The Genuine Progress Indicator: A Measure of Net Economic Welfare

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Introduction

Countries need a way of measuring progress and goals to strive toward. Since about the 1950s, gross domestic product (GDP) has been the indicator used globally to determine society's progress. However, the goal that we are striving toward is never defined on the global scale.

The attempt was made to change this in 2000, when the United Nations established eight millennium development goals (MDGs). These goals were only created for 15 years, through 2000–15, and only targeted half the world, the developing countries. The sustainable development goals (SDGs) replaced the MDGs in 2016. Again, these goals are set for 15 years but, unlike the MDGs, they target both the developed and developing world.

Although a major step forward, the SDGs have certain limitations. The primary drawback is that with 17 goals, 169 targets, and over 300 indicators in the environmental, social, and economic areas, there is no single overarching goal or vision that society is striving toward (Griggs et al., 2013; Costanza et al., 2016). With 17 goals, there are tradeoffs that will be required, diluting the effectiveness of the SDGs toward a common goal.

But what if maximizing human wellbeing was the unstated goal that the SDGs, and even the MDGs, were aiming toward. If such a goal existed, society would need a measure other than GDP to ascertain whether we were making progress toward achieving this goal or moving backward. However, currently, GDP is the only measure we do use.

Problems With GDP

GDP was never designed to measure social or economic welfare. The original creators of GDP warned against using it for anything except as a specialized tool that measured only a narrow segment of society's activity. However, since the 1950s we have used the size of the economy as our primary indicator of overall progress (Nordhaus and Tobin, 1972). By that yardstick, the global economy (as measured by GDP) has grown more than threefold since 1950. However, economic welfare has actually decreased slightly since 1978 (Kubiszewski et al., 2013).

GDP's current role poses a number of problems. One major issue is that it interprets every expense as positive and does not distinguish welfare-enhancing activity from welfare-reducing activity. For example, an oil spill increases GDP because of the associated cost of cleanup and remediation, but it obviously detracts from overall wellbeing. Examples of other activities that increase GDP include hurricanes (and all other natural disasters), cancer (and other illnesses), crime, car accidents, and divorce.

GDP adds up all marketed deliveries to "final demand" (sales to households, government, net exports, and capital formation) that occur within a country, regardless of whether they represent a real benefit or a "defensive expenditure" like cleaning up an oil spill or treating pollution caused health effects (Leipert, 1989). This is because GDP is calculated using the input/output model. This means that the only things that can be included in GDP are those items that are produced and consumed by one of the sectors in the economy. Nothing else is included.

If the same method of input/output tables were to be used to calculate GDP, the entire process would have to be adjusted. The tables would have to distinguish between the economic activities that added to versus subtracted from economic welfare. Another major change would have to be the inclusion of goods and services that are not within the economic market but do have a large influence on welfare. Over the past few years, various groups, including the United Nation's Statistic Division and the World Bank have been working on creating national accounts that incorporate ecosystem services (Bartelmus, 2014; Hein et al., 2015). Some of these efforts modify the input/output model to incorporate services provided by nature.

Herman Daly, a former senior economist at the World Bank, once commented that, "the current national accounting system treats the earth as a business in liquidation." He also noted that we are now in a period of "uneconomic growth," where GDP is growing but economic welfare is not.

GDP also leaves out many components that enhance welfare but do not involve monetary transactions and therefore fall outside the market. For example, the act of picking vegetables from a garden and cooking them for family or friends is not included in GDP. Yet buying a similar meal in the frozen food aisle of the grocery store involves an exchange of money and a subsequent GDP increase. A parent staying home to raise a family or do volunteer work is also not included in GDP and yet they are potentially key aspects of someone's economic welfare.

There are problems with GDP including that it does not account for the distribution of income among individuals, which has considerable effect on individual and social wellbeing (Wilkinson and Pickett, 2009). GDP does not care whether a single individual or corporation receives all the income in a country, or whether it is equally distributed among the population. A dollar's worth of increased income to a poor person produces more additional welfare than a dollar's increased income to a rich person. Additionally, the distribution of income within a country influences a range of social problems and overall societal welfare.

