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Toward more inclusive measures of economic well-being: Debates and practices

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Abstract

This paper reviews debates and practice around the conventional and alternative measures of economic well-being. Evaluating the major contending "Beyond GDP" measures – Genuine Progress Indicator, Human Development Index, Happiness/life-evaluation index, Happy Planet Index, the OECD's Better Life Initiative dashboard – the paper argues that the GPI is the only indicator that that incorporates inequality, care for human beings and care for the environment in a single framework. GPI is therefore best suited to guide policy in responding to the major challenges of our time – rising inequality, climate change, environmental destruction. GPI's GDP-like features make it suitable to gauge economic performance that contributes to well-being outcomes and examine proposed policies. Meanwhile, its dashboard-like features allow changes in contributing variables to be tracked in physical and monetary terms. Although GPI has high data demands, which make it difficult to estimate the full GPI for low-income countries, and an evolving methodology, the main obstacles to adopt the GPI are social and institutional, including lack of political leadership and institutional support.

Preface

In August 2017, the Director-General of the International Labour Office convened an independent Global Commission on the Future of Work. The Commission will produce an independent report on how to achieve a future of work that provides decent and sustainable work opportunities for all. This report will be submitted to the centenary session of the International Labour Conference in 2019.

The Future of Work Research Paper Series aims to support the work of the Commission by publishing in-depth, original studies on specific topics of interest to the Commission, ranging from explorations of artificial intelligence and the platform economy to lifelong learning and universal social protection. Each paper provides a critical analysis of current and future developments and raises important questions about how to ensure a future of inclusive development with decent work at its heart.

As we look toward the future, many are beginning to question whether GDP remains the most appropriate indicator for assessing economic well-being. Indeed, concerns about environmental degradation and the undervaluation of paid and unpaid care work have resulted in the development of a number of alternative indicators to GDP measurement; these alternatives seek to provide a more comprehensive and nuanced picture of well-being. This paper, authored by Gunseli Berik, provides a critique of GDP as a measure of economic welfare and discusses the alternative indicators that seek to provide a more complete account of the myriad of services and work, both environmental and human, which sustain us.

The author, Günseli Berik, is a Professor of Economics at the University of Utah. She has published extensively on alternative indicators to GDP, including the Genuine Progress Indicator, as well as on themes of economic inclusivity, gender and austerity.

Her paper provides a rich contribution to this important debate. It challenges our thinking about how to ensure that contributions and costs that impact well-being are fully accounted for, whether they take place in the market or not. We hope you enjoy it.

Damian Grimshaw
Director
Research Department

I. Introduction

While the trend in modern economies is to provision livelihoods through markets and the state, a not insubstantial part of our livelihood is secured through non-market activities or services, and this is especially true in low-income countries. Moreover, our well-being is dependent on healthy natural ecological life-support systems and the maintenance of natural resource stocks that do not enter the market. However, GDP per capita (hereafter GDP), a standard measure of national income commonly used to gauge the economic welfare of a nation, only captures market-sourced goods and services and underestimates the government-funded non-profit services; furthermore, the associated labour force concepts define work and production in relation to the market. Equating market activity with economic welfare reinforces important knowledge gaps in understanding the non-market contributors to well-being, such as unpaid care, domestic labour and the environment, and fails to account for environmental degradation and resource depletion. As a result, policy measures that rely on GDP instead of an integrated framework may undermine well-being. For example, economic activities that rely on natural resource depletion and associated environmental destruction are reflected in the GDP as value added, which reinforces continued reliance on these economic activities through a range of policy measures. Additionally, there is interest in measuring well-being outcomes, such as health or quality of life, rather than (monetary) inputs to economic well-being, which GDP is often presumed to measure.

Concerns about the limitations of GDP have given rise to a number of efforts in the past few decades to develop aggregate well-being measurements as either alternatives or complements to the GDP. As a result, a number of competing indicators have been developed, though GDP continues to be used as the conventional measure of economic well-being. The most prominent of these are the Human Development Index (HDI), the OECD's Better Life Initiative (BLI), the Cantril Ladder (for self-assessment of happiness), the Happy Planet Index (HPI) and the Genuine Progress Indicator (GPI). However, not all of these new indicators incorporate care for both the environment and human beings, which are central to well-being, as components in a single framework. This results in a lacuna in data that could be used to guide our responses to the major challenges of our times, namely rising income and wealth inequality, and ecological degradation that adversely affect economic performance and well-being. This paper makes an attempt to better reflect the importance of unpaid care and domestic labour, natural capital and environmental quality in composite well-being indicators and national income or asset accounting.

The paper begins with a critique of GDP as a measure of economic welfare and its use as an indicator of well-being. The subsequent section summarizes alternative aggregate metrics of well-being and analyses whether and how major contending indicators have adequately incorporated care for the environment and care of human beings. The paper then looks more closely at the advantages and shortcomings of the GPI as the only indicator that incorporates environmental, social, and economic components of well-being in a single framework. Following this, it discusses measurement efforts to account for environmental costs and unpaid work that do not rely on aggregate indicators. Finally, the paper concludes by considering the way forward, including suggestions about how other indicators, such as social protection or training, could be incorporated into the measurement of well-being.

2. Critiques of GDP

The failure of GDP as a measure of economic welfare has been long recognized. The architects of the System of National Accounts (SNA), such as Kuznets (1934), intended these accounts to be used as a specialized tool only to keep track of the volume of market exchanges. Moreover, the SNA documents clearly state that GDP should not be taken as a measure of well-being (SNA, 2009). Despite such explicit caution against welfare interpretations, national income measures are commonly utilized to gauge the economic welfare of a nation or its sub-national entities (region, province, state). The misuse of GDP derives from the convenience for policy-makers and business media of relying on a single number, and in particular the benefits for elected officials of highlighting their achievements in terms of a number that, by definition, is always positive or growth oriented.[1]

Central to the critique of GDP is its misuse as a measure of economic welfare. Its current use as a measure of market activity is routinely endorsed and rarely questioned, notwithstanding calls for revisions to better capture quality and composition of public services and new goods and services that enter the market, and in particular the digital economy (Stiglitz, Sen and Fitoussi, 2009; Coyle, 2014). However, equating market activity with economic welfare – through policy discourse, via the media – reinforces important knowledge gaps in understanding of the non-market contributors to well-being, such as unpaid care labour and the environment, and the activities that detract from economic welfare, such as environmental degradation and resource depletion. In addition, how economic performance is measured in national income as either input or output results in a misleading picture of productivity. This is because government-provided services such as education or health are valued on the basis of expenditures to produce these services rather than on the actual education or health outcomes produced (Stiglitz, Sen and Fitoussi, 2009). As a result, if there is growth of productivity in the public sector, then the GDP measures underestimate growth.

Among the key problems are that GDP does not account for shifts in the distribution of income among households. In the presence of high levels of inequality, the average output level is a poor proxy for individual and societal well-being. Another problem is that it fails to account for many contributors to well-being that do not involve monetary transactions and therefore fall outside the market. Principal among these are non-market household services, voluntary work and ecosystem functions, such as the contribution of forests in providing clean air.

Critics have also pointed out that GDP overestimates well-being by interpreting every expenditure as a contributor to welfare, without distinguishing between welfare-enhancing and welfare-reducing activity. Thus, spending on clean-ups and rebuilding activity after a hurricane, the time and money spent commuting to work, and health expenditures due to exposure to water or air pollution are all added to the total, which in turn is interpreted as a measure of well-being. Hurricane damage to coastal watersheds, and to marine and plant life, is not considered an adverse effect to human well-being. In a nutshell, GDP does not have a debit side, nor does GDP account for depletion or degradation of assets, such as the erosion of natural resources. Therefore GDP is unable to measure sustainability both in terms of well-being and income.

1 That said, politicians will pay little attention to reports of low rates of GDP growth unless their purposes are thereby served. Thus politicians who are intent on pursuing an austerity agenda of budget cuts may justify these policies (for example, tax cuts that reduce government revenues) in terms of their benefit for raising the GDP growth rate.

Some critics also argue that GDP is implicitly part of a political project that encourages commodification, because of its focus on market activity. Continued reliance on GDP as a measure of economic welfare appeals to interests that favour expansion of market relations, the generation of more profit-making opportunities as captured by the GDP growth rate, and also appeals to interests that seek to keep negative externalities invisible (Costanza et al., 2009). Indeed, this feature of the GDP – its concordance with the values and goals of capitalism – may explain its continued dominance as a measure of economic welfare (Felice, 2009).

3. Search for and debates on alternative aggregate well-being metrics

The scholarship on the shortcomings of GDP as a measure of economic welfare has grown immensely in recent years and has fuelled efforts to develop alternative indicators "Beyond GDP" (Easterlin, 1995; Stiglitz, Sen and Fitoussi, 2009; Redermacher, 2015; Durand, 2015). At present, new measures, several of which are sponsored by foundations and international organizations, appear to be competing with each other; meanwhile GDP continues to be the most commonly used indicator of economic well-being worldwide.

