from the index. This adjustment had been included in the original Daly and Cobb index, but was later abandoned as a result of criticisms that advertising spend is an intermediate expenditure and does not appear in final consumption. It also included 50% of the public expenditure on highways as a non-defensive public expenditure, and the change in fish stocks as an element in the cost of water pollution.

The results of the German study are typical of other studies (Figure 7). The ISEW per capita rose more or less in line with GDP until about 1980. Thereafter it began to diverge considerably from the conventional measure.

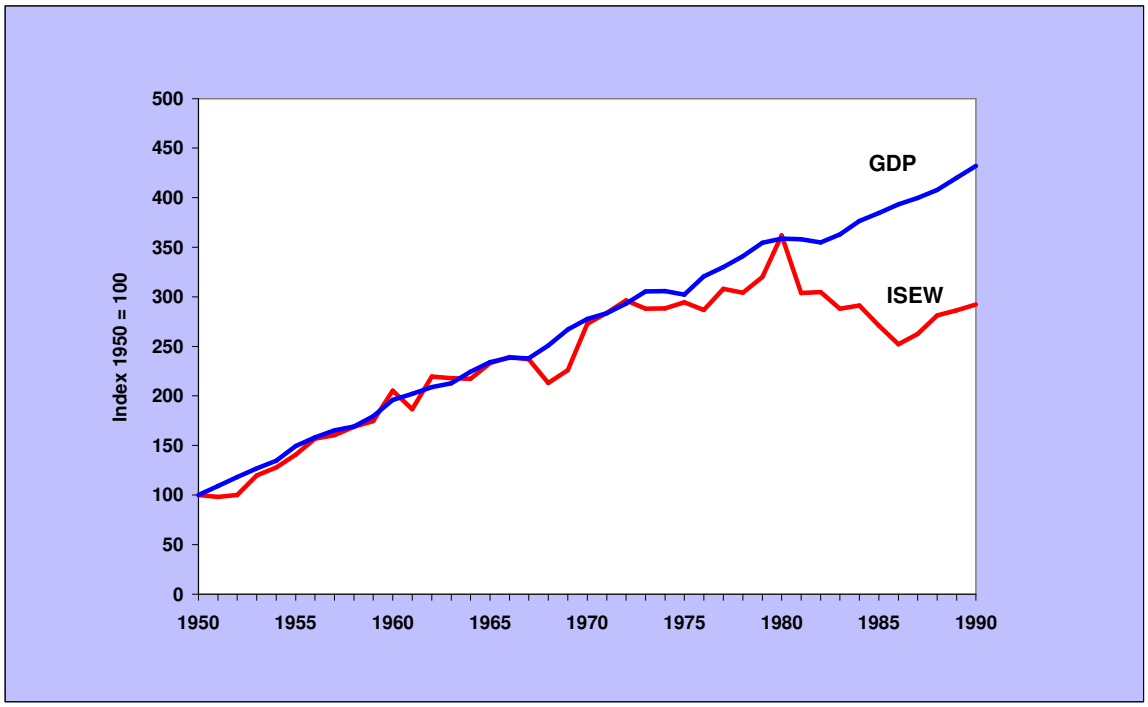

Figure 7: ISEW vs GDP per capita in Germany 1950 - 1990

[63] Diefenbacher, H 1994. The Index of Sustainable Economic Welfare in Germany. In Cobb C and J Cobb, *The Green National Product*. Lanham, MD: University of Americas Press.

Italy

A pilot ISEW for Italy was constructed by Giorgio Guenno and Silvia Tiezzi at the Fondazione ENI Enrico Mattei for the years 1960 to 1990.[64] The study follows the early Daly and Cobb ISEW methodology fairly closely.

In relation to the three highlighted variables, the Italian ISEW makes the following choices: 1) the income inequality adjustment is made by constructing a composite 'index of inequality' for Italy using a variety of local indicators including a Gini-type coefficient; 2) long-term impacts from climate change is accounted for cumulatively using the same methodology employed in the 1994 Cobb and Cobb index; 3) the Italian index departs from other indices in its calculation of the cost of resource depletion; the authors chose to use the El Serafy user cost method, which Daly and Cobb considered but rejected (because of disagreements in principal with the discounting of long-term environmental costs) in their original 1989 index.

The results of the index are shown in Figure 8.[65] ISEW grows more slowly over most of the time period and as a result there is a growing gap between ISEW/cap and GDP/cap. However, this study is uncharacteristic in failing to illustrate a clear turning point at which ISEW/cap begins to stabilise or decline. On the contrary the index grows consistently over the period, although at a slower rate than GDP.

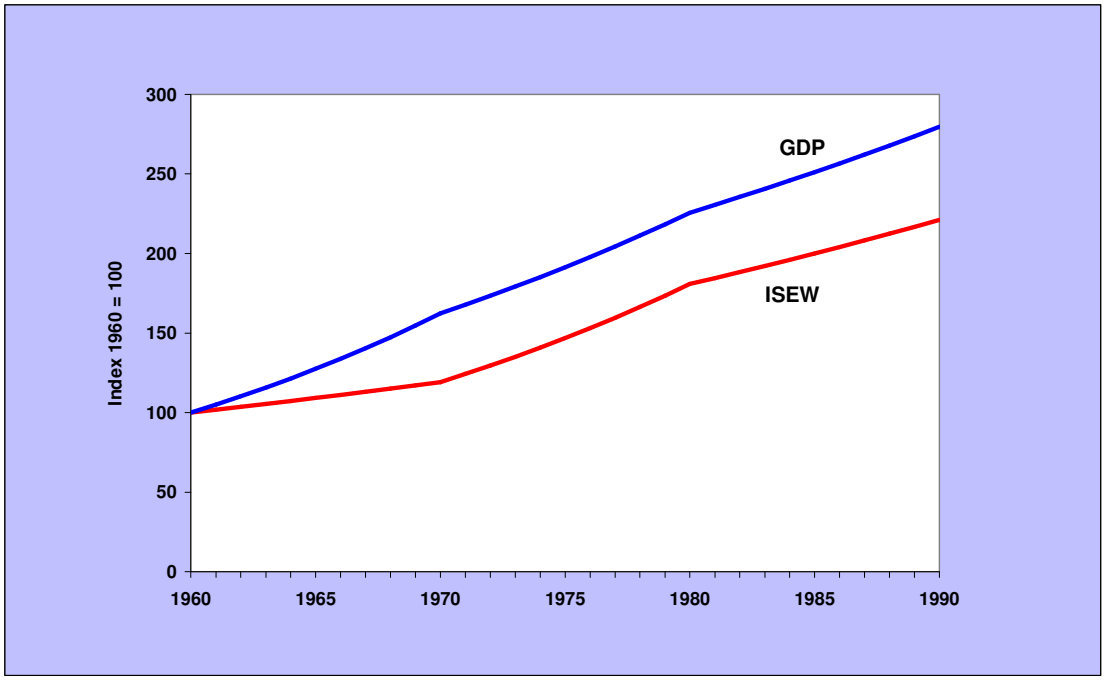

Figure 8: ISEW and GDP per capita in Italy: 1960 to 1990

64 Guenno, G and S Tiezzi 1998. The Index of Sustainable Economic Welfare (ISEW) for Italy. Nota di Lavoro 5.98. Trieste, Italy: Fondazione ENI Enrico Mattei; Guenno, G and S Tiezzi 1996. An index of sustainable economic welfare for Italy, FEEM Newsletter, vol 2, p16-21.

65 Insufficient data were available to draw this graph accurately. Instead it uses average year on year growth rates reported in Guenno and Tiezzi 1998 for both ISEW and GDP in each decade.

Netherlands

A pilot ISEW was constructed for the Netherlands by David Rosenberg and Tammo Oegema at IMSA, Amsterdam, covering the years 1950 to 1992.[66] One of the earlier European studies, the Netherlands index was based mainly on the Daly and Cobb study. However, it was forced to omit some key columns – such as domestic labour, the service flow from consumer durables, and net capital growth from lack of data.

With respect to the three highlighted parameters: 1) the income inequality adjustment was made using a 1950-based Gini-type index to adjust consumption (as in the Daly and Cobb ISEW); 2) climate costs were counted cumulatively; and 3) resource depletion was accounted for by subtracting the value of fossil fuels used in each year (as in the original Daly and Cobb ISEW).

The results show that ISEW/cap climbed faster than GDP over the first three decades of the study period, but declined quite sharply over the later years of the study. This result is slightly unusual by comparison with most other studies, in which ISEW struggles to keep up with GDP at any stage. It is probably explicable however on the basis of the exclusions made from the study. The value of domestic labour for example, has both a depressive effect on the shape of the index (because less time is now spent in domestic labour than it was in 1950) and also tends to reduce extreme variations in the index (because it is a large positive number).