And yet, even with all the problems surrounding GDP, it is the most commonly used indicator of a country's overall performance.

The Genuine Progress Indicator

Wellbeing is the outcome of a convergence of factors, ranging from good human relations, to greater equality as well as a healthy social and natural environment (Wilkinson and Pickett, 2009; Boarini et al., 2012). Indicators are essential to promote change in economic governance. As post-GDP measurements are integrated into institutional processes, they will be followed by relative rewards and sanctions, as is the case with GDP at present.

In recent years, much work has been done on alternative indicators to GDP—more comprehensive indicators that consolidate economic, environmental, and social elements into a common framework to show net progress. A number of researchers have proposed alternatives to GDP that make one or more of these adjustments with varying components and metrics (Smith et al., 2013). These indicators can be divided into three broad groups: (1) measures that modify economic accounts to address equity and nonmarket environmental and social costs and benefits; (2) measures that use weighted indices of "subjective" indicators based on survey results; and (3) measures that use weighted indices of a number of "objective" indicators.

One such indicator, which fits into the first category, is the genuine progress indicator (GPI). The GPI is a version of the index of sustainable economic welfare (ISEW), first proposed in 1989 by Daly and Cobb (1989) and later modified and renamed the genuine progress indicator (Redefining Progress, 1995).

GPI starts with personal consumption expenditures (a major component of GDP) but adjusts it using about 25 different components (seen in Fig. 1). These components subtract those aspects that are actually an overall negative activities in society, such as the costs of environmental degradation, biodiversity loss, and ecosystem services loss, cost of family breakdown, cost of unemployment, and cost of crime and pollution. They also add positive components left out of GDP, including the benefits of volunteering and household work, among others. GPI, unlike GDP, is also adjusted for income distribution (Cobb et al., 1995; Lawn, 2003; Bagstad and Shammin, 2012). By separating activities that diminish welfare from those that enhance it, GPI better approximates sustainable economic welfare. GPI is not meant to be an indicator of sustainability. It is a measure of economic welfare that needs to be viewed alongside biophysical and other indicators. In the end, since one only knows if a system is sustainable after the fact, there can be no direct indicators of sustainability, only predictors.

Over the past few decades, ISEW or GPI have been calculated in around 20 countries worldwide (Lawn and Clarke, 2008; Kubiszewski et al., 2013). These studies have indicated that in many countries, beyond a certain point, GDP growth no longer correlates with increased economic welfare. The trend is similar in many countries, GPI tracks GDP pretty closely as a country develops, but at a certain point the two diverge. In the United States it happened in the late-1970s while in China in the mid-1990s. GDP keeps growing while GPI levels off or decreases.

Recently, a global GPI was estimated using GPI and ISEW data from 17 countries, containing approximately 53% of the world's population and 59% of the global GDP (Kubiszewski et al., 2013). On the global level GPI/capita peaked in 1978 (Fig. 2). Interestingly, 1978 is also around the time that the human ecological footprint, a biophysical indicator that measures humanity's demand on nature, exceeded the Earth's capacity to support humanity. Other global indicators, such as surveys of life satisfaction from around the world, also began to level off around this time. In fact, a strikingly consistent global trend suggests that as income increases, wellbeing often decreases amidst rising rates of alcoholism, suicide, depression, poor health, crime, divorce, and other social pathologies.

An important function of GPI is to send up a red flag at that point. Since it is made up of many benefit and cost components, it also allows for the identification of which factors increase or decrease economic welfare. Other indicators are better guides of specific aspects. For example, Life Satisfaction, determined by surveys, is a better measure of overall self-reported wellbeing. By observing the change in individual benefit and cost components, GPI reveals which factors cause economic welfare to rise or fall even if it does not always indicate what the driving forces are behind this. It can account for the underlying patterns of resource consumption, for example, but may not pick up the self-reinforcing evolution of markets or political power that drive change.