Five main approaches to measuring economic well-being have been proposed as a response to the shortcomings of GDP (Brown, 2017).[2] This section discusses the most commonly used "Beyond GDP" approaches, their methodologies, and recent values of the indicators. The Appendix summarizes the approach used to calculate three of the indicators discussed below.

3.1. Genuine Progress Indicator

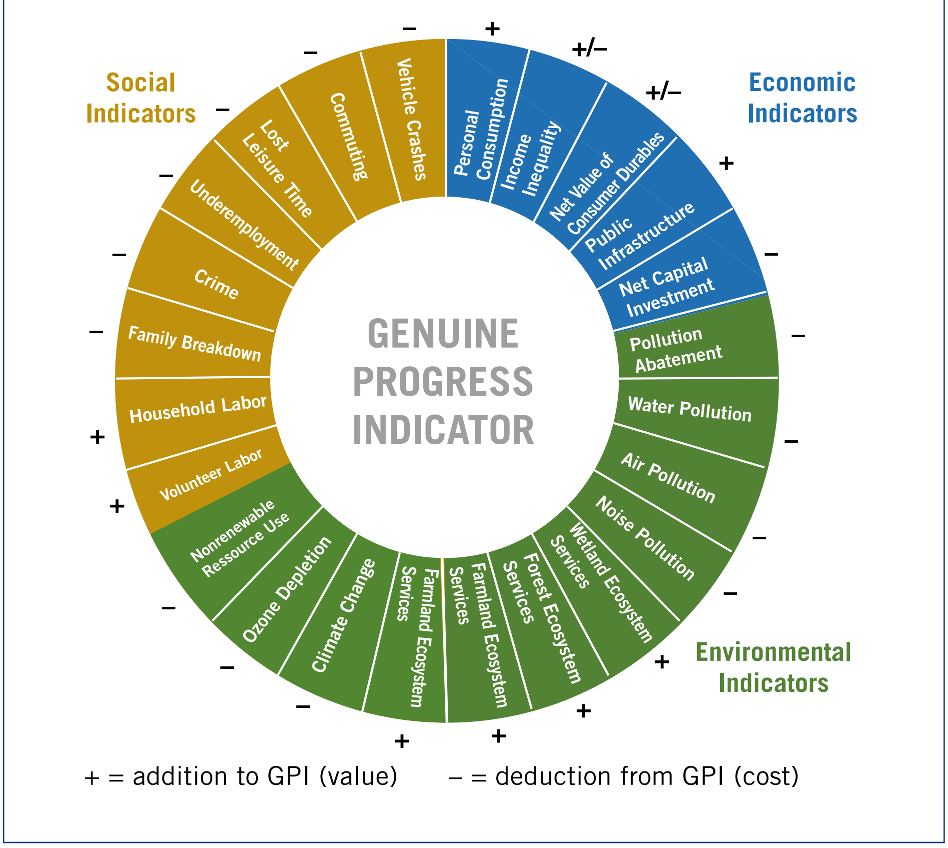
The first approach to address the shortcomings of GDP is to correct for GDP's many deficiencies and create more comprehensive measures that include social and environmental components. These efforts have evolved: from the Measurement of Economic Welfare (MEW) (Nordhaus and Tobin, 1972), to the Index of Sustainable Economic Welfare (ISEW) (Daly and Cobb, 1989), to the Genuine Progress Indicator (GPI) (Cobb, Halstead and Rowe, 1995; Anielski and Rowe, 1999). The ISEW, and later GPI, encompass the three "pillars" of sustainability (economic, environmental, and social) that have been embraced widely since the Brundtland Report of 1987.

GPI is a composite indicator that incorporates roughly 25 adjustments to personal consumption expenditures, the largest component of GDP. It weights personal consumption by income inequality, incorporates both the value of non-market activities and the social and environmental costs associated with market activity. All components of GPI are expressed in monetary units and aggregated into a single GPI value, akin to the GDP. Green GDP efforts constitute another variant of this approach, whereby estimates of environmental degradation and depletion of natural resources are incorporated into the GDP to arrive at a single monetary value.

2 *See Brown, Chapter 6 for a lucid, concise discussion of the strengths and weaknesses of the alternatives to GDP per capita.*

To illustrate this, figure 1 shows the component list of the Utah, US GPI study. GPI is the only well-known attempt to incorporate both non-market household services and environment contributions and damages into a single-value monetary indicator of current economic welfare. As a monetary indicator it is directly comparable with GDP and is useful for policy simulations, as it can gauge the effects in monetary terms. In addition, the GPI framework tracks each of its components in both monetary and non-monetary terms, which allows the sources of change in GPI to be easily identified. As elaborated below, GPI has been criticized, mainly for having a weak theoretical basis and an ad hoc component list, and for its inability to gauge sustainability.

Figure 1. Components of Utah, US, Genuine Progress Indicator (GPI)



Source: Author's formulation based on Berik and Gaddis (2011).

3.2. Human Development Index

The UNDP's Human Development Index (HDI) approach was launched in 1990 as a pioneering alternative indicator and it added new components to the GDP to generate a more comprehensive measure of well-being. Since then, HDI has been consistently estimated for all countries, and in its latest (2010) variant, the HDI aggregates Gross National Income (GNI) per capita, life expectancy at birth, and (mean and expected) years of schooling into a non-monetary index that ranges from 0 to 1. HDI grew out of the capabilities approach developed by Amartya Sen and Martha Nussbaum (Sen, 1992 and 1999; Nussbaum, 2003), and to the measure of *inputs* to well-being (income) it adds measures of *outcomes* in terms of the capabilities achieved through longer life and education.

The problem with HDI is that it does not address the shortcomings of GDP, which it includes as a component. While the inequality-adjusted HDI (IHDI) shows the decline in HDI once inequality is taken into account, neither HDI nor any of its associated set of indexes (IHDI, Gender Inequality Index (GII), Multidimensional Poverty Index (MPI)) incorporate the contributions of (or damages to) the environment nor the value of unpaid work. HDI values show limited variation among high-income countries, while among low-income countries there is a wider variation, which suggests that the HDI is more useful for assessing changes in well-being in low-income countries, but not for both groups of countries (Brown, 2017). The comparison of HDI rank to GNI per capita rank is useful in highlighting and examining the sources of the shortfalls of achievement in health and education outcomes (if a country's HDI rank is considerably below its GNI rank), which may lead to greater resources being devoted to developing capabilities in education and health.

3.3. Happy Planet Index

Another approach has been to design new non-monetary indices, such as the Happy Planet Index (HPI), which aggregates different (non-GDP) measures into a single index. First introduced in 2006 and sponsored and maintained by the New Economics Foundation (NEF), HPI aims to measure sustainable well-being or "a country's ecological efficiency in delivering human well-being" (Costanza et al., 2009). According to the latest (2016) report, HPI "compares how efficiently residents of different countries are using natural resources to achieve long, high wellbeing lives" (New Economics Foundation, 2016, p. 1). HPI comprises four components: life expectancy, life satisfaction, inequality of outcomes, and Ecological Footprint (EF). In the 2016 version, life expectancy at birth and life satisfaction (measured using the Cantril Ladder) are adjusted for inequality to obtain the number of inequality-adjusted Happy Life Years experienced by a typical resident in each country. In turn, these years are divided by the country's EF per capita, which measures the per person "demand on the natural environment by the country's residents" (ibid.).[3] While HPI incorporates EF, which works as an offset to consumerism, the EF is limited in the dimensions of ecological sustainability it can measure (for example, it does not measure the damage to the environment by toxic materials).

3.4. Happiness/Life Evaluation Index

A fourth approach advocates use of subjective well-being or self-reported life evaluation as the dominant or sole metric (Layard, 2005). Country or group life-evaluation scores are obtained on the basis of annual Gallup World Poll surveys that ask respondents to use the Cantril Ladder to assess their lives on a scale from zero to 10 on the day of the survey, with zero being the worst possible life and 10 the best possible life. While the Cantril Ladder question does not ask how happy people are, the *World Happiness Report* uses life evaluation, happiness, and subjective well-being interchangeably. Replacing GDP with happiness or life evaluation as the hallmark of a flourishing existence may be appealing since that appears to measure the extent to which human needs are actually being met. However, the interpretation of country scores is problematic.