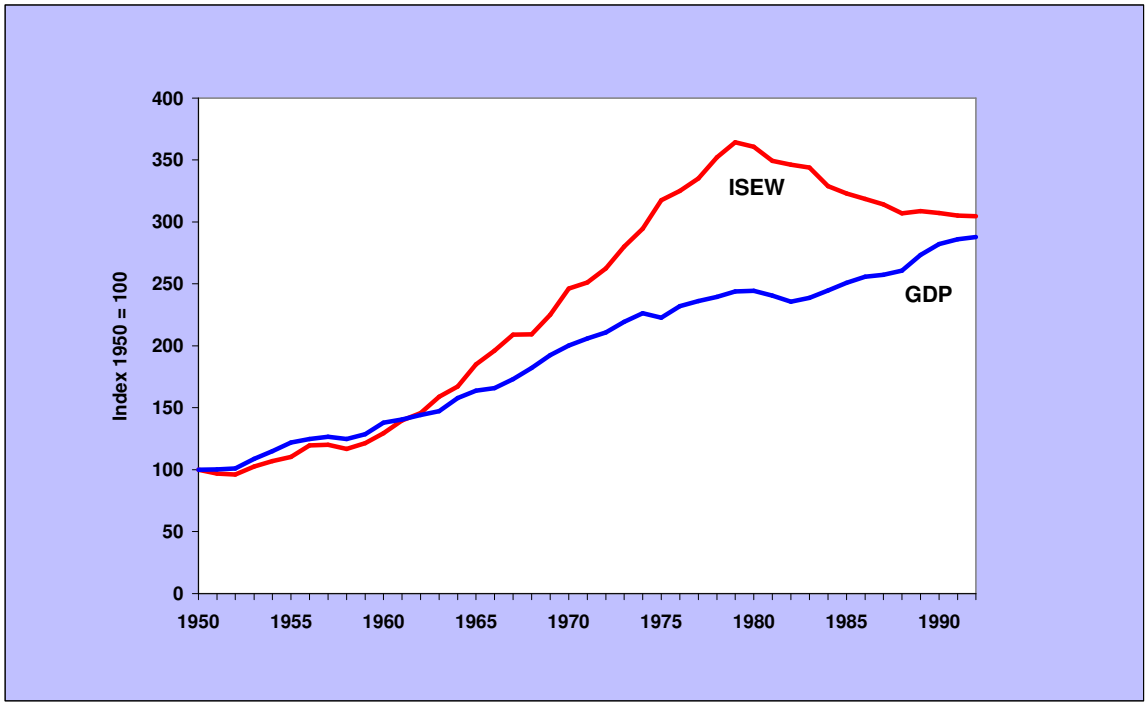

Figure 9: ISEW and GDP per capita in the Netherlands 1950-1992

[66] Rosenberg, D and T Oegema 1995. A Pilot ISEW for The Netherlands 1950-1992. Amsterdam: Instituut voor Milieu-en-Systeemanalyse (IMSA).

Scotland and Wales

Interesting variation on national ISEW-type studies have been the attempt to develop local or regional indices. Often reliant on wider national proxies for regional data, these measures are nonetheless useful in teasing out regional variations in economic welfare, and also in exploring the boundaries of the methodology. In many cases, these attempts have disclosed limitations in the way that regional data are collected or collated and highlighted the need for consistent data frameworks at a variety of scales.

An early regional ISEW-type measure was constructed for Scotland for the years 1984 to 1990 by Ian Moffatt and colleagues at the University of Stirling.[67] Drawing substantially on the first UK ISEW study, the Scottish index followed the original Daly and Cobb method quite closely. Many of the values for Scotland had to be estimated using UK-wide proxies, but the authors were able to scale the index in such a way as to give a useful indication of trends in Scotland over a short period. The results indicated (Figure 10) that during the relatively short period of the study it was already possible to see a divergence of ISEW from GDP, as predicted by most other ISEW studies.

A similar pilot study for Wales, based largely on the 1997 UK ISEW was carried out for the Countryside Council for Wales by Max Munday, Annette Roberts and colleagues at the Cardiff Business School (Appendix 1c).[68] Not surprisingly – given the UK results over this period - the variation between ISEW/cap and GDP/cap in this study was far less than observed over longer (or earlier) periods of time in other studies.

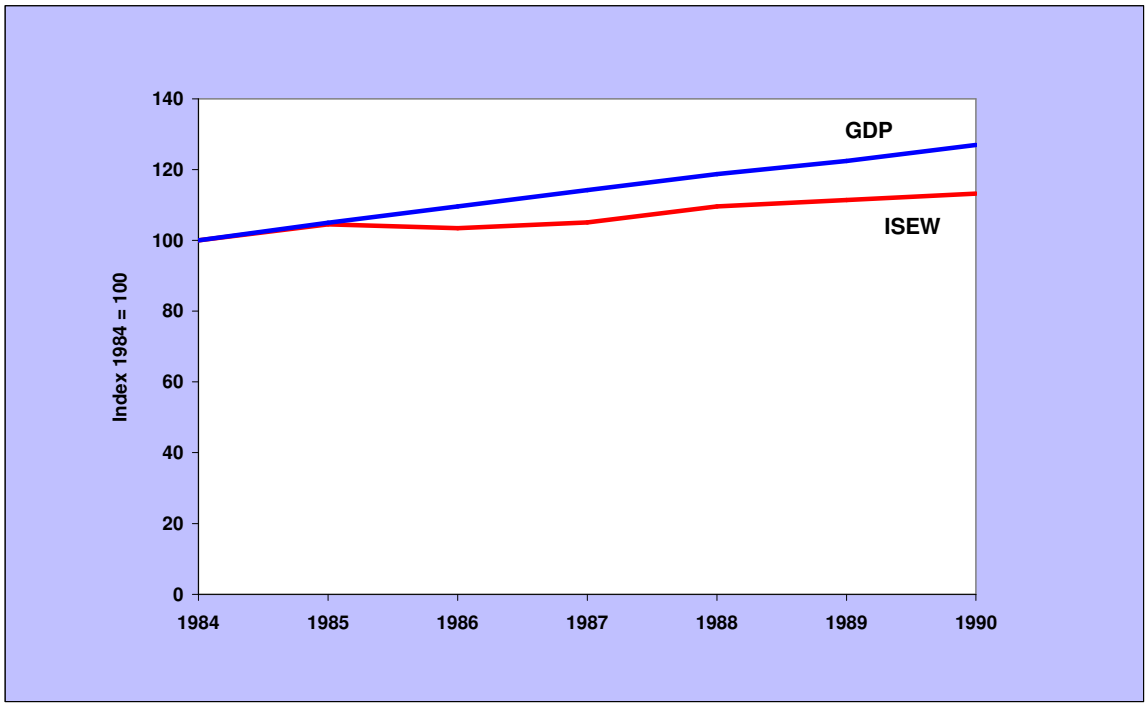

Figure 10: ISEW and GDP per capita in Scotland 1984-1990

[67] Gill, M and I Moffat 1995. Index of Sustainable Economic Welfare for Scotland: a pilot study from 1984 to 1990. Stirling: University of Stirling. See also Hanley, N, I Moffatt, R Faichney and M Wilson 1999. Measuring Sustainability: a time series of alternative indicators for Scotland. *Ecological Economics* 28, 55-73.

[68] Matthews, J, M Munday, A Roberts, A Williams, M Christie and P Midmore 2003. An Index of Sustainable Economic Welfare for Wales: 1990-2000. Cardiff: Cardiff Business School.

Sweden

The Swedish ISEW was developed for the years 1950 to 1992 by Tim Jackson and Susanna Stymne and published in 1996 by the Stockholm Environment Institute.[69] The authors broadly followed the revised Cobb and Cobb methodology throughout.

With respect to the three highlighted factors, the Swedish ISEW made the following choices: 1) the income inequality adjustment was made using the Gini coefficient, although a later version of the Index – published in a paper on intra-generational equity in *Ecological Economics* – illustrated the effect of applying the Atkinson method instead;[70] 2) the costs of climate change were accumulated; 3) depletion costs were calculated using the revised Cobb and Cobb replacement cost method.

By contrast with some other countries, the Swedish ISEW follows GDP much more closely until the early 1980s (Figure 11). It then begins to depart from GDP per capita over the last decade of the study. The reason for the slightly better performance of ISEW over much of the period is interesting. It can be attributed mainly to the fact that the Swedish electricity system has a high proportion of hydro-generation. Fossil fuel consumption, resource depletion costs, and climate change costs are all therefore significantly lower than for the UK (eg). In addition, social policy in Sweden has had a redistributive effect and reduced income inequality.

In spite of these moderating factors, there is a significant variation between GDP and ISEW per capita by the end of the period. GDP per capita in 1992 is 233% of the 1950 level. ISEW per capita is only 193% of the 1950 level.