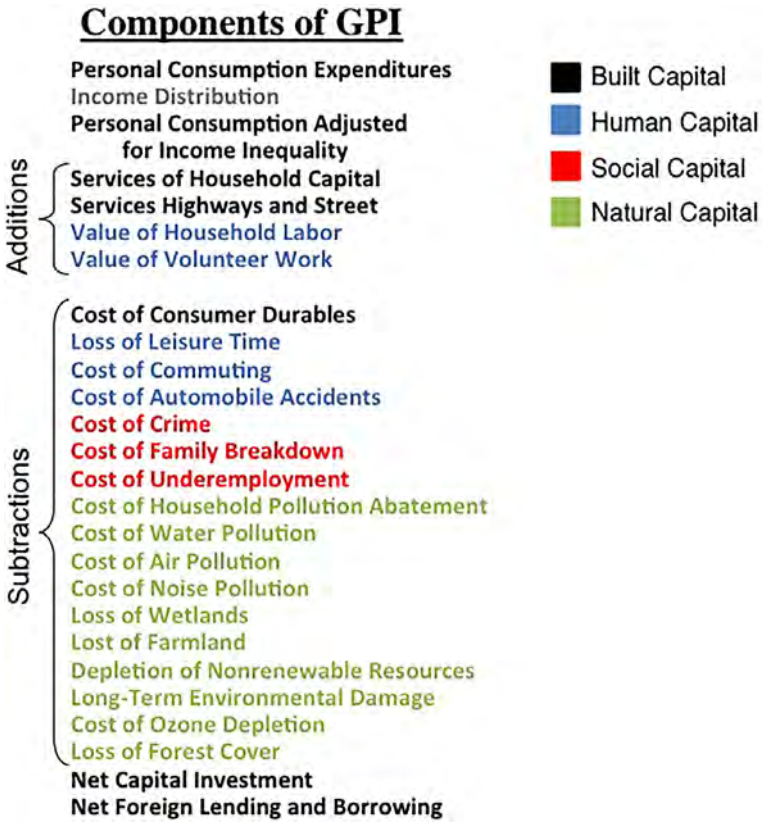

Fig. 1 Components of GPI separated into built, human, social, and natural capitals.