The approach has been criticized on conceptual and methodological grounds (Sen, 1999; Stewart, 2014; Costanza et al., 2016; Brown, 2017). For example, critics caution

3 EF measures the per capita amount of land needed to maintain a country's consumption. EF expresses the ecological impact of human economic activity in terms of the physical area required to provide the resources humans use and to absorb the waste in a year, at the given technological level. Expressed in per capita terms, for an economy to be sustainable, EF has to be less than biocapacity, the land area available to provide these services.

against comparing results across different cultures or social groups that would reflect different social norms or expectations. They also point out that happiness measures are subject to adaptation (that is, people adapt to their circumstances over time), or individuals' assessment of their own life may be in comparison to how well they perceive others to fare. They also critique happiness measurement for its inability to capture the array of objectives necessary to promote well-being. Moreover, happiness, like HDI, ignores inputs such as ecological sustenance and unpaid care labour. Individuals may be unaware of the critical contributions of a healthy ecosystem to their well-being and disregard those factors in their response to life satisfaction surveys. The 2018 *World Happiness Report* reports that three-quarters of the variation in average Cantril Ladder scores across 157 countries are explained by six variables selected for consideration: GDP per capita, healthy life expectancy at birth, social support, freedom to make life choices, generosity and perceptions of corruption.

3.5. OECD Better Life Initiative

The fifth approach is to use a "dashboard" of many indicators without aggregating these into an overall value. One recent version treats a dashboard as a *complement* to the GDP, as recommended by the Commission on the Measurement of Economic Performance and Social Progress, also known as the Stiglitz-Sen-Fitoussi Commission (Stiglitz, Sen and Fitoussi, 2009) and implemented by OECD's Better Life Initiative (Durand, 2015).

The OECD's Better Life Initiative dashboard encompasses 11 dimensions of current well-being. The 11 dimensions include three "material" conditions (income and wealth, jobs and earnings, housing) and eight "quality of life" dimensions (health status, work–life balance, education and skills, social connections, civic engagement and governance, environmental quality, personal security and subjective well-being) (Cantril Ladder). Several of the 24 indicators used to gauge these 11 dimensions are also measured based on people's perceptions on the quality of their water, own health status and their social network support.

A more recent dashboard is the Sustainable Development Goals (SDGs), comprising 17 goals that will frame international development efforts until 2030 (UNDP, 2018). These goals address some of the persistent barriers to sustainable development, they encompass economic, social and environmental dimensions in a fairly comprehensive manner, and apply to all countries. However, with a large number of associated targets (169) and indicators (more than 300), it is difficult to see how overall progress towards sustainable development goals can be assessed without an overarching goal that integrates sub-goals and tracks the overall goal with clear metrics. This problem leads Costanza et al. (2016) to propose a Sustainable Well-being Index that connects with the SDG dashboard and is based on a grouping of 17 SDGs into three goals ("sustainable scale", "fair distribution" and "efficient allocation").

Others have argued that a dashboard of indicators could be used *instead* of a single composite indicator (Dobell and Walsh, 2013) or as a transitional step until a groundswell of interest in an alternative composite single-valued indicator emerges (Felice, 2016). The drawback of using an array of indicators – which is the current default approach in social science research, though not named as such – is that, unlike a single-value indicator, it does not allow assessment of change in overall well-being over time. That said, a dashboard of indicators can be aggregated into a single index, once the weighting of each indicator is figured out. However, as the OECD (2017) notes, due to methodological problems the BLI indicators have not (yet) been aggregated into a single index. Currently, the OECD's interactive website only allows each user to generate a Better Life Index, based on the user's own weighting of the 11 dimensions. Durand (2015) views the interactive website experiment as a step towards constructing an OECD Better Life Index.

3.6. Discussion on the different approaches to measuring well-being

These major alternative approaches strive to measure different stages and dimensions of well-being: while an "adjusted-GDP" indicator, such as GPI, assesses the potential well-being of people, an "augmented-GDP" indicator, such as HDI, assesses well-being outcomes in terms of objective indicators of life expectancy and years of schooling (along with GDP per capita). The subjective well-being approach provides an assessment of people's self-evaluated level of well-being. HPI is also an outcome measure, but one that takes into account the resource demand (relative to availability) to generate the happy life years equitably enjoyed. Since no single indicator can capture all potential dimensions of well-being, depending on the goal pursued, the indicators generated by each approach may be paired with a dashboard of indicators or each other and used in complementary ways. However, not all the contending indicators are created equal.

Table 1 summarizes the relationship to GDP of each of the major indicators discussed, whether they respond to key critiques of GDP, and their usefulness in guiding policy toward a more sustainable future by allowing assessment of cross-country differences and changes over time. If the composite well-being indicator of choice is to help address the pressing problems of income inequality, climate change, and environmental degradation, then it is important for it to adjust consumption for income distribution and track environmental and non-market contributors to well-being. Of the indicators discussed, only GPI tracks all three concerns as well as non-market contributors. While the GPI has not yet attained cross-country comparability (due to data constraints), as a monetary-value indicator it is the only one that can show percentage change in the indicator value over time for a given country and thus can be useful in simulations to assess the impact of proposed policies.

Table 1. Strengths and shortcomings of major alternative indicators

	GPI (1989) 2006 version	HDI (1990) 2010 version	HPI (2006) 2016 version	Cantril Ladder (2012) 2018 version	OECD BLI dashboard (2011)
Relation to GDP	Adjusts	Includes	No	No	No
Incorporates:					
Inequality	Yes	No	Yes	No	No
Non-market work	Yes	No	No	No	Yes
Environment	Yes	No	Yes	No	Yes
Cross-country comparability	No	Yes	Yes	Yes	Yes
Change over time (%)	Yes	No	No	No	No

Notes: Year in parenthesis denotes year the indicator (or dashboard) was launched, followed by the year of version for which characteristics are indicated in the table.

OECD dashboard reports for OECD countries only; work-life balance and environmental quality on the dashboard may be considered as proxies for non-market work and environmental damage, respectively.

Cross-country comparability refers to use of standard data and methodology across countries.

Change over time (%) refers to use of metric to measure percentage increase or decrease in outcome between two periods for a specific country.

Table 2. Country rankings by aggregate indicator, 2015–2017

Country	GDP per capita	Country	HDI	Country	Life evaluation (Cantril Ladder)	Country	HPI
Top 10 countries							
Qatar	127,480	Norway	0.949	Finland	7.632	Costa Rica	44.7
Macao SAR, China	105,420	Australia	0.939	Norway	7.594	Mexico	40.7
Luxembourg	102,389	Switzerland	0.939	Denmark	7.555	Colombia	40.7
Singapore	87,833	Germany	0.926	Iceland	7.495	Vanuatu	40.6
Brunei Darussalam	77,421	Denmark	0.925	Switzerland	7.487	Viet Nam	40.3
Kuwait	74,264	Singapore	0.925	Netherlands	7.441	Panama	39.5
United Arab Emirates	72,400	Netherlands	0.924	Canada	7.328	Nicaragua	38.7
Ireland	71,472	Ireland	0.923	New Zealand	7.324	Bangladesh	38.4
Switzerland	63,889	Iceland	0.921	Sweden	7.314	Thailand	37.3
San Marino	60,933	Canada US	0.920	Australia	7.272	Ecuador	37.0
Lowest 10 countries							
Central African Rep.(CAR)	699	188 CAR	0.352	156 Burundi	2.905	140 Chad	12.8
Burundi	778	187 Niger	0.353	155 CAR	3.083	139 Luxembourg	13.2
Congo, Dem. Rep.	802	186 Chad	0.396	154 South Sudan	3.254	138 Togo	13.2
Liberia	813	185 Burkina Faso	0.402	153 Tanzania, United Rep.	3.303	137 Benin	13.4
Niger	986	184 Burundi	0.404	152 Yemen	3.355	136 Mongolia	14.3
Malawi	1,169	183 Guinea	0.414	151 Rwanda	3.408	135 Côte d'Ivoire	14.4
Mozambique	1,217	181 Mozambique + South Sudan	0.418	150 Syrian Arab Rep.	3.462	134 Turkmenistan	14.6
Sierra Leone	1,476	179 Eritrea + Sierra Leone	0.420	149 Liberia	3.495	133 Sierra Leone	15.3
Togo	1,491	178 Guinea-Bissau	0.424	148 Haiti	3.582	132 Swaziland	15.5
Madagascar	1,506	177 Liberia	0.427	147 Malawi	3.587	131 Burundi	15.6

Notes: The data reported are the latest available for each indicator, i.e., from the period 2015–2017, except for HPI (with data for 2012).
HDI values range from 0 to 1; Cantril Ladder ranges from 0 to 10; HPI ranges from 0 to 100.
Sources:
GDP per capita, PPP (current international $) for 2016 is from the World Bank https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD
HDI for 2015 is from Human Development Report 2016 http://hdr.undp.org/en/2016-report
Life Evaluation (Cantril Ladder) for 2015–2017 survey period is from World Happiness Report 2018
Happy Planet Index is for 2012 from Jeffrey, K., Wheatley, H., Abdallah, S. (2016) The Happy Planet Index: 2016. A global index of sustainable well-being. London: New Economics Foundation http://happyplanetindex.org/countries/

Table 2 shows how countries rank on the different aggregate measures of GDP per capita, HDI, life evaluation (Cantril Ladder), and HPI. The focus is on the top ten and bottom ten countries in terms of each measure. GPI is not included due to limited data availability. For countries that have the lowest values, there is considerable overlap in GDP per capita and HDI country rankings, while there is very limited overlap at the top end, where highest levels of GDP per capita are achieved by major oil-exporting countries and city-States with small populations.