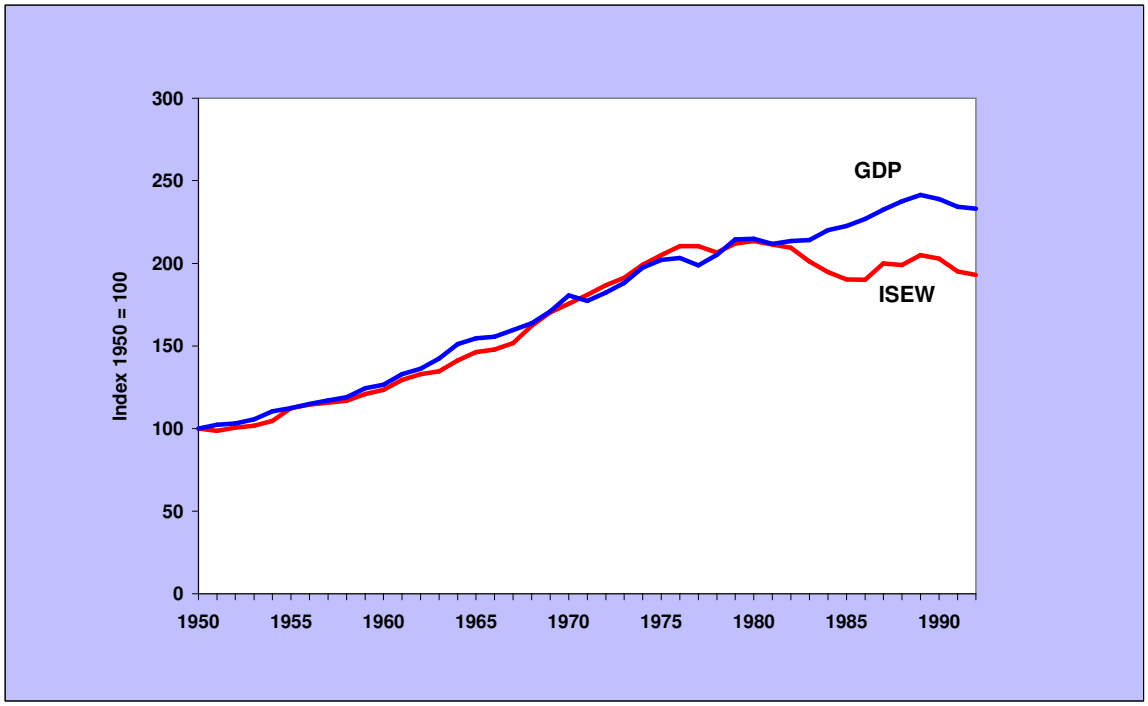

Figure 11: ISEW and GDP per capita in Sweden 1950-1992

69 Jackson, T and S Stymne 1996. Sustainable Economic Welfare in Sweden: a pilot index 1950-1992. Stockholm: Stockholm Environment Institute.

70 Stymne, S and T Jackson 2000.

Thailand

Thailand is only the second developing country to have published an ISEW.[71] The study was carried out by Matthew Clarke at RMIT University and Sardar Islam at Victoria University in Melbourne, Australia. The ISEW is in press in the journal *Ecological Economics*.[72] The study holds a special interest not just because it concerns a developing country, but also because that country saw vigorous growth rates during the 1980s and early 1990s, at least until the economic crisis.

The authors broadly followed the methodology of Daly and Cobb (1989) and Cobb and Cobb (1994). In relation to the three highlighted factors the authors made the following decisions: 1) income inequality was calculated using the Atkinson index as pioneered in the 1997 UK study; 2) carbon emissions were calculated on an annual basis but in contrast to most other studies included emissions from deforestation and rice cultivation as well as fossil fuel consumption; and 3) the index appears not to have accounted for resource depletion.

The authors also included some adjustments quite specific to the Thai case. Specifically, they decided to subtract costs for corruption, commercial sex work and servicing debt.

Even taking into account the crash of 1997/8, by 1999 GDP per capita in Thailand was three times the level it had been in 1975. By contrast (Figure 2) the ISEW per capita rose more slowly overall, reaching only twice the level it had been in 1975 by the end of the period. Like GDP, the ISEW falls sharply on the back of the economic crisis. Perhaps more importantly, it fails to recover in the final year of the index, in spite of economic recovery.

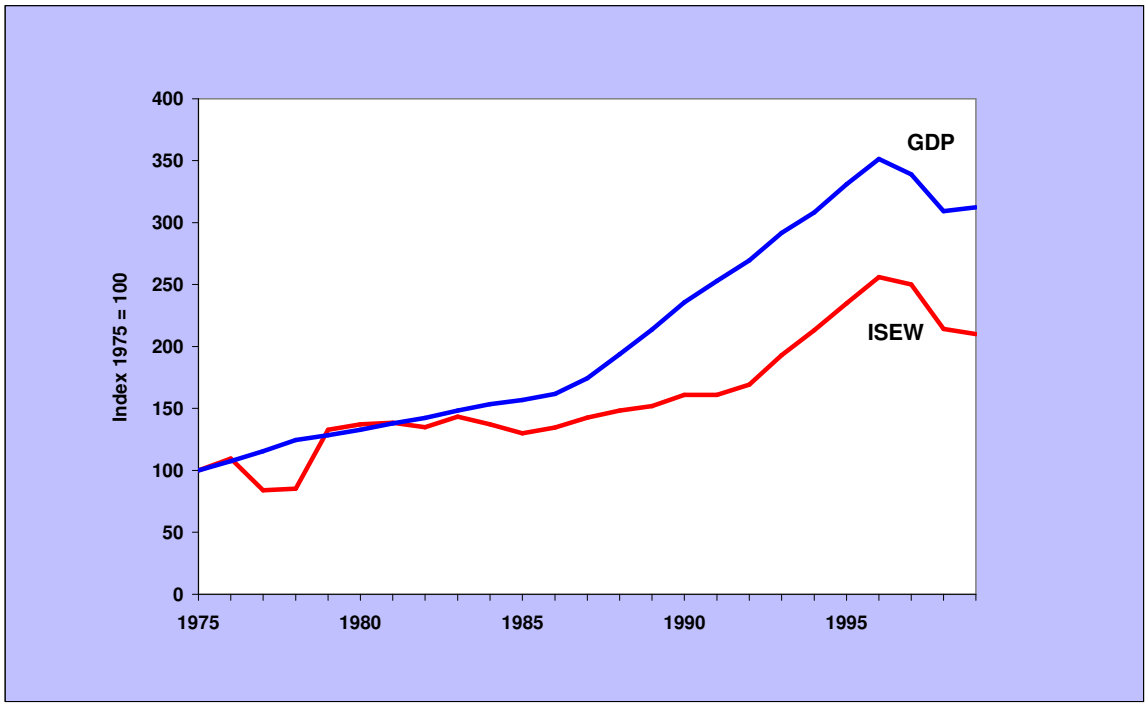

Figure 12: ISEW and GDP per capita in Thailand 1975-1999

[71] An unpublished ISEW also exists for South Korea.

[72] Clarke, M and S Islam 2005. Diminishing and negative welfare returns of economic growth: an index of sustainable economic welfare (ISEW) for Thailand. *Ecological Economics*. In press.

United Kingdom

The United Kingdom was one of the first European countries to develop an ISEW, and on-going work to revise and update the measure has continued at the University of Surrey for over a decade, led by Tim Jackson. The first UK ISEW study was published in 1994 and covered the years 1950 to 1990. A revised and updated ISEW was published in 1997. This later version also provided the basis for web-based interactive tool which allowed users to make their own choices about key parameters in the index. Finally, a 'rebranded' study was published by **nef** in 2004.[73]

The early studies closely follow the ISEW methodology laid down by Cobb and Cobb. In relation to the three highlighted parameters: 1) the 1997 UK study was the first to use the Atkinson index to calculate the welfare losses from income inequality; 2) the UK index has always based its account of long-term environmental damage on the cumulative emissions of greenhouse gases; but the most recent update uses an index that flattens out once the UK target of a 60% reduction over 1990 emissions is met; 3) the most recent UK study follows the replacement cost method proposed by Cobb and Cobb, but uses a lower cost escalator. The UK MDP also includes two new columns (crime and family breakdown) bringing it closer in concept to the GPI.

The UK index typifies the ISEW trends exhibited by many other studies, rising more or less in line with GDP until the mid-1970s and then falling away from the GDP trend-line. In the most recent revision (Figure 13) the MDP displays an interesting 'recovery period' during the 1990s, partly as a result of a decline in some environmental and social costs. In addition, however, the dip between 1976 and 2000 is a stark illustration of changing patterns of investment over the period.