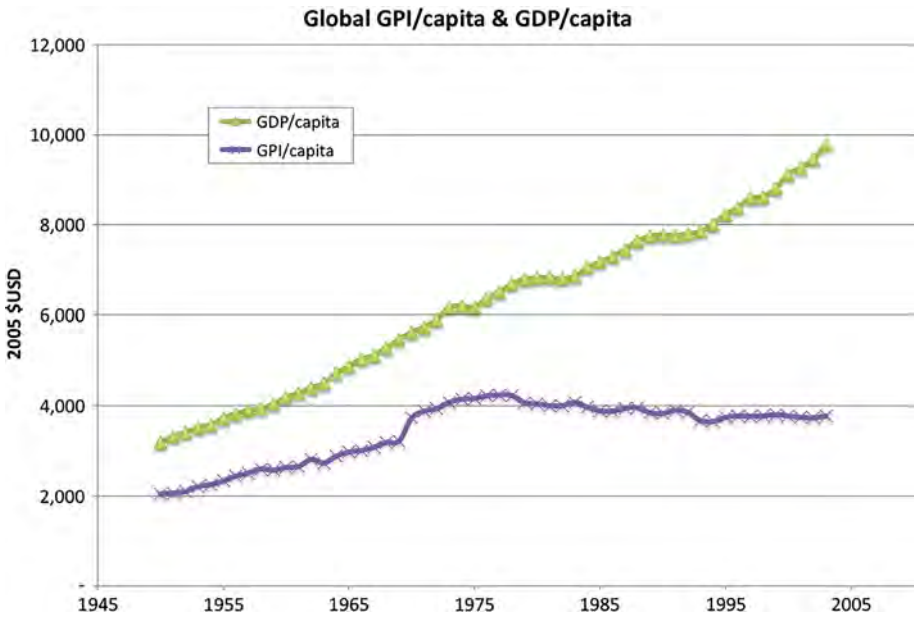

Fig. 2 Global GPI/capita and GDP/capita. GPI/capita was estimated by aggregating data for the 17 countries for which GPI or ISEW had been estimated, and adjusting for discrepancies caused by incomplete coverage by comparison with global GDP/capita data for all countries. All estimates are in 2005 US$. Source Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T. and Aylmer, C. (2013). Beyond GDP: Measuring and achieving global genuine progress. *Ecological Economics* **93**, 57–68.

Recently, two state governments in the United States have adopted GPI as an official indicator, the states of Maryland and Vermont, and others have begun calculating it (Berik and Gaddis, 2011; McGuire et al., 2012; Erickson et al., 2013; Stiffler, 2014; Kubiszewski et al., 2015). In addition, the data necessary to estimate GPI is becoming more available in many countries and regions. For example, remote sensing data allow better estimates of changes in natural capital and surveys of individuals about their time use and life satisfaction are becoming more routine. New means of measuring inequality are being developed, and more detailed data are being collected on the costs of crime, family breakdown, underemployment, and other measures that might be used in GPI in the future. The bottom line is that the costs of estimating GPI are not particularly high, the data limitations can be overcome, and it can be relatively easily estimated in most countries.

A Closer Look at National GPI Results

A 2013 study (Kubiszewski et al., 2013) looked at the GPI and other indicators for 17 countries from around the world. Four of those countries (China, Japan, the United Kingdom, and the United States) are used here as representative examples of the 17 countries for which data has been collated (Fig. 3).

China experienced rapid GDP/capita growth between 1950 and 2008 as it moved from an agrarian to an industrialized society. GPI/capita also increased during this time, albeit more slowly. After 1994, China joined the world market more completely and its GDP/capita, along with its GPI/capita, increased rapidly. However, this only lasted for about 5 years after which worsening income distribution (the Gini coefficient increased from 0.29 to 0.42) and high environmental externality costs began to become significant enough that they canceled out consumption-related gains. (The Gini coefficient is a measure of income distribution within a country, used as a gauge for economic inequality. This coefficient ranges between 0 and 1, with 0 representing perfect equality and 1 representing perfect inequality.) The change in these costs and benefits can be seen through the individual components that comprise GPI. Consequently, GPI/capita leveled off (Wen et al., 2008).

A similar trend is seen in India. A 1995 study by Manfred Max-Neef showed that the per capita GPI of wealthy nations started to fall when the per capita GDP reached around $15,000–20,000 (MaxNeef, 1995). He concluded at the time that this constituted a "threshold" level of per capita income. A subsequent study in 2008, showed that Thailand's per capita GPI started to fall when its per