HDI and life evaluation bear a close relationship at the high end. Countries that rank the highest on Cantril Ladder scores also rank among the highest in HDI, which is not surprising since high HDI is driven by a combination of high GDP per capita, high education and health achievements that in turn are the key ingredients for life satisfaction. The *2018 World Happiness Report* shows that the largest contributor to the happiness gap between top ten and bottom ten countries is the difference in income per capita.

Not surprisingly, HPI rankings bear virtually no relationship to rankings on the other three measures, with the exception of Burundi, which ranks among the lowest ten countries across all four measures. None of the top-ranked countries on the HDI and the Cantril Ladder appears among the top-ranked HPI countries, since their ecological footprint (EF) is large, even though they have high levels of happy life years. By the same token, HPI levels are low, with the top-ranked country (Costa Rica) only attaining an index value of 44.7 in 2012. HPI also has very different countries at the low end compared to the other three measures because the happy life years attained are low, even if their EF might be low. HPI, along with GPI, are the only two major composite indicators that take into account resource use or environmental degradation or contribution.

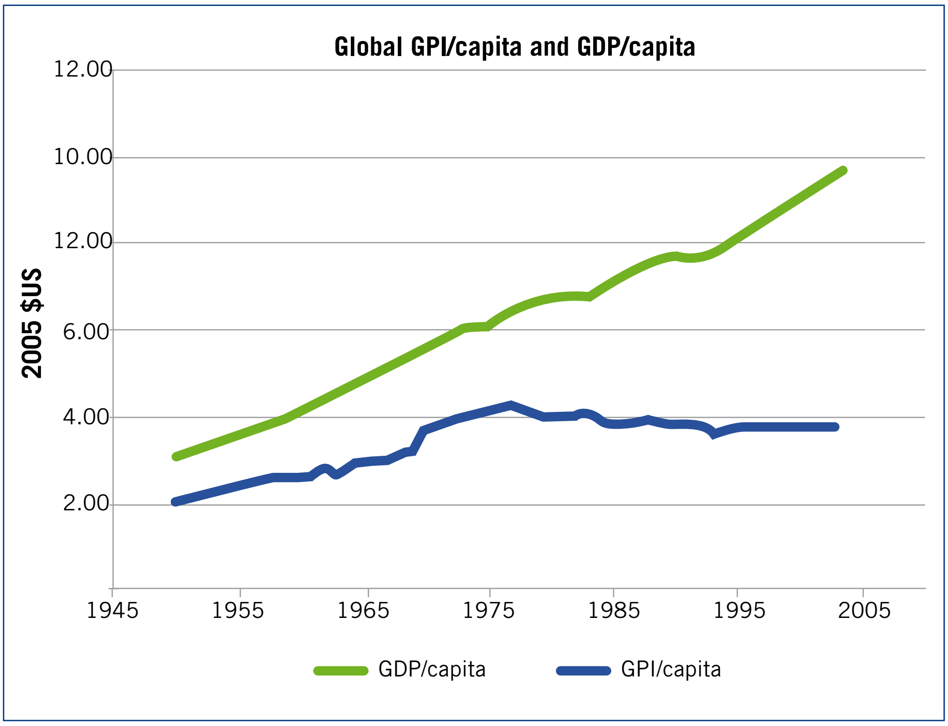
4. Evaluating the case for Genuine Progress Indicator

Over the years, critics of GPI have problematized the theoretical foundations of GPI and its component list, questioned both the appropriateness of valuation methods used for some components and GPI's suitability as a measure of sustainable welfare (Neumayer, 1999, 2000 and 2010; Dietz and Neumayer, 2006; Harris, 2007; Brennan, 2008; Felice, 2016). Much of the methodological critique has been addressed by recent improvements in the GPI methodology (Lawn, 2003 and 2005; Lawn and Clarke, 2008; Kubiszewski et al., 2013). Recent contributions have grounded the GPI methodology in the utilitarian theoretical framework, identifying a consistent component list that defines current economic welfare based on benefits of consumption, net of the adverse effects of externalities and undesirable conditions (Lawn, 2003; Talberth and Weisdorf, 2017). Among GPI researchers, the debate has focused on how to measure the welfare gains and losses associated with inequality, leisure time, ecosystem services, climate change and government health and education expenditures (Bagstad, Berik and Gaddis, 2014).

GPI was also criticized for its inability to measure ecological sustainability. At present the consensus is that, at best, GPI measures "weak sustainability", which allows for substitutability of different flows of income in increasing the GPI. Thus, for example, the costs of air or water pollution could be compensated for by larger increases in personal consumption expenditures, and in many studies GPI value is dominated by the personal consumption expenditures.[4] The current consensus is that the "strong sustainability" concept is the superior guide to sustainable development, and that it is accounted for in terms of stocks, rather than income flows, for example, to determine whether a nation's stock of natural resources has declined to a degree that makes welfare ecologically unsustainable (Neumayer, 2010). Hence, GPI is not an ecological sustainability measure. Accordingly, the GPI income statement should be accompanied by a balance sheet that shows the state of the various forms of assets ("capital stocks") that underlie the income streams.[5] If such accounts are not available, then a biophysical indicator such as per capita Ecological Footprint (EF) may be used to evaluate strong sustainability, despite the many shortcomings of this measure (Neumayer, 2012).

Another shortcoming of GPI is that it does not yet adequately address transboundary impacts of production. Specifically, GPI increase in one country could be driven by higher consumption enabled by natural resource depletion in another country. As a result, countries rich in natural resources would end up with lower GPI levels while the natural-resource importer countries would not bear the cost of natural resource depletion.[6] And natural resource exporter countries may be overestimating their economic welfare, if gauged by their trade surplus and GDP growth.

Figure 2. Global GPI per capita and GDP per capita trends



Note: Global GPI represents aggregation of GPI or ISEW values for 17 countries.

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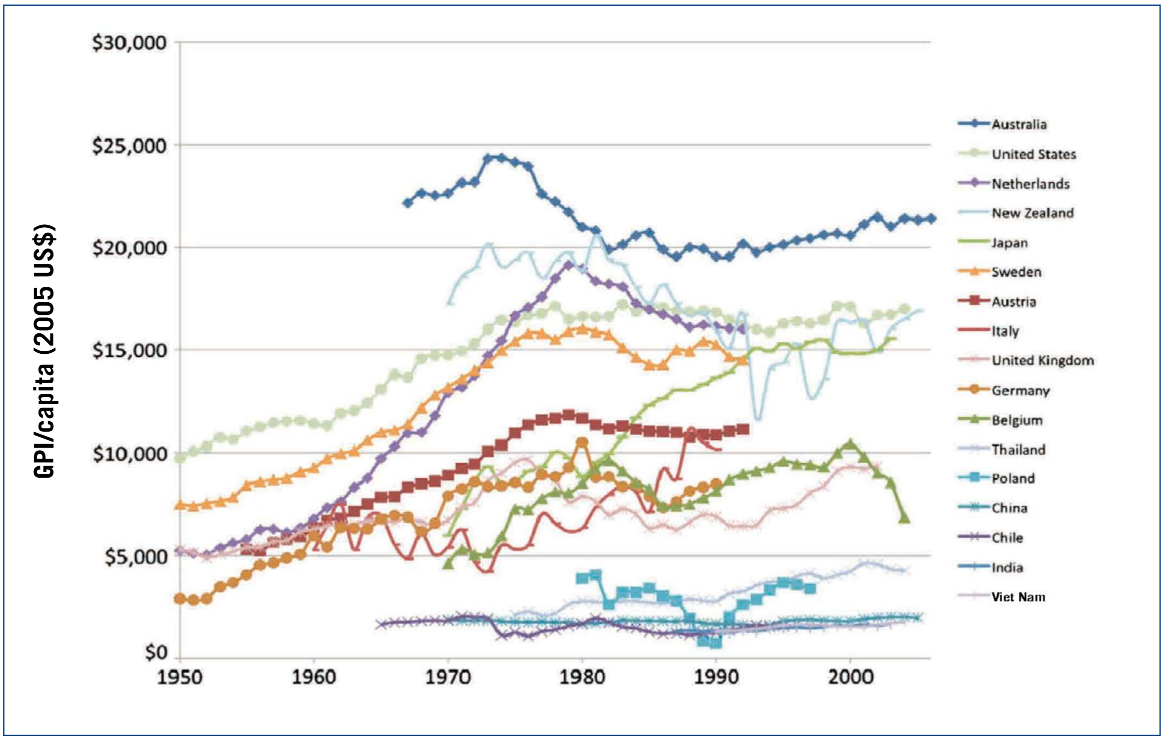
4 *A related concern is the dominance of personal consumption expenditures in driving GPI and compensating for environmental degradation. Some GPI/ISEW researchers have proposed further differentiating among consumption expenditures (beyond the costs associated with defensive consumer spending to keep well-being levels intact) and deducting these. However, such deductions have so far been limited to only a small share of food consumption.*