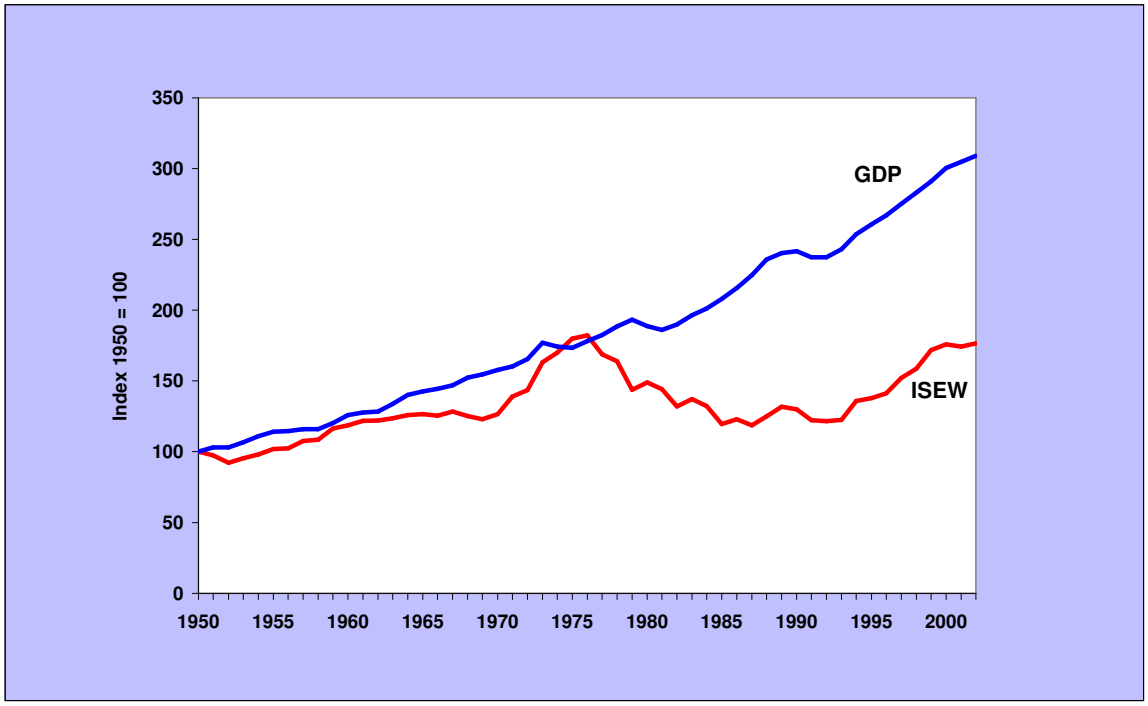

Figure 13: MDP and GDP per capita in the UK 1950-2002

[73] Jackson, T and N Marks 1994. Measuring Sustainable Economic Welfare - a pilot index 1950-1990. London and Stockholm: New Economics Foundation/Stockholm Environment Institute; Jackson, T, N Marks, J Ralls and S Stymne 1997. Sustainable Economic Welfare in the UK 1950 -1996. London: New Economics Foundation. Jackson, T 2004. Chasing Progress? beyond measuring economic growth. London: New Economics Foundation. See also: http://www.foe.org.uk/campaigns/sustainable_development/progress/

USA

Not surprisingly, more ISEW-type studies exist for the USA than for any other country. Pioneered originally for the US by Daly and Cobb, the Index has undergone a series of revisions and additions in recent years. The most recent GPI covering the years from 1950 to 2002 was published in 2004 by Redefining Progress.[74]

This latest version takes the following approaches to the three highlighted issues: 1) personal consumption is weighted for income inequality using the Gini coefficient; 2) costs of climate change are counted cumulatively; 3) depletion of natural resources uses the replacement cost methodology set out initially in Cobb and Cobb 1994. This GPI incorporates accounts for social costs such as crime, divorce and loss of leisure time. It also includes the value of volunteer work. The results of the study (Figure 14) show that GPI/cap rose in line with GDP until the mid-seventies. From the high point in 1976 they then declined steadily until a slight recovery in the late 1990s. Although GDP/cap tripled during the period, GPI/cap increased by only two thirds over the 1950 value by 2002.

In addition to the national GPI, some interesting attempts have been made to construct very localised GPIs in the US. A recent study carried out by Robert Costanza and colleagues in Vermont (Appendix 1c) calculates GPI over a fifty year period at three different regional scales: Vermont State, Chittenden County and the City of Burlington.[75] A one year snapshot GPI has been calculated for the San Francisco Bay Area.[76] Modelled closely, on the US national GPI, these indices tend to echo the growing divergence between GDP and GPI over a period of time. However, the Vermont State GPI remains closer to GDP, partly as a result of a high proportion of non-fossil fuel use in the region.

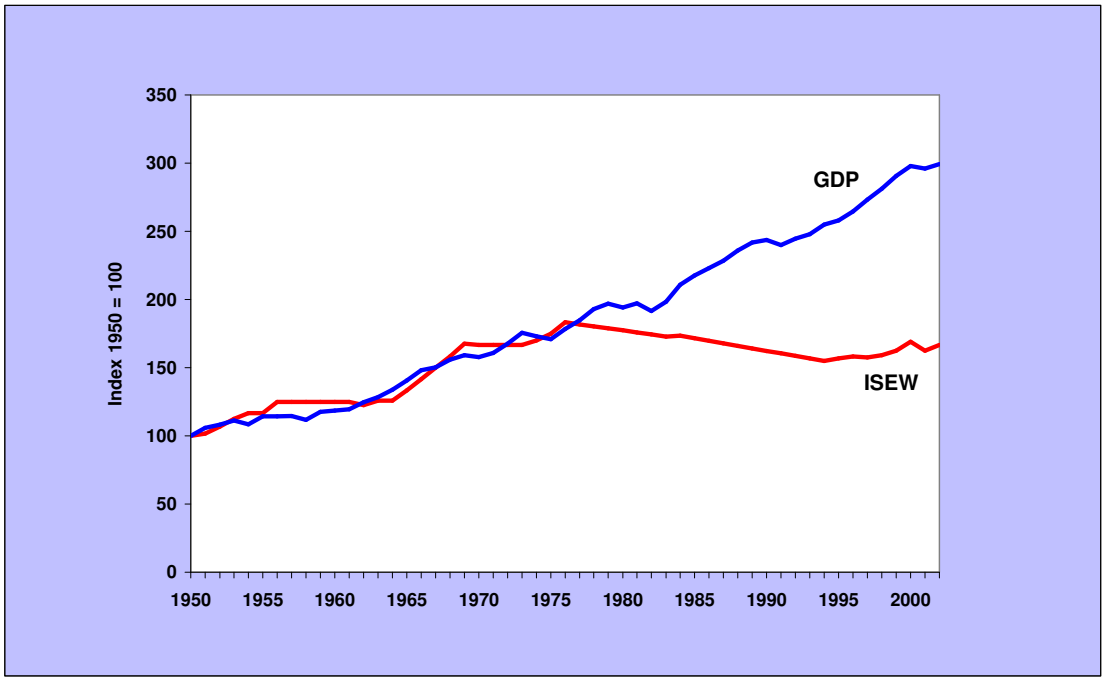

Figure 14: GPI and GDP per capita in the US 1950-2000

74 Venetoulis, J and C Cobb 2004. The Genuine Progress Indicator 1950-2002 (2004 Update). Oakland, California: Redefining Progress.

75 Costanza, R et al 2004. Estimates of the Genuine Progress Indicator (GPI) for Vermont, Chittenden County and Burlington, from 1950 to 2000. Ecological Economics 51, 139-155.

76 See Venetoulis and Cobb 2004 (ref 69).

> '[H]aving detected among people in rich countries a growing feeling that they were part of an overall deteriorating system that affected them both at the personal and collective levels, we were led to propose a 'Threshold Hypothesis' stating that: for every society there seems to be a period in which economic growth (as conventionally measured) brings about an improvement in the quality of life, but only up to a point – the threshold point – beyond which, if there is more economic growth, quality of life may begin to deteriorate.'
>
> Manfred Max-Neef 1995.[77]

5. Discussion

The previous section has summarised briefly the results of the twenty or so ISEW-type studies that have been carried out to date covering around fifteen countries or regions. Several other similar studies are in progress. A pilot ISEW is in the process of being constructed for Greece and is being considered for Switzerland. Several regional studies are also under consideration. Only 6 European States have so far attempted to construct national ISEW studies.[78]

There are significant differences between some of these studies. Although most EU studies are based relatively closely on the original Daly and Cobb ISEW and later revisions of it, there is no overall consensus on methodology. Different studies have adopted different decisions regarding key parameters – even within the broad framework set out by the original US study. Some studies have omitted key columns (or adjusted the methodology) simply because of lack of data. With the exception of the UK – which was updated very recently – none of the EU studies have looked beyond 1992.

This means not only that recent trends in green GDP across Europe are difficult to summarise, but also that the more recent revisions associated with the GPI have not yet been incorporated into EU measures. The costs of crime, divorce, loss of leisure time and so on remain unaccounted for. Taken together however, the experience from these EU studies and those carried out in non-EU countries already provides an interesting evidence base from which to consider the feasibility of developing green GDP type measures in the EU.

In spite of many differences, there are clearly some marked similarities between these country studies. In particular, many of them show evidence of a progressive divergence between GDP and GPI over the last few decades. In many of the studies the adjusted indices appear to have grown more or less in line with GDP until about the mid-1970s or early 1980s. After that point, however, the adjusted measures – particularly those carried out in more developed countries – tend to stabilise or decline, in spite of continued growth in GDP.

The reasons for this divergence are complex and differ slightly from country to country. Amongst the principal factors in the UK, for example, are an increasing inequality in the distribution of incomes over the later years of the study, and the steady accumulation of 'ecological debts' from resource depletion and long-term environmental damage. Some more conventional economic factors such as patterns

---

[77] Max Neef, M. 1995. Economic growth and quality of life - a threshold hypothesis, *Ecological Economics* 15, 117.

[78] Actually, an attempt was made to construct an index for Denmark, but the author concluded that it was not possible.

of net capital growth over time also play some role in the final shape of the adjusted index.

Taken together with the studies in subjective well-being (Figures 1 and 2 in Section 2), this evidence appears to confirm the phenomenon which Chilean economist Manfred Max-Neef has called the 'threshold hypothesis' (see the quotation at the beginning of this section), namely: that economic growth ensures increasing welfare only up to a certain threshold of per capita income. Beyond that threshold, we appear to see a stabilisation or decline in welfare as the growing costs of increased growth outweigh the advantages.

If this hypothesis is even partially correct, then it clearly poses some important challenges for conventional economic and social policy. In particular, it goes directly against the received wisdom that economic growth inevitably leads to improved well-being, and raises some serious doubts about the assumption that the best way of improving and maintaining quality of life is to pursue policies that will raise the nation's GDP.