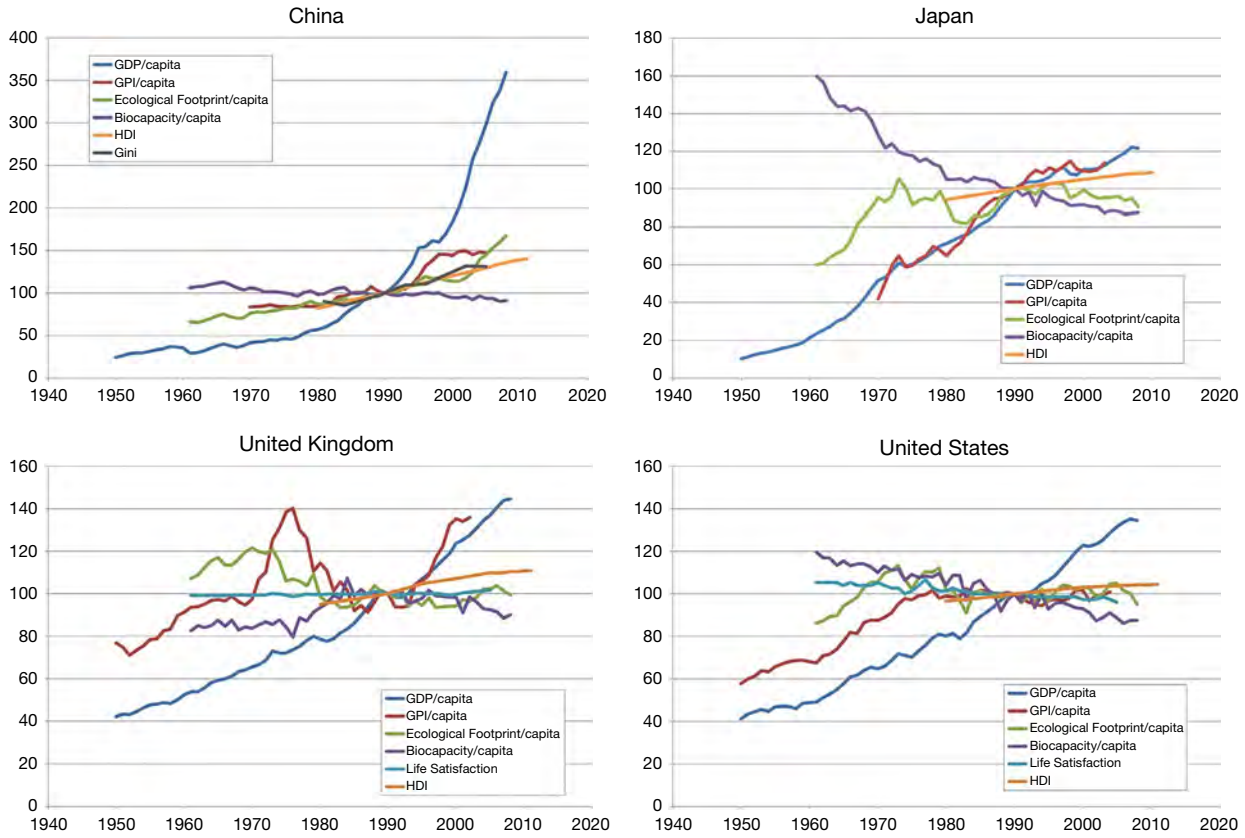

Fig. 3 Comparison with other indicators. The 4 out of the 17 countries comparing indexed trends for GPI/capita, GDP/capita, ecological footprint/capita, biocapacity/capita, HDI, life satisfaction, and the Gini coefficient. All graphs are indexed to 1990 = 100. Source Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T. and Aylmer, C. (2013). Beyond GDP: Measuring and achieving global genuine progress. *Ecological Economics* **93**, 57–68.

capita GDP reached $7500 (Lawn and Clarke, 2008). For China, the threshold is at $5000. One interpretation is that the threshold level of per capita income is contracting because poor nations are growing their GDP in a "full" world (Costanza, 2008). Hence the marginal cost of GDP growth appears now to be much higher for poor nations at the same stage of the economic development process. We conclude that the ability of poor nations to increase their economic welfare may now be dependent upon rich countries abandoning their obsession with GDP growth. This would provide the "ecological space" for poor nations to experience a phase of welfare-increasing growth.

Japan on the other hand, is one of the only developed countries that experienced a continuous rise in GPI/capita between 1970 and 2003. Much of this is due to the rebuilding after World War II, and is particularly striking in view of Japan's "lost decade" of faltering economic growth. As in China, much of this growth was based on intense natural resource use. In recent years, starting around 1990, the GPI rate of increase has diminished due to environmental degradation (Makino, 2008). Fig. 4 also shows that Ecological Footprint/capita and biocapacity/capita for Japan intersect around 1990. This means that after that point, Japan began using resources faster than it was generating them. However, Japan is a very heavy importer of raw materials and therefore its own environmental costs have not risen significantly (Makino, 2008). This creates a problem for GDP since it does not handle transboundary issues well. It also underscores the case for estimating a global GPI since an undervaluation of environmental costs in one country is counterbalanced by overvaluation in others.