5 *Anielski (2001) developed a prototype GPI balance sheet for capital stocks (assets and liabilities) as well as estimating a GPI net income statement for Alberta, Canada.*

6 *A promising area of research to incorporate transboundary impacts is the modelling of ecosystem service "imports/exports" between countries (Schroeter, forthcoming).*

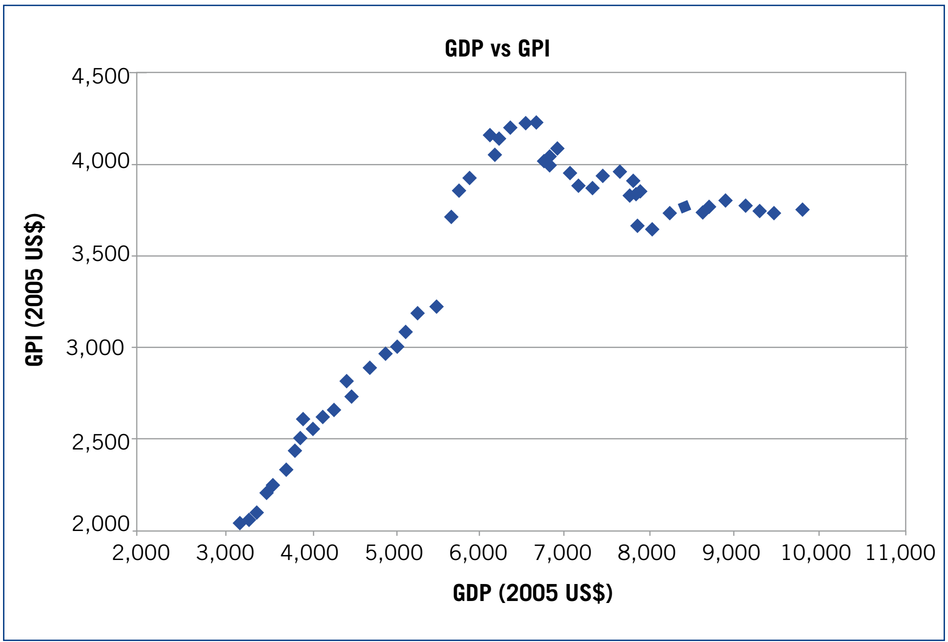
While not a sustainability measure, GPI per capita provides a good approximation of a nation's sustainable economic welfare by distinguishing between activities that reduce welfare, or do not add to it, and those that enhance it. GPI's most common use has been for comparison between its values (trends) and those of GDP. Typically, GPI per capita estimates fall below the GDP per capita and studies often show that GPI stagnates above a certain level of GDP, when the costs of growth rise faster than its production benefits. The meta- study of GPI/ISEW studies by Kubiszewski et al. (2013) illustrates this relationship (figure 2). The authors estimated a (population-weighted) global GPI per capita trend for 1950–2005 for 17 countries for which GPI or ISEW had been estimated, which accounted for 53 per cent of the world's population and 59 per cent of global GDP in 2005, and compared that with the world GDP per capita, both expressed in 2005 US dollars. Figure 3 shows the real GPI trends for the 17 countries, and figure 4 indicates that real GPI per capita and real GDP per capita are strongly positively correlated up to US$7,000, after which they diverge. This divergence is largely the result of inclusion of the costs of growth, which pull down GPI values, despite the addition of the positive contributions of monetary value of non-market household and volunteer services that positively affect the GPI. Thus GPI is a tool for critiquing theory and policy-making that elevates growth as a priority.

Figure 3. Real GPI trends for 17 countries



Note: Global GPI represents aggregation of GPI or ISEW values for 17 countries.
Reprinted from Kubiszewski et al. (2013), with permission from Elsevier.

Figure 4. Scatterplot of GDP per capita vs GPI per capita



Note: GDP per capita and GPI per capita are positively correlated (R^2=0.98) until GDP of roughly US$7,000, after which they are negatively correlated (R^2=0.61).

Reprinted from Kubiszewski et al. (2013), with permission from Elsevier.

While the meta-study by Kubiszewski et al. (2013) shows divergence of GPI and GDP, this relationship does not hold in all studies and, in fact, may change over time to the extent that policies address the cost components of GPI. These might include a shift to renewable energy sources, a reduction in underemployment or an increase in leisure time of full-time employed workers. For example, the latest Vermont, United States, GPI study shows that the cost of non-renewable energy resource depletion has declined as the state began implementing its renewable energy plan (Zencey, 2018).

In addition to providing a welfare profile of an economy, GPI has also been used in simulations, albeit to a lesser extent, to assess the impact of proposed policies. For example, Talberth (2014) estimated the impact of raising the minimum wage on Maryland's GPI, which amounted to a substantial increase in GPI as the wage effects work through several GPI components.[7]

ISEW was renamed GPI in the US study by Cobb, Halstead and Rowe (1995). After 1995 the US, Canada, and Asia-Pacific studies have estimated the GPI while European studies have tended to estimate the ISEW. Thus far, ISEW/GPI has been estimated for 28 countries (for several of them a number of times) and at sub-national levels in nine of them. Most of these are for high- and middle-income countries, enabled by publicly available official statistics.[8]

7 Talberth (2014) showed increased personal consumption expenditures by workers who benefited from minimum wage increase (partially offset by decline in personal consumption by small business owners), decline in underemployment costs (due to rise in full-time employment owing to multiplier effects of rising aggregate demand), decline in costs of crime and rise in services of consumer durables (due to increased purchases by minimum wage earning workers). Costs to the state (of enforcement of the law and state employee wages), which are not included in the GPI, offset a small portion of the overall positive impact on the GPI.

8 Among low- and middle-income countries ISEW/GPI has been estimated for Chile (Castaneda, 1999), China (Wen, Yang and Lawn, 2008), Brazil (Andrade and Ruiz Garcia, 2015), India (Lawn, 2008), Thailand (Clarke and Islam, 2005), Viet Nam (Hong, Clarke and Lawn, 2008).

GPI studies of low-income countries incorporate fewer than the standard number of components. For example, the Brazil GPI study has only 17 components (Andrade and Ruiz Garcia, 2015), compared to more common 25 components in studies of high-income economies. Although use of different number of components renders the results not strictly comparable across countries, some GPI proponents argue that starting with preliminary, simplified versions of GPI could serve as a useful path towards full-cost accounting of well-being where relevant data are relatively sparse, as observed in the case studies on the Asia-Pacific region (Bleys, 2007; Lawn and Clarke, 2008). Menegaki (2018) also suggests a path for generating comparable ISEWs with gradual expansion of data availability. There is some debate on the usefulness of GPI for low-income countries. Brown (2017) observes that GPI is not an adequate indicator for low-income countries and needs to be complemented with HDI because of low levels of market consumption that have not changed much over time and the lack of systematic data on some components of GPI. On the other hand, GPI studies for low-income Asia-Pacific economies suggest that GPI is reaching inflection points at lower levels of GDP (for example, Clarke and Islam, 2005), which make GPI useful to track.

GPI studies are mostly conducted by academic researchers or NGOs, but in a number of US states GPI is a state research project or state indicator.[9] Several European States and regional governments also estimate ISEW; in the case of Germany, this is its National Welfare Index (NWI) variant (Held et al., 2018). There has also been a recent increase in scholarly efforts to improve the GPI methodology in response to the imperative to use it as guide for policy-making toward sustainability (Bagstad, Berik and Gaddis, 2014; Talberth and Weisdorf, 2017). In addition, recent arguments in favour of GPI hold that its adoption serves the need to “delegitimize” the dominant growth-centric measurement of well-being (Held et al., 2018’ p. 398) and the urgency of moving to an alternative metric that incorporates sustainability, shared prosperity and quality of life (Brown, 2017).