Inevitably, this view (and the debate over the development of green GDPs more generally) has been subject to some quite robust criticisms. Broadly speaking these criticisms have been of three main kinds.[79]

In the first place, it has been argued, the green GDP type measures lack a robust theoretical foundation and are construed inconsistently in the literature – sometimes as an extension of Hicksian concepts of income, sometimes as an extension of the Fisherian notion of welfare, for example. As a result, it is claimed, proponents introduce elements into the index in an 'ad hoc' manner and fail to provide a coherent justification for the simultaneous inclusion of different flow and stock elements.

Partly as a result of this alleged confusion, it is claimed (and this is the second main area of criticism), there is a degree of selectiveness in deciding which factors should or should not be included in the index. Some critics have argued, for example, that the ISEW fails to take an adequate account of changes in human capital, which if included might radically change the shape of the index – and indeed swamp many of the other factors. Some have pointed to the absence of accounting (in the earlier indices) for changes in leisure time or for increases in life expectancy.

Thirdly, specific criticisms have been levelled against individual methodologies employed in evaluating different environmental and social components of the index. Some of these criticisms can be (and have been) addressed in revisions of the index. However, some of these criticisms have been concerned with the inherent uncertainties involved in monetarising or identifying shadow prices for environmental and social goods. Critics have claimed that this inherent variablity means that the results of the exercise are inevitably arbitrary and that drawing robust lessons is therefore impossible.

---

[79] For summaries of some of these criticisms see (eg) Neumayer, E 2000. On the methodology of ISEW, GPI and related measures: some constructive comments and some doubt on the threshold hypothesis, *Ecological Economics*, 34 (3), pp347-361. Offer, Avner 2003. Economic Welfare Measurements and Human Well-being. Chapter 12 in David, P and M Thomas (eds) *The Economic Future in Historical Perspective*. Oxford: Oxford University Press. See also contributions to Cobb and Cobb 1994.

A variety of responses can be (and have been) made to these criticisms. For example, later revisions of the ISEW explicitly responded to the criticisms over income inequality by using the Atkinson index to measure this effect. The charge of selectivity is more difficult to counter. Up to a point it is true, as we have explicitly demonstrated in the studies reviewed in Section 4. There is no clear consensus on what should be included in such indices and individual studies sometimes make purely prudential choices – based on the availability of data. The charge of not having an entirely consistent conceptual framework also carries some weight.

On the other hand, one thing is very clear: there is at the moment no coherent framework for measuring progress at all. The GDP itself is essentially a well-reinforced convention about the measurement of certain traded goods and services. But it does not account consistently for stocks and flows either. It is patently flawed as a measure of economic welfare, and it fails to account for real changes in important parameters which have a profound effect on present and future well-being. Though they may ultimately be flawed as measures of sustainable well-being, the green GDP type measures are all fairly robust as a critique of the conventional SNA. GDP does not allow us to measure progress.

Improving on the consistency and composition of the ISEW and similar measures probably requires building the kind of international effort that characterised the early development of the SNA. GDP is ultimately a social construct – based on an agreed set of accounts – developed at a time when the most important policy question was to decide how much of a country's industrial output could be directed at the war effort.

Today we are faced with more complex policy choices. To address these we require a more sophisticated and a more comprehensive accounting framework. Developing this will require consensus. But this is not to suggest that there is no justification for such an exercise. On the contrary, the individual features incorporated into the such indices all have strong economic justifications. The methodologies are all based in economic theory and many of them can be improved on systematically, given the appropriate allocation of resources. In particular, it is clear that better, more consistent and properly structured databases can improve some at least of the inconsistencies that currently dog the green GDP.

Arguably the most problematic issue to face is the whole question of monetarising different aspects of welfare. This task is clearly fraught with danger. Imputing shadow costs on the basis of contingent valuation methods, hedonic pricing or willingness to pay techniques, or estimating future damage costs in the face of uncertain environmental risks: all these things are inherently difficult.

Getting beyond such intractability will not be easy. But not impossible. It is relatively clear, for example, that the precise value of any individual component of the index relies on a range of different assumptions about very specific parameters. Perhaps the best way to proceed is to develop consensus over a clear methodological framework, in which each critical assumption is identified and can be modified as new information (and better 'guestimates') emerge.

Some of these values will never be precisely knowable. Nonetheless, they can quite legitimately become the object of a collective or inter-subjective value judgement. Developing the mechanism for articulating such value judgements and incorporating

them into decision frameworks may be a useful step in the development of the green GDP.[80]

Finally then, it is worth asking the question: to what extent is it useful or feasible to think in terms of developing a pan-European ISEW-type index; and what might such a study show us?

What is clear from the evidence reviewed is that existing individual EU country studies are characterised by so much variability that direct inter-country comparison is useless. It is even questionable whether these studies can give us any overall indication of 'genuine progress' in Europe. Nonetheless, the overall tendency for adjusted measures to show divergence from GDP in the later years of the study, and strong evidence of the same trend in individual EU states prompts the question: what is the overall or average trend in the six EU states examined so far?

Figure 15 answers this question. Since only one national study ventures into the mid or late 1990s, the time period here has been restricted – for illustrative purposes – to the forty two years between 1950 and 1992. Over that period, we see a clear echo of the trend outlined earlier. ISEW/cap follows GDP/cap closely until around 1980. At that point, it begins to diverge quite sharply from the upward trend in GDP. Although economic growth begins to recover after the 1991 recession, ISEW appears to maintain a downward trend in the final years of the study.

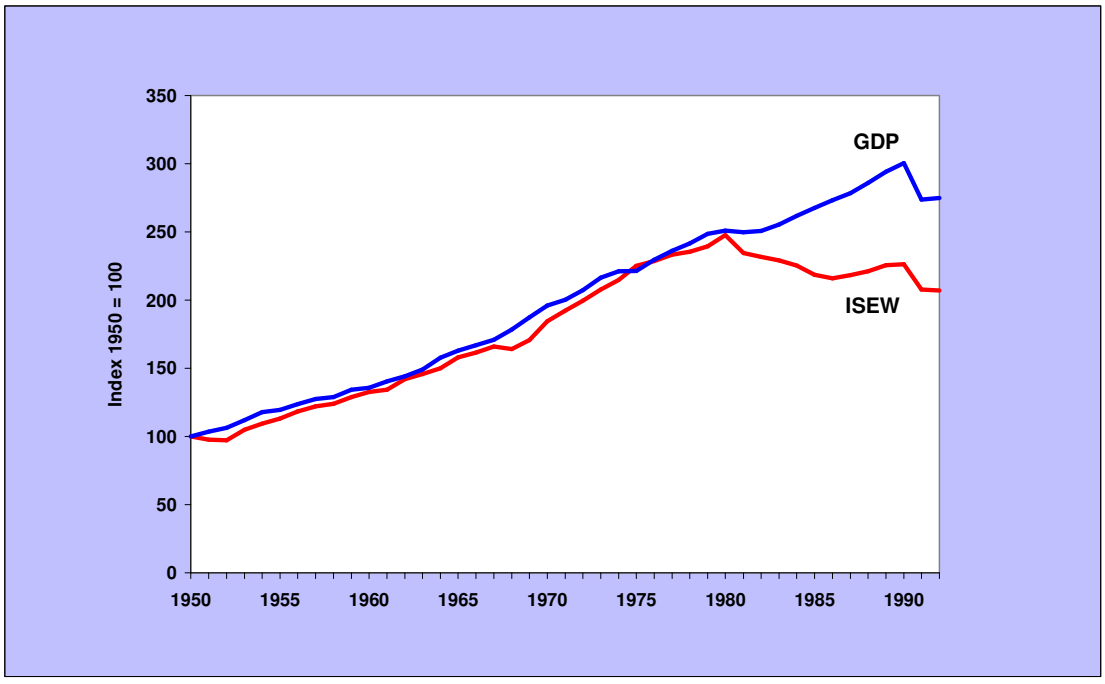

Figure 15: Illustrative Average ISEW and GDP/cap for EU 6 1950-1992

[80] This approach has been followed for example in one of the earlier revisions of the UK ISEW, which was posted on the Friends of the Earth website, and allowed users to select specific values for individual paramters on the basis of information about the range of possible values and the relevance of the choice. The website not only reports the 'original' ISEW constructed by the study authors, but also compiles an 'average' ISEW from all the responses entered online. See ref 72 for more details.

Obviously, this result can be regarded at best as an illustration, based on an incomplete set of sometimes inconsistent studies. Realistically, it cannot provide the basis for a more reliable pan-European GPI. Moreover, it is arguable whether collecting the results of laissez-faire individualist approaches to measuring green GDP will ever offer anything better than this.

More promising would be to set out a European framework for collecting and collating the data sets relevant to this task, and begin to build the capacity to construct an EU GPI which is consistent between nations and can be reported either as a Europe-wide index or as individual national accounts.

For the moment, the challenge of approaching this task is formidable – even in terms of providing consistent, time-series data sets. A good start might be to develop a streamlined version of the GPI including some of the most influential factors, such as unpaid labour, income inequality, resource depletion and long-term environmental damage costs. A first attempt at such a streamlined EU-wide index could be built on World Bank and Eurostat time-series statistics on energy use, time use and income.

Increasingly, as States begin to implement the UN SEEA, a variety of satellite accounts providing some of the wider underlying data needs is beginning to emerge. From here, it would be a relatively short step to building a user-interactive, modifiable indicator which allows us to select values for individual parameters and interrogate better the relationship between income growth and long-term human well-being.