The graph for the United Kingdom seems to show much variation over the course of 52 years. However, because these are indexed graphs, showing only trends, we see that the change in actual GPI/capita is small throughout that period. GDP/capita has been increasing steadily over that time period (Jackson et al., 2008) while GPI showed increases and decreases due to changes in government policies.

The United States shows GPI/capita and GDP/capita increasing at a relatively similar rate until about 1979 at which point GDP/capita continues to increase while GPI/capita flattens out. This occurred for reasons similar to those in other countries: a worsening of income distribution combined with environmental and social costs rising faster than consumption-related benefits.

Interestingly, HDI and Life Satisfaction do not change much within any of these 4, or even the original 17, countries. In three of our four countries, Japan, the United Kingdom, and the United States, the Ecological Footprint/capita remains significantly higher than biocapacity/capita.

There is also a general trend that appears from approximately 1950 until around 1975 where the GPI/capita for the majority of countries is increasing. Much of this is due to the rebuilding effort after World War II when consumption and built capital were the limiting factors for improving economic welfare in many countries and environmental externalities had not yet become significant. However, around the mid-to-late 1970s, much of the infrastructure was rebuilt while worsening income distribution and increasing external environmental costs canceled the growth in consumption-related benefits, causing GPI/capita to level off.

Fig. 4 shows that globally GPI/capita peaks at around $6500 GDP/capita. This estimate excludes African countries, as GPI has not yet been calculated for any African countries. However, since most African nations are poor economically, and given the GPI results for China (where the GPI started declining at a per capita GDP of $5000), a threshold per capita GDP value of $6500 is therefore a conservative one.

Until the $6500 GDP/capita peak, the GPI/capita and GDP/capita are highly correlated ($R^2 = 0.98$). This is consistent with some subjective life satisfaction studies showing leveling after around $7000 GDP/capita (Inglehart, 1997; Deaton, 2008). It is also

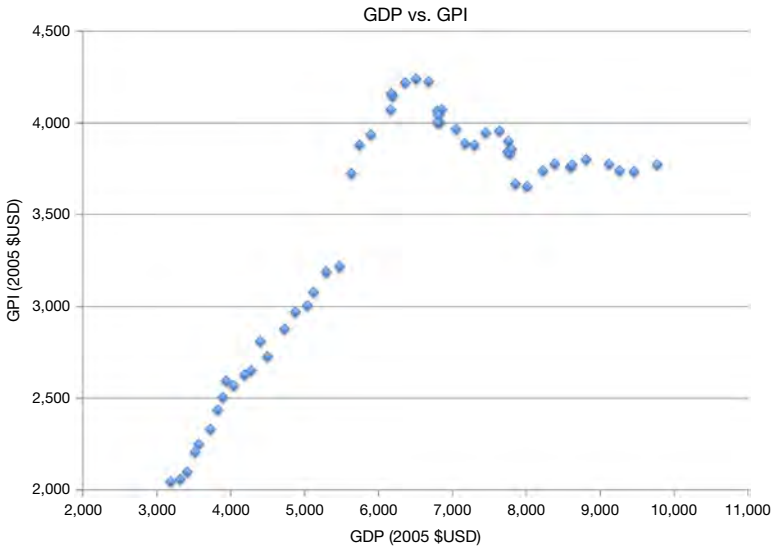

Fig. 4 GDP/capita versus GPI/capita. A plot of global GDP/capita versus estimated global GPI/capita. The two are positively correlated until about $7000/capita ($R^2 = 0.98$), after which they diverge with a negative correlation ($R^2 = 0.61$). All data in 2005 US$. Source Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T. and Aylmer, C. (2013). Beyond GDP: Measuring and achieving global genuine progress. *Ecological Economics* **93**, 57–68.

interesting