GPI responds to both ecological economists’ and feminist economists’ objects of concern – care for human beings and for the environment. Each group has long expressed dissatisfaction with the invisibility of unpaid work and ecosystems in economics as important contributors to well-being. Feminist ecological economists have sought to integrate them in conceptual frameworks (see the *Ecological Economics* special issue edited by Perkins, 1997). For example, Jochimsen and Knobloch (1997), conceptualize (unpaid) care work and ecosystems as part of the “maintenance economy” that supports and limits the (paid) “industrial economy.” More recently, Aslaksen, Bragstad and Âs (2013) emphasize the shared positions held by ecological economists and feminist economists that could shape visions and strategies for achieving a sustainable future. Despite this common conceptual ground, however, The authors note the continued invisibility of women’s labour in ecological economics and invisibility of nature in feminist economics.

GPI is well-placed to serve as a framework for engagement for ecological economists and feminist economists since it reminds each group to keep the other’s concerns in mind. However, some environmentalists and feminists oppose quantification and/or monetary valuation and/or single-value composite indicators entirely and hence would likely resist adoption of the GPI. Some of these opponents prefer to rely on “narrative” approaches as a mode of argument and strategy toward a sustainable future by, for example, building social consensus around the concept of strong sustainability and pursuing this goal through transforming the legal structure by democratic decision– making (Dobell and Walsh, 2013). Nonetheless, the debates indicate that there may be elements of a consensus favourable to the adoption of the GPI (Berik, 2018). These include: (i) openness to complementing

9 Maryland and Vermont adopted the GPI as a state indicator to complement the gross state product (GSP) and committed to maintaining and updating it, although the commitment has waned in response to political shifts. In Hawaii GPI was estimated by state agencies while in Colorado it was estimated by an independent research organization.

narrative approaches in discourse and strategy with quantification (Stirling, 2010; Jax et al., 2013); (ii) openness to relying on monetary valuation as one input in policy-making regarding use of environmental resources (Aguilar-González, Bernardo and Azur Moulaert, 2013); and (iii) recognition of the value of relying on a single framework to account for economic, social, and ecological contributors to (or detractors from) economic well-being (Waring, 2003; Saunders and Dalziel, 2017).

The latest GPI or ISEW studies give an indication of the issues that are at the forefront of this scholarship. Two US studies provide new GPI estimates as well as move the methodological debate forward. Talberth and Weisdorf (2017) implemented several methodological innovations in the GPI components consistent with the Fisherian concept of current income[10] and responded to some of the proposals for improvement in the US GPI research community. Their GPI component list is longer than the standard list and includes the value of public provision of goods and services, higher and vocational education, Internet services, and costs of homelessness, groundwater depletion and solid waste pollution. Based on this new approach, which they refer to as "pilot" accounts, they generated new GPI estimates for the City of Baltimore, State of Maryland, and the US for 2012–14. Fox and Erickson (2018) applied the original US state-level methodology (first implemented in the 2004 study of the US state of Vermont) to estimate GPI for 50 states for one year (2011). These two studies respond to two goals of GPI research: the quest to apply a consistent methodology in order to ensure comparability over time and across states vs. the quest to reset the GPI methodology on the basis of a sound theoretical foundation, improved methods introduced since 2004, and availability of new state-level data. While these goals appear to be inconsistent with each other, Fox and Erickson (2018) present the 50-state estimates as a baseline for researchers to experiment with improved methods or new state-level data sources to produce an eventual GPI 2.0 methodology that derives GPI components from a sound theoretical foundation and with stakeholder input.

On the European front, the first study for Spain applies refined methods for estimating the costs of energy depletion and climate change in estimating the ISEW for the period 1970–12 (O'Mahony, Escardó-Serra and Dufour, 2018). Held et al. (2018) estimate the German variant of ISEW/GPI (the NWI) and its regional counterparts (RWI) for the period 1991–2014. Germany has had ISEW studies since the early 1990s, but this latest study reports on national results since the German Government adopted the NWI/RWI in 2011. Menegaki (2018) estimated the first ISEW for Turkey for the period 2000–12. She differentiates among three levels of data availability and agreement on methods in estimation of ISEW. The first level comprises economic components of ISEW (including non-market household services), which can be estimated for all countries; the second level includes environmental components that may be subject to data constraints for many countries; and the third level "site-specific" ISEW that currently can only be estimated for a small number of mostly high-income countries. Menegaki's ISEW estimates for Turkey comprise only the first- and second-level components, and as such can only be compared to countries whose ISEW has similar components. Menegaki's approach implies that countries that face data constraints to estimate a full GPI could start with a small list of components until requisite data become available.

These five studies underscore that GPI/ISEW research is vibrant and the research community is dedicated to strengthening the GPI as a metric that will be available for widespread adoption to guide policy toward a sustainable future. Fox and Erickson

10 Fisher's concept of income is a net psychic income of benefits (utilities) derived from consumption from which harmful aspects (disutilities) are deducted. Thus, GPI can be expressed as a social welfare function that sums up individual utilities derived from consumption of goods and services for a population, net of undesirable economic, social, environmental conditions that are caused by economic activity at both the local and non-local levels. Also, these undesirable conditions may affect future generations as well as other communities and generate disutilities for a given population that would also be reflected in the GPI.

(2018) and Held et al. (2018) see scope for substantial and independent methodological improvements in the GPI before it is routinely reported by government agencies or used in policy analysis. This gradual approach also seems to be supported by evidence on the policy impacts of the GPI/ISEW (NWI/RWI).

Evaluations of Beyond-GDP measurement efforts (whether recent or the sustainability indicators introduced since 1992) show no evidence of direct policy impacts of these metrics (Hayden and Wilson, 2016 and 2018). Investigating the underlying obstacles to adopting and using ISEW for policy purposes in Belgium and Germany, Bleys and Whitby (2015) identify three sets of factors: the Great Recession context, which has heightened the policy emphasis on GDP growth; questions about the usefulness of the indicator itself; and the suitability of the indicator for users' own purposes. Similar obstacles are highlighted by Hayden and Wilson (2018), who examined the experience of Maryland, US, where GPI was adopted as a state metric alongside the gross state product (GSP) in 2010. Based on an interpretive methodology that includes semi-structured interviews with Maryland officials and practitioners involved in the GPI project and an analysis of documents, Hayden and Wilson show that the direct policy impact of GPI has been limited. However, their research shows that GPI made headway in its conceptual and political use in Maryland before the change in political leadership and loss of high-level support for it at the end of 2014.

Hayden and Wilson (2018) identify a number of obstacles to GPI's use and influence in Maryland, US. First, there was not sufficient time to embed GPI in the policy process, due to bureaucratic inertia, limited training of state staff, difficulty releasing GPI results in a timely manner, and costliness of producing GPI (fiscal) notes to assess the policy impacts on GPI on a regular basis, before the change in political leadership in 2014. Second, while GPI did not generate conservative pushback on a large scale, it had limited grassroots support, owing to its genesis as a state project endorsed by the governor. Third, there were questions about GPI's ostensible promise to drive transformative change away from growth, and whether in the interests of sustainability it should be the alternative to the GSP. These questions arose from the dominance of consumption in driving GPI, with a methodology that is perceived to underplay environmental costs, that allows economic components to compensate for environmental degradation, as noted earlier, and all too conveniently export the costs of economic growth to other locations. Moreover, similar to the findings for Belgium and Germany (Bleys and Whitby, 2015), there was scepticism about monetization of social and environmental contributors to GPI, which was perceived as reinforcing reliance on economic values. In a nutshell, Hayden and Wilson conclude that a beyond-GDP metric like GPI needs more time if it is to shift attitudes sufficiently to change the discourse, and for it to be adopted by the state. This will necessarily involve greater grassroots support for GPI, and a greater emphasis on showing its policy relevance.

5. Other accounting projects

In tandem with pursuing better alternative composite indicators, two groups of researchers have focused on accounting for unpaid work, paid work and contributions of the environment as the often overlooked non-market contributors to well-being without seeking aggregation into composite well-being indicators. However, while these two groups on occasion recognize the parallel invisibility of both the environment and unpaid care labour in national income accounts, there is a bifurcation of the scholarship and policy efforts to recognize and value them. And within each group there are debates over the appropriateness or usefulness of measuring or attaching monetary values to unpaid labour and the environment. Differing opinions on valuation may be partly responsible for the continued lack of consensus on a better metric to replace or complement the GDP, even as the parallel measurement efforts have grown in sophistication. However, these accounting projects also provide valuable inputs for estimation of aggregate well-being metrics such as GPI that incorporate unpaid household labour and damages to or contributors of ecosystem services.

This section focuses on examples of country surveys (time use, labour force) and accounting practices (national income or asset accounts) that explicitly recognize the importance of the environment and unpaid work, in physical or monetary units.