One thing is clear: without such a prospect we are no closer to measuring 'overall progress' towards sustainable development than we were a decade ago. Nor, more importantly, are we in any position to understand whether our continuing commitment to economic growth is or is not taking us in the right direction.

6. Appendix 1: ISEW Analysis Matrices

Appendix 1a: Australia, Austria, Chile, Germany, Italy, Netherlands
Appendix 1b: Scotland (UK), Sweden, Thailand, UK
Appendix 1c: USA, Vermont/Burlington (USA), Wales (UK)

Appendix 1a: ISEW Analysis Matrix for Australia, Austria, Chile, Germany, Italy, the Netherlands

Country/region	**Australia**	**Austria**	**Chile**	**Germany**	**Italy**	**Netherlands**
Study	Hamilton (1997), *The Genuine Progress Indicator: A new index of well-being in Australia*	Stockhammer et al (1995), *The ISEW as an alternative to GDP in measuring economic welfare*	Castañeda (1999), *An index of sustainable welfare for Chile*	Diefenbacher (1995), *The Index of Sustainable Welfare: A case study of the Federal Republic of Germany*	Guenno & Tiezzi (1998), *The Index of Sustainable Economic Welfare (ISEW) for Italy*	Instituut voor Milieu en Systeemanalyse (IMSA) (1995), *A pilot ISEW for the Netherlands*
Description	Based on Daly & Cobb's ISEW and Redefining Progress' GPI, but prefers the GPI nomenclature	ISEW based on Daly & Cobb, revised for consistency and clarity	ISEW following Cobb & Cobb's revision of Daly & Cobb's 1989 ISEW	ISEW following Daly & Cobb	ISEW based on Daly & Cobb (1989) with some changes to construction of variables.	ISEW following Daly & Cobb, etc.
Methodology	Adjust personal consumption for income inequality, factor in welfare variables.	Household consumption base, subtract welfare costs, *then* adjust for income distribution	Follows the standard ISEW path, omitting some columns due to lack of data; adds 2 new ones	Adjust personal consumption for income inequality, factor in welfare variables.	Adjust consumption, for income inequality, factor in 21 welfare index variables; 14 are "market" variables, i.e. value can be inferred from market values; 7 are environmental variables to be estimated.	Adjust personal consumption for income inequality, factor in welfare variables.

Appendix 1a (cont): Australia, Austria, Chile, Germany, Italy. Netherlands

	Item	Australia	Austria	Chile	Germany	Italy	Netherlands
Economic indicators	Consumer expenditure	Y	Y	Y	Y	Y - total household consumption (SNA)	Y
	Domestic labour	Y	Y	Y	Y	Y	N – domestic labour is calculated but omitted due to controversy over its use and definition
	Public exp on health / educ	Y – 50% of health is defensive. Education is an investment in human capital, thus only the returns should be counted. But this index does count human or social capital, so education is excluded	Y – *All* public consumption is counted	Y	Y	Y – add 100% of public spending on education, but only 50% of health (consider 50% as defensive)	Y – defined as "welfare derived from current govt expenditure". Tax / public spending are high; assume at least some of it is welfare-inducing; count 100% education exp. as approximation.
	Net flows on consumer durables	N	Y	Y	Y	Y – including cars	N – referred to, but not included due to insufficient data
	Net capital growth	Y	Y	Y	Y	Y	N – referred to, but not included due to insufficient data
	Net internat, position	Y	Y	N – lack of data	Y	Y	N – referred to, but not included due to insufficient data
	Other	Non-defensive spending: 25% of defence, public order; 50% transport & comms; 50% general govt services; 100% recreation & culture Services from public infrastructure (7%). Volunteer work; leisure time	Consumption base includes public consumption (assumes welfare benefits = cost of production) Services from public infrastructure (roads)		50% of public expenditure on streets and highways	Current public expenditure on streets and highways	

Appendix 1a (cont): Australia, Austria, Chile, Germany, Italy, Netherlands

	Item	Australia	Austria	Chile	Germany	Italy	Netherlands
Social costs	Income inequality	Y	Y – but applied *after* subtraction items, not before.	Y	Y – but lacking data for a Gini co-efficient, Diefenbacher constructs an index using the ratio of wage-earnings to national income	Y - a mean of three indices derived by the method suggested by Cobb & Cobb (1994) – though limitations of this are recognised and a Kolm-Atkinson index proposed for future versions.	Y
	Defensive private exp. on health / educ.	Y	Y – 50% of health expenditure deemed defensive	Y	Y	Y	N
	Commuting	Y	Y	Y	Y	Y – based on Daly & Cobb, varying proportion of travel due to work (65% in Italy); also includes maintenance costs (public exp. on transport services)	Y
	Accidents	Y – including industrial accidents	Y	Y	Y	Y	Y
	Noise	Y	Y	N	Y	Y	Y
	Crime	Y	N	Y	N	N	N
	Family breakdown	N	N	N	N	N	N
	Other	Underemployment and overwork (working additional hours involuntarily).	Defensive advertising – 50% of advertising spending is deemed necessary just to keep up with competitors		50% of advertising spending is counted – assuming the other 50% has no informational value to consumers (after Zolotas, 1981) Urbanisation – increased housing costs counted from 1965 onwards	Urbanisation – subtract the increase in consumer expenditure due to rising housing costs.	Underemployment (working <12 hrs per week)

Appendix 1a (cont): Australia, Austria, Chile, Germany, Italy, Netherlands

	Item	Australia	Austria	Chile	Germany	Italy	Netherlands
Environmental costs	Personal pollution control	N	N	N	N	N	N
	Air pollution	Y	Y	Y	Y	Y	Y
	Water pollution	Y – also estimates cost of irrigation as opportunity cost of environmental flows	Y	Y	Y – includes loss of fish stocks	Y	Y
	Climate change	Y – based on carbon consumption	Y	Y	Y – see below	Y – see below	Y – based on carbon consumption
	Ozone depletion	Y – based on CFC consumption	N	N	Y – this and climate change considered together as "long term environmental damage", linked to consumption of fossil fuels.	Y – this and climate change considered together as "long term environmental damage", linked to consumption of fossil fuels.	Y – based on CFC consumption

Appendix 1a (cont): Australia, Austria, Chile, Germany, Italy, Netherlands

	Item	Australia	Austria	Chile	Germany	Italy	Netherlands
Prudent use of natural resources	Loss of natural habitats	Y – native forests	Y – especially wetlands	N – but see "Other" below on deforestation	Y – wetlands, see below	Y - wetlands	Y – see below
	Loss of farmland	N	Y – but only in terms of loss of soil productivity, not urbanisation	Y – urbanisation and soil erosion	Y – this and wetlands are considered together under "soil degradation"	Y – urbanisation and soil erosion	Y – urbanisation and the item above come under "land use changes". Soil pollution marked as serious issue for the Netherlands, but not included due to insufficient data
	Resource depletion	Y – costs of shifting from oil & gas to renewables. Also includes land degradation, including soil erosion etc., measured by foregone output.	Y – mineral resources	Y - replacement value of energy consumed (oil equivalents)	Y - replacement value of energy consumed (oil equivalents)	Y – using: $R - X = R\{\frac{1}{(1+r)^{n+1}}\}$ where : X = annual rent R = total returns net of extraction costs r = discount rate n = no. of periods to resource exhaustion.	Y
				Depletion of renewable resources (replacement cost of wood fuel energy in areas of deforestation). This is added to supplement the hotelling rent (inappropriate for subsistence communities)			

Appendix 1b: ISEW Analysis Matrix for Scotland (UK), Sweden, Thailand, UK

Country/region	**Scotland**	**Sweden**	**Thailand**	**UK (1994)**	**UK (1997)**	**UK MDP**
Study	Gill & Moffat (1995), *Index of Sustainable Economic Welfare for Scotland: A Pilot Study from 1984-1990*	Jackson & Stymne (1996), *Sustainable Economic Welfare in Sweden: A Pilot Index 1950-1992*	Clarke & Islam (2004), *Diminishing and negative welfare returns of economic growth: an index of sustainable economic welfare (ISEW) for Thailand*	Jackson & Marks (1994), *Measuring Sustainable Economic Welfare: A Pilot Index 1950-1990*	Jackson et al (1997), *Sustainable economic welfare in the UK 1950-1996*	new economics foundation (2004), *Chasing Progress: Beyond measuring economic growth*
Description	ISEW following Daly & Cobb, etc.	ISEW following Daly & Cobb	ISEW following Daly & Cobb with adjustments including sex work, debt servicing, corruption.	ISEW based on Daly & Cobb, with some methodological updates.	ISEW based on the 1994 version, with some revisions.	Based on earlier UK ISEWs, but include new social costs
Methodology	Adjust personal consumption for income inequality, factor in welfare variables.	Adjust personal consumption for income inequality, factor in welfare variables.	Adjust personal consumption for income inequality, factor in welfare variables.	Adjust personal consumption for income inequality, factor in welfare variables.	Adjust personal consumption for income inequality (using Atkinson index rather than Gini co-efficient), factor in welfare variables, including climate change and ozone depletion (based on consumption rather than production).	Adjust personal consumption for income inequality, factor in welfare variables, including crime and family breakdown.

Appendix 1b (cont): Scotland, Sweden, Thailand, UK

	Item	Scotland	Sweden	Thailand	UK (1994)	UK (1997)	UK MDP
Economic indicators	Consumer expenditure	Y	Y	Y	Y	Y	Y
	Domestic labour	Y	Y	N	Y	Y	Y
	Public exp. on health / educ.	Y	Y - 50% of each	Y – 75% of both due to low base	Y	Y – 50% of each (the other 50% of health is defensive; the other 50% of education is pure consumption	Y
	Net flows on consumer durables	? – unclear from data available	Y	Y – 10% of expenditure	Y	Y	Y
	Net capital growth	? – unclear from data available	Y	N	Y	Y	Y
	Net internat, position	? – unclear from data available	Y	N	Y	Y	Y
				50% of national debt servicing; 50% public expenditure on roads			

Appendix 1b (cont): Scotland, Sweden, Thailand, UK

	Item	Scotland	Sweden	Thailand	UK (1994)	UK ISEW (1996)	UK MDP
Social costs	Income inequality	Y	Y – using an index derived from the Gini co-efficient	Y	Y	Y – using Atkinson index	Y
	Defensive private exp. on health / educ.	Y	Y - 50% of each (though study notes this is insignificant, as most such costs are public)	Y – health, but not education	Y	Y – 50% of each, as above	Y
	Commuting	? – unclear from data available	Y	Y	Y	Y	Y
	Accidents	Y	Y	N	Y	Y	Y
	Noise	? – unclear from data available	Y	Y	Y	Y	Y
	Crime	? – unclear from data available	N	Y – but only in the context of corruption	N	N	Y
	Family breakdown	? – unclear from data available	N	N	N	N	Y
	Other			Sex work (3% GNP subtracted as cost to spiritual system)			

Appendix 1b (cont): Scotland, Sweden, Thailand, UK (1994, 1996, 2004)

	Item	Scotland	Sweden	Thailand	UK (1994)	UK ISEW (1996)	UK MDP
Environmental costs	Personal pollution control	Y	Y	Y – access to clean water and air comes under the heading "urbanisation"	Y	Y	Y
	Air pollution	? – unclear from data available	Y	Y	Y	Y	Y
	Water pollution	? – unclear from data available	Y	Y	Y	Y	Y
	Climate change	? – unclear from data available	Y – under the hading of "long term environmental damage", based on carbon consumption	Y	Y – based on carbon consumption	Y – based on carbon consumption	Y
	Ozone depletion	? – unclear from data available	Y – based on CFC consumption	N	Y– based on CFC consumption	Y – based on CFC consumption	Y
	Other						
Prudent use of natural resources	Loss of natural habitats	? – unclear from data available	Y - wetlands	Y – deforestation	Y – various uncultivated habitats, incl. heath and moor	Y – various uncultivated habitats, incl. heath and moor	Y
	Loss of farmland	Y	Y – due to urbanisation and soil degradation	N	Y – including loss of land due to urbanisation and degradation of soil quality	Y – including loss of land due to urbanisation and degradation of soil quality	Y
	Resource depletion	? – unclear from data available	Y - replacement value of energy consumed (oil equivalents)	Y – but only in the context of deforestation, already counted above	Y – replacement value of energy consumed (oil equivalents)	Y – replacement value of energy consumed (oil equivalents)	Y

Appendix 1c: ISEW Analysis Matrix for USA, Vermont/Burlington (USA), Wales

Country/region	**USA (1994)**	**USA (1998)**	**USA (1999, 2000, 2004)**	**Vermont/Burlington (USA)**	**Wales**
Study	Cobb & Cobb (1994), *The Green National Product*	Anielski & Rowe (1998), *The Genuine Progress Indicator – 1998 update*	Anielski & Rowe (1999), *Why Bigger isn't Better: The Genuine Progress Indicator – 1999 update.* Cobb et al (2001), *The Genuine Progress Indicator – 2000 update.* Cobb & Venetoulis (2004), *The Genuine Progress Indicator1950-2002 (2004 Update).*	Costanza et al (2004), *Estimates of the Genuine Progress Indicator for Vermont, Chittenden County and Burlington, from 1950 - 2000*	Matthews et al (2003), *An Index of Sustainable Economic Welfare for Wales: 1990-2000*
Description	Adaptation of Daly & Cobb's ISEW to produce the GPI as used by Redefining Progress	GPI as developed by Cobb & Cobb; similar to ISEW.	As for USA GPI 1998.	GPI following Redefining Progress	ISEW based on Jackson & Marks 1994
Methodology	Adjust personal consumption for inequality (Gini co-efficient), factor in welfare variables	Adjust personal consumption for inequality (Gini co-efficient), factor in welfare variables	All three studies follow the 1998 GPI methodology.	Personal consumption weighted for income distribution, with welfare variables factored in.	Adjust personal consumption for income inequality, factor in welfare variables.

Appendix 1c (cont): USA, Vermont/Burlington (USA), Wales

	Item	USA (1994)	USA (1998)	USA (1999, 2000, 2004)	Vermont/Burlington (USA)	Wales
Economic indicators	Consumer expenditure	Y	Y	Y	Y	Y
	Domestic labour	Y	Y	Y	Y	Y
	Public exp on health / educ	N	N	N	N	Y – 50% of health is defensive, 50% of higher education is consumption
	Net flows on consumer durables	Y	Y	Y	Y	Y
	Net capital growth	Y	Y	Y	Y	Y
	Net internat, position	Y	Y	Y	N – omitted due to difficulty of collecting accurate data below national level	N
	Other	Services from streets & highways; volunteer work	Services from streets & highways (7.5% of stock); volunteer work	Services from streets & highways; volunteer work	Services of streets and highways; volunteer work	

Appendix 1c (cont): USA, Vermont/Burlington (USA), Wales

	Item	USA (1994)	USA (1998)	USA (1999, 2000, 2004)	Vermont/Burlington (USA)	Wales
Social costs	Income inequality	Y – index of change in share of income received by bottom quintile	Y – now using the Gini co-efficient	Y – using Gini co-efficient	Y	Y
	Defensive private exp. on health / educ.	N	N	N	N	Y
	Commuting	Y	Y	Y	Y	Y
	Accidents	Y	Y	Y	Y	Y
	Noise	Y	Y	Y	Y	Y
	Crime	Y	Y	Y	Y	N
	Family breakdown	Y	Y	Y	Y	N
	Other	Loss of leisure time Underemployment	Loss of leisure time Underemployment	Loss of leisure time Underemployment	Underemployment Loss of leisure time	

Appendix 1c (cont): USA, Vermont/Burlington (USA), Wales

	Item	USA (1994)	USA (1998)	USA (1999, 2000, 2004)	Vermont/Burlington (USA)	Wales
Environmental costs	Personal pollution control	Y	Y	Y	Y	Y
	Air pollution	Y	Y	Y	Y	Y
	Water pollution	Y	Y	Y	Y	Y
	Climate change	Y – included in "long term environmental damage", along with radioactive waste management	Y – included in "long term environmental damage", along with radioactive waste management	Y – included in "long term environmental damage", along with radioactive waste management	Y – based on energy consumption	Y – based on GHG emissions
	Ozone depletion	Y – based on CFC production	Y – based on CFC production	Y – based on CFC production	Y – based on CFC consumption	Y
Prudent use of natural resources	Loss of natural habitats	Y – wetlands and old-growth forests	Y – wetlands and old-growth forests	Y – wetlands and old-growth forests	Y – wetlands and forest cover	Y – various uncultivated habitats (heath, bog, woodland, montane, etc)
	Loss of farmland	Y – by urbanisation and soil degradation	Y – by urbanisation and soil degradation	Y – by urbanisation and soil degradation	Y – urbanisation only; soil degradation not included	Y – by urbanisation and soil degradation
	Resource depletion	Y – cost of replacing non-renewable energy consumed with renewable (eg gasohol from biomass)	Y – cost of replacing non-renewable energy consumed with renewable (eg gasohol from biomass)	Y – cost of replacing non-renewable energy consumed with renewable (eg gasohol from biomass)	Y	Y – replacement value of energy consumed (oil equivalents)

7. References

Atkinson, A 1983. *The Economics of Inequality*, 2nd edition (reprint 1995), Oxford University Press, Oxford.

Atkinson, G 1995. Measuring Sustainable Economic Welfare: a critique of the UK ISEW, CSERGE working paper GEC95-08, University College, LONDON.

Bolt, K, M Matete and M Clemens 2002. Manual for Calculating Adjusted Net Savings, Washington DC: World Bank.

de Boton, A 2004. Status Anxiety. Oxford: OUP

Castaneda, B 1999. An Index of Sustainable Economic Welfare for Chile, *Ecological Economics*, vol 28(2), 231-244.

Christie, I and K Warpole 2001. Quality of Life. Chapter 6 in *Transforming Britain*, A.Harvey (ed), Fabian Society, London.

Clarke, M and S Islam 2005. Diminishing and negative welfare returns of economic growth: an index of sustainable economic welfare (ISEW) for Thailand. *Ecological Economics*. In press.

Cobb, C and J Cobb 1994. *The Green National Product*, University of Americas Press, Lanham, Md.

Cobb, C, E Halstead and J Rowe 1995. The Genuine Progress Indicator – summary of data and methodology. Washington, DC: Redefining Progress.

Costanza, R et al 2004. Estimates of the Genuine Progress Indicator (GPI) for Vermont, Chittenden County and Burlington, from 1950 to 2000. Ecological Economics 51, 139-155.