5.1. Measurement of unpaid work

In the case of unpaid work, since the 1970s there has been considerable recognition of its importance as contributor to the functioning of the economy and to human well-being. Feminist economists have taken the lead in spearheading the effort at the conceptual and practical levels under the framework of the so-called "Accounting for Women's Work" project (Benería, Berik and Floro, 2015). The measurement effort has proceeded on three fronts: encouraging regular implementation of time-use surveys; valuation of unpaid work; and the creation of satellite accounts for household labour. The UN's international women's conferences, in particular the Beijing Platform for Action (1995), and since 2015, the Sustainable Development Goals (SDGs), have put the measurement of unpaid work on the international development agenda. Specifically, the Gender Equality goal (Goal 5) of SDGs seeks to recognize, reduce and redistribute unpaid care and domestic work burdens through public policy and to monitor time spent on this work. Along with SDG 5, increasing interest in use of gender-responsive budget analysis in evaluating fiscal policy will also likely give impetus to national time-use survey efforts, since time-use data are necessary to make the case for investments in reducing drudgery of women's work, especially in low-income countries (Chakraborty, 2013).

With respect to unpaid work, the UN SNA production boundary definition used to delineate economic activity has expanded over time: first to include subsistence production of goods and later water or firewood fetching/collecting fuel activities on the grounds that these goods are potentially marketable. However, in the SNA non-market domestic services, caring for household and non-household members, shopping, and travel related to these activities are left out of the GDP and the labour involved is not counted as an active part of the labour force. In practice, this delineation has resulted in undercounting of women's labour force participation, since their subsistence work is often interspersed with domestic activities for household's own consumption. Moreover, the practices of national statistical agencies and international organizations have often resulted in default positions that lump together heterogeneous groups as "not in the labour force." As described by Ghosh (2016), the latest convention of India's National Sample Survey Office (NSSO) is to classify those who perform unpaid domestic work (with or without additional activities to secure family subsistence), along with retirees, students, and some others who perform work for pay or profit, as not in the labour force. In the case of domestic work, this classification abides by longstanding statistical conventions of the SNA, yet is conceptually inconsistent with NSSO's own conventions of classifying (counting as part of the labour force) those who engage in unpaid economic activities for household consumption. The recent resolution by the 19th International Conference of Labour Statisticians (ICLS) seeks a more coherent and broader definition of work, which includes unpaid work (ILO, 2013). While this resolution is promising in heralding far-reaching changes to the statistical conventions, the change has yet to be implemented and reflected in labour statistics, economic models, and policy discourse.

As of February 2016, 102 time-use surveys had been conducted in 65 countries (Charmes, 2016). Analysis of these surveys shows the heterogeneity of activity classifications and age groups included in the surveys as limitations for cross-country analysis, albeit there are attempts to harmonize the classification of activities across the surveys. Time-use survey data are inputs for estimating the monetary value of unpaid work and other uses of time.

While some feminist economists oppose moving beyond use of time units to attach monetary values to unpaid work time, others have done so. The latter have long combined time-use data with valuation approaches to estimate the value of unpaid household work relative to the GDP in order to highlight its importance (Aslaksen and Koren, 1996; Ironmonger, 1996; Suh and Folbre, 2016). Valuation of non-market household labour time and adding it to the GDP show the problems with leaving out household production from GDP: the study of 27 OECD countries for 2008 by Ahmad and Koh (2011) confirms that excluding household production from GDP results in underestimation of actual consumption and overestimation of GDP growth. Nonetheless, the study also cautions against inclusion of these services in the GDP since the monetary value of household services is sensitive to the wage rate used in valuation (wage foregone or wage paid to someone else) and may distort GDP estimates. This caution also underlies efforts to track unpaid household work in supplemental or satellite accounts to the SNA.

Besides accounting for unpaid work, time-use surveys have been useful in obtaining more accurate estimates of SNA work, such as subsistence production and informal jobs, that are missed in standard labour force surveys. For example, comparison of the NSSO's 1999–2000 employment–unemployment survey with the findings of the 1998–1999 pilot Indian Time Use Survey (TUS) indicates that the size of the workforce in India is much larger than estimated by the labour force survey (Hirway and Jose, 2011). The widest discrepancy between the labour-force and time-use survey estimates is found for urban women, whose workforce participation jumps from an average of 12.8 per cent to 30.9 per cent, while urban men's participation jumps from 51 to 59 per cent. For rural women, the estimates more than double, rising from 25 per cent to 58 per cent. These wide gaps reflect the ongoing measurement problems that affect labour force surveys. The problems emanate from how respondents self-report (the tendency is to report housewife status in social contexts where this status is highly valued) and what survey takers presume women's labour force status to be (that they are housewives/out of the labour force), whereas TUS starts with the question of how people spend their time, which is likely to better measure women's unpaid activities. Similarly, TUS highlights the underreporting problem in the case of informal activities. In the case of South Africa, Floro and Komatsu (2011) used the 2000 national TUS to identify individuals who would have been classified as not in the labour force or unemployed – by standard labour force surveys – as having actually performed subsistence production and casual and short-term jobs.[11]

11 Floro and Komatsu find that 11 per cent of women and 16 per cent of men who were classified as not in the labor force spent 2.6 and 3.6 hours per day, respectively, in paid work. Moreover, 12 per cent of unemployed women and 27 per cent of unemployed men engaged in short-term paid work and subsistence production for about 3 and 4.6 hours per day, respectively.

5.2. Environmental accounting

With respect to the environment, ecological-environmental economists have sought to recognize and value ecosystems, which provide important functions not only as inputs for market production but also for human well-being (such as clean air). While these economists debate how to value ecosystem functions and their health, for example, whether to apply market valuation to account for them and make their importance visible, there has been a burgeoning scholarship on ecosystem services and attempts to set up satellite natural resource accounts that can be used to ascertain environmental sustainability (Costanza et al., 2017). The consensus among environmental economists is that such asset accounts are necessary complements for the major proposed GDP alternatives, like the HDI or GPI (Neumayer, 2012; Talberth and Weisdorf, 2017). These accounts are suitable for assessing the extent to which the level of natural resources is maintained (consistent with the notion of strong sustainability).

6. Conclusion

Our times are marked by three serious challenges to well-being that humanity needs to address. These are the challenge of climate change, rising income inequality and increases in wars and human rights violations. While peace and respect for human rights may not be incorporated in a single-value indicator of well-being, we need an aggregate indicator of economic well-being that is cognizant of the problems of ecological disaster and extreme inequality, and aims to measure whether and to what extent we are effectively addressing them. Moreover, we need a measure that incorporates non-market contributors to well-being, which are (or may be) degraded by market activity. Among the prominent indicators, only GPI tracks both challenges and incorporates non-market contributors to well-being, and is thus best equipped to track economic performance and well-being over time. However, just because GPI is more comprehensive than other Beyond-GDP measures does not mean that it will be readily adopted for policy use. Moreover, GPI is not unique in this regard. Recent evaluations of use of Beyond-GDP indicators suggest that organizations and researchers are good at developing alternative measures and regularly reporting at least some of them, but these indicators are not used to guide policy.

Politics remain the major obstacle to adopting a metric such as the GPI and using it to guide policies to achieve greater sustainability. A metric that seeks full accounting of the costs of our economic process runs counter to the goals of expanding output. Evaluations of the obstacles to the use of Beyond-GDP metrics in Germany, Belgium, US, and Canada indicate the steps that need to be taken to overcome this obstacle: showing the policy relevance of the metric, having a grassroots constituency that would like to see the measure regularly reported and used, and promoting greater public awareness of social and ecological sustainability.

The data demands of ISEW/GPI are considerable. However, the obstacles faced by the first generation ISEW/GPI researchers are declining. Increasing availability of internationally comparable data has helped generate new studies and updated ISEW/GPI estimates. In particular, increasing availability of time-use survey data supports estimation of several GPI components, such as unpaid household services, volunteer services, leisure time and costs of underemployment for a growing number of countries. The time-use data infrastructure and availability are likely to improve further with the pursuit of SDG 5 and growing reliance on gender-responsive budget analysis in evaluating fiscal policy. In the meantime, ISEW/GPI is ready for a to read: methods update, and standardization of methodology is within reach, with the growing consensus on what the GPI 2.0 would look like.

For ISEW/GPI there is another obstacle: with few exceptions, the task of estimating and updating the GPI has been carried out on a piecemeal basis by independent researchers, through peer-reviewed scholarly publications, and mostly supported by non-profit organizations. For the GPI to fulfil its promise it needs to be supported by a public research organization that will ensure the resources to regularly release new estimates, update the methodology on a periodic basis, and provide blueprints for policy simulations.