Csikszentmihalyi, M 2000. The Costs and Benefits of Consuming. Journal of Consumer Research 27, 267-272.

Dalton, H 1920. The measurement of the inequality of incomes, *Economic Journal*, vol 30, pp348-361.

Daly, H 1996. Beyond Growth – the economics of sustainable development. Boston: Beacon Press.

Daly, H and J Cobb 1989. *For the Common Good – redirecting the economy towards community, environment and sustainable development*. Boston: Beacon Press.

Desai, M 1991. Human Development: concepts and measurement. *European Economic Review* 35, 350-357.

DEFRA 2005. *Securing the Future – Delivering UK Sustainable Development Strategy*. London: HMSO.

DETR 1999a. A Better Quality of Life: the UK Sustainable Development Strategy, Department for the Environment, Transport and the Regions, London.

DETR 1999b Quality of Life Counts: indicators for sustainable development, Department for the Environment Transport and the Regions, London.

Diefenbacher, H 1994. The index of sustainable economic welfare in Germany. In Cobb and Cobb (1994).

Diener, E and M Seligman 2004. Beyond Money: toward an economy of well-being. *Psychological Science in the Public Interest* 5(1).

El Serafy, S 1989. The proper calculation of income from depletable natural resources. In Ahmad, Y, S El Serafy and E Lutz (eds). Environmental Accounting for Sustainable Development. Washington, DC: World Bank, 10-18.

Eisner, R 1978. Total Incomes in the United States 1959 and 1969. *Review of Income and Wealth* 21(2), 153-181.

Eisner, R 1989. The Total Incomes System of Accounts. Chicago: Chicago University Press.

Estes, R 1988. *Trends in World Social Development: the social progress of nations 1970-1987*. New York: Praeger.

Economist 2004. 'The Economist Intelligence Unit's quality of life index', Economist Online, December 2004: http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf.
Fisher, I 1906. Nature of Capital and Income. New York: A. M. Kelly.
Gill, M and I Moffat 1995. Index of Sustainable Economic Welfare for Scotland: a pilot study from 1984 to 1990. Stirling: University of Stirling.
Guenno, G and S Tiezzi 1998. The Index of Sustainable Economic Welfare (ISEW) for Italy. Nota di Lavoro 5.98. Trieste, Italy: Fondazione ENI Enrico Mattei.
Hamilton, C. 1999. The Genuine Progress Indicator: methodological developments and results from Australia. *Ecological Economics*, vol 30(1), pp13-28.
Hamilton, C and H Saddler 1997. The Genuine Progress Indicator: a new index of changes in well-being in Australia. Discussion paper 14. Canberra: The Australia Institute.
Hamilton, K 1994. Green Adjustments to GDP. *Resources Policy* 20(3): 155-168.
Hanley, N, I Moffatt, R Faichney and M Wilson 1999. Measuring Sustainability: a time series of alternative indicators for Scotland. *Ecological Economics* 28, 55-73.
Harrison, A 1989. Introducing Natural Capital the the System of National Accounts, Chapter 4 in Y J Ahmad, S El Serafy and E Lutz (eds), *Environmental Accounting for Sustainable Development*, World Bank, Washington, DC.
Hicks, J 1939. *Value and Capital*, Oxford University Press, Oxford and New York.
Hotelling, H 1931. *The Economics of Natural Resource Use.* New York: Harper and Row.
Jackson, T 2005. Motivating Sustainable Consumption: a review of evidence on consumer behaviour and behavioural change. A report to the Sustainable Development Research Network. London: Policy Studies Institute.
Jackson, T 2004. Chasing Progress – beyond measuring economic growth. London: New Economics Foundation.
Jackson, T, N Marks, J Ralls and S Stymne 1997. *Sustainable Economic Welfare in the UK: 1950-1996*, Centre for Environmental Strategy/New Economics Foundation, London.
Jackson, T and N Marks 1994. *Measuring Sustainable Economic Welfare, a pilot index 1950-1990*, Stockholm Environment Institute/New Economics Foundation, Stockholm.
Jackson, T and N Marks 1999. Consumption, Sustainable Welfare and Human Needs – with reference to UK expenditure patterns between 1954 and 1994, *Ecological Economics*, vol 28, pp421-441.
Jackson, T, and S Stymne 1996. *Sustainable Economic Welfare in Sweden - a pilot index 1950-1992*, Stockholm Environment Institute, Stockholm.
Kasser, T 2002. The High Price of Materialism, MIT Press, Cambridge, Mass.
Kuznets, S 1971. *Economic Growth of Nations: Total Output and Production Structure*, Harvard University Press, Cambridge (USA), 1971
Lawn, P and R Sanders 1999. Has Australia surpassed its optimal macroeconomic scale? Finding out with the aid of 'benefit' and 'cost' accounts and a sustainable net benefit index. *Ecological Economics* 28, 213-229.
Layard, R 2005. Happiness – lessons from a new science. London: Allen Lane.
Matthews, J, M Munday, A Roberts, A Williams, M Christie and P Midmore 2003. An Index of Sustainable Economic Welfare for Wales: 1990-2000. Cardiff: Cardiff Business School.
Max Neef, M. 1995. Economic growth and quality of life - a threshold hypothesis, *Ecological Economics*, vol 15, pp115-118.
Meadows, D H et al. 1972. *The Limits to Growth.* A Report to the Club of Rome. London: Pan Books.
Mill, J S, 1957. *Autobiography* (1873), Bobbs-Merrill, Indianapolis, p57.

Morris, D 1979. *Measuring the Changing Quality of the World's Poor: the Physical Quality of Life Index*. Oxford: Pergamon.
Morris, D 1979. *Measuring the Changing Quality of the World's Poor: the Physical Quality of Life Index*. Oxford: Pergamon.
Myers, D and E Diener 1996. The Pursuit of Happiness, *Scientific American*, no 274, pp 54-56.
nef 2004: A Wellbeing Manifesto for a Flourishing Society. London: New Economics Foundation;
Neumayer, E 2000. On the methodology of ISEW, GPI and related measures: some constructive comments and some doubt on the threshold hypothesis, Ecological Economics, 34 (3), pp347-361.
Neumayer, E 1999. The ISEW: Not an indicator of sustainable economic welfare, Social Indicators Research, 48 (1), pp. 77-101.
Nordhaus, W 1992. Is growth sustainable? Reflections on the Concept of Sustainable Economic Growth. Paper prepared for the International Economic Association meeting in Varenna, Italy, October 1992.
Nordhaus, W, and J Tobin 1972. Is growth obsolete? in *Economic Growth,* Fiftieth Anniversary Colloquium V, National Bureau of Economic Research, Columbia University Press, New York.
Offer, Avner 2003. Economic Welfare Measurements and Human Well-being. Chapter 12 in David, P and M Thomas (eds) *The Economic Future in Historical Perspective*. Oxford: Oxford University Press.
Osberg, L and A Sharpe 2002. An Index of Economic Well-being for Selected OECD countries. Review of Income and Wealth 48(3), 291-316.
Oswald, A, 1997. Happiness and Economic Performance, *Economic Journal*, vol 107, pp 1815-1831.
Pigou, A 1920. *The Economics of Welfare*. London, Macmillan.
Rosenberg, D and T Oegema 1995. A Pilot ISEW for The Netherlands 1950-1992. Amsterdam: Instituut voor Milieu-en-Systeemanalyse (IMSA).
Sen, Amartya 1998 [1984]. 'The Living Standard', Chapter 16 in Crocker, David and Toby Linden (eds) *The Ethics of Consumption*, New York: Rowman and Littlefield, 287-311.
Slottje, D. 1991. *Measuring the Quality of Life Across Countries: a multidimensional analysis.* Boulder, Col: Westview.
SNA, 1993. *System of national accounts, 1993*. Prepared under the auspices of the Inter-Secretariat Working Group on National Accounts; Studies in methods - United Nations. Series F; 2:Rev.4. New York.
Stockhammer, E, H Hochreiter, B Obermayr and K Steiner 1997. The Index of Sustainable Economic Welfare (ISEW) as an alternative to GDP measuring economic welfare. The results of the Austrian (revised) ISEW calculation 1955 – 1992. *Ecological Economics* 21, 19-34.
Stymne, S and T Jackson 2000. Intragenerational equity and sustainable welfare, *Ecological Economics* 33, 219-236.
UN 1993. Integrated Environmental and Economic Accounting, in the *Handbook of National Accounting*, Series F, No 61, Dept for Economic and Social Information and Policy Analysis, Statistical Division, New York.
UN 2003. Integrated Environmental and Economic Accounting. Studies in Method: Handbook of National Accounting. Series F, No 61, Rev 1. New York: United Nations.
Veenhoven, R 2004. States of Nations, World Database of Happiness: http://www2.eur.nl/fsw/research/happiness.
Venetoulis, J and C Cobb 2004. The Genuine Progress Indicator 1950-2002 (2004 Update). Oakland, California: Redefining Progress.

Wachtel, Paul 1983. The Poverty of Affluence – a psychological portrait of the American Way of Life, New York: The Free Press.
Weitzman, M 1976. On the Welfare Significance of the National Product in a Dynamic Economy. *Quarterly Journal of Economics*. 90, 156-62.
World Bank, various years. *Poverty Reduction*. Washington, DC: World Bank.
Zolotas, X 1981. *Economic Growth and Declining Social Welfare*. Athens: Bank of Greece.