Finally, questions remain about how different social expenditures like investment in education and training, or social protection, should be accounted for within the national accounts. At present, these are treated as expenditures in national accounts (or costs for companies) instead of investment, which have implications during business cycles and have an impact on well-being. Education generates personal and social welfare benefits, including higher incomes, greater happiness, better health and greater longevity, and positive spillovers to communities. However, within the national accounts, education and training are treated as a cost rather than as an investment, which make them susceptible to budget cuts. Similarly, accounting practices of businesses do not treat expenses on staff training as an investment or an asset, but as an expense like cost of heating, etc., which could count as a disadvantage in comparison to competitors. This makes investment in education and training even more fragile during business cycles (Delsen, 2007). The same also holds for social protection, which are looked at as expenditures in the national accounts and as costs in the companies, rather than as future investments.

At the same time, new business models like the platform economy bring new challenges for measuring well-being. For example, the contribution of digital platforms to national income is represented by the “advertisement related services” they sell to the firms, and not by “services they provide to the users” (Mazzucato, 2018, p. 220). The question is also what is considered as value creation or production in the digital economy, and accounted for in national income and what is not, which requires further exploration.

Ultimately GPI is ideally suited for government departments to generate and maintain each of its components, but funding is necessary to standardize its methodology and develop its template for wider use. If GPI received such institutional support, it would be ready for adoption and tracking by governments or independent research organizations. Considering the time and money spent in developing and regularly releasing GDP, it is difficult to see how a new indicator could achieve widespread acceptance and use without adequate commitment of resources. Moreover, once a public organization steps in to support GPI, private funds are likely to follow that could be used to maintain the initiative and to help meet data demands.

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Appendix

I. Calculating the Human Development Index

Step 1: Creating the dimension indices

In order to construct indices based on indicators expressed in different units, minimum and maximum values for each indicator are identified. These values are "natural zeros" or "aspirational goals" respectively, as follows:

Dimension	Indicator	Minimum	Maximum
Health	Life expectancy (years)	20	85
Education	Expected years of schooling	0	18
	Mean years of schooling	0	15
Standard of living	Gross national income per capita (2011 PPP $)	100	75,000

An index for each dimension is calculated as follows:

Dimension index = (actual value observed in a country – minimum value) / (maximum value – minimum value)

The same formula is used for each education indicator, after which an arithmetic mean of the two indices is taken.

Step 2: Aggregating the indices to produce HDI.

HDI is the geometric mean of the three dimension indices:

HDI = (Health Index x Education Index x Income Index)$^{1/3}$

Source: UNDP, Human Development Report 2015, Technical Notes.

II: Calculating the Genuine Progress Indicator based on methods used in the Utah (US) Study

The Utah GPI study for the 1990–2007 period retains the methodology updated in the US studies by Anielski and Rowe (1999) and Talberth et al. (2007), while updating some methods based on availability of new data (e.g. time-use, ecosystem value data), introducing new methods (such as estimating value of available ecosystem functions, as opposed to their loss from a distant benchmark year), and incorporating the value of locally relevant ecosystems (such as desert grasslands and scrublands). See Berik and Gaddis (2011) for detailed description of the rationale, data, and methodology of the Utah GPI study. The report and data spreadsheet are available at http://www.utahpopulation.org/our-projects/genuine-progress-indicator or See Bagstad, Berik, Gaddis (2014) for details on the divergence in GPI methods in US state-level studies and an emerging consensus on components to include/omit. For the latest update on the GPI components and methodology, see Talberth and Weisdorf (2017).

Components	**Contributor or detractor from economic welfare***	**Brief description of methodology**
Personal Consumption Expenditure (PCE)	Positive	Start with US Consumption data; use Utah/US Consumption ratio from Environmental Systems Research Institute (ESRI) data to obtain an estimate for consumption for Utah; deduct percentage of tobacco, alcohol, and food as harmful to health (amounts to 3% lower PCE in 2007)
Income Inequality		Derive income inequality index based on the Gini coefficient, by benchmarking the lowest Gini value for the period under study
Personal Consumption adjusted for income inequality	Positive	Personal Consumption divided by inequality index
Net Value of Consumer Durables	Positive/ Negative	Use ESRI Consumption data for Utah. Calculate the annual service value of durables purchased in a given year and deduct the spending on consumer durables (negative values possible, if built-in obsolescence is accelerating)
Services of Public Infrastructure (Streets and highways)	Positive	Annual service value of Utah roads=UT-US mileage ratio x US stock value of roads x 75% of vehicle miles for non-commuting x 10% (=2.5% depreciation + 7.5% interest rate)
Net capital investment	Positive	Scaled down from US data; change in the value of built capital stock over and above that needed to maintain a constant capital-labour ratio
Household work	Positive	Based on American Time Use Survey (ATUS), identify the number of housework and care labour hours of employed, unemployed, and out of the labour force women and men x hourly wage rate of housekeepers and maids in the state
Volunteer work	Positive	Weight population by education level (assumption: more educated provide more volunteer labour) x hourly wage for volunteer labour for the state
Underemployment	Negative	Measures social cohesion erosion – some of it captured by crime, divorce. Measured by foregone earnings of the underemployed=numbers who worked involuntarily fewer hours in the March CPS x hours they could not provide (i.e. hours of full-time, year-round (FTYR) worker – underemployed hours) x hourly wage for Utah
Lost leisure time	Negative	Measures overwork experienced by those fully employed. Based on ATUS, calculate value of lost leisure time=Number of FTYR workers x Lost leisure hours (=Benchmark 2800 leisure hours in US in 1969 – paid work hours of FTYR + unpaid care work hours of employed workers) x hourly wage (weighted by 1.28 based on assumption that people value leisure hour more than a paid-work hour)
Commuting	Negative	Sum of cost of own-vehicle driving (=miles driven to job x mileage reimbursement rate) + costs of time commuting (Utah hours from ATUS x Utah hourly wage) + public transit fares
Crime	Negative	Direct costs of crime + indirect costs (crime prevention) based on UT data on number of violent and property crimes; US cost per crime data based on victim cost estimates in crime studies
Motor vehicle accidents	Negative	Direct costs (property damage and health-care expenses) + indirect costs (value of lost life and lost wage associated with injury and death) based on data on total fatalities, injuries, and crashes involving property damage
Family breakdown	Negative	Cost of setting up new households after divorce + cost of excessive television watching in families with children (more than 2 hours per day)
Pollution abatement	Negative	Household spending to reduce or dispose of pollution from automobile emissions, wastewater treatment, solid waste disposal (using ESRI data for Utah)

Components	Contributor or detractor from economic welfare*	Brief description of methodology
Water pollution	Negative	Water impairment data for four primary designated water uses in Utah x per capita value of beneficial uses (based on US estimates)
Air pollution	Negative	Emissions data on six major pollutants for Utah x damage cost estimates per unit ton of each type of pollutant produced, estimated for each county in the US
Noise pollution	Negative	Average damage cost per person scaled down from US estimates for urban areas x urban population in Utah
Wetland services	Positive	Wetland acreage in Utah x wetland value per acre for western US (estimate based on various types and functions of wetlands)
Farmland services	Positive	Farmland acreage in Utah x the option value of preserving the agricultural land for the future (option value=market value of conservation easements in Utah)
Forest services	Positive	Forest acreage in Utah x forest value per acre for western US (estimate based on various forest types and functions)
Desert grassland and scrubland services	Positive	Grassland and scrubland acreage in Utah x value per acre for western US (estimate based on various grassland types and functions)
Non-renewable energy resource depletion	Negative	Total energy consumption of each energy source (coal, natural gas, petroleum, electricity) x the cost per unit of energy consumed (based on the replacement cost approach, namely the assumption that the cost of replacing the particular resource with renewable energy is established at the point of consumption)
Ozone depletion	Negative	US cost per ton ozone-depleting chemicals emitted x per-capita emissions in Utah
Climate change (Carbon emissions)	Negative	Carbon emissions from consumption in Utah (metric tons of carbon emitted per dollar of each category of consumption from ESRI) x global-level cost of carbon estimates (a median value per ton from a meta study of cost of carbon)

**The signs reflect the estimated values in the Utah study.*

III. Calculating the Happy Planet Index

Happy Planet Index = ((Life expectancy x Experienced well-being) x Inequality of outcomes) / Ecological Footprint

where,

Life expectancy is life expectancy at birth

Experienced well-being is given using the Cantril Ladder

Inequality of outcomes: each variable i above is adjusted for inequality by using the following equation:

Inequality-adjusted variable i = (1 – Atkinson index of variable i) x Mean of variable i

Ecological Footprint refers to the amount of land needed per person to sustain a typical country's consumption patterns. Specifically, it "includes the land required to provide renewable resources people use (most importantly food and wood products), the area occupied by infrastructure, and the area required to absorb CO^2 emissions" (p. 2).

Source: New Economics Foundation. 2016. Happy Planet Index 2016: Methods Paper http://happyplanetindex.org/about (accessed 20 March, 2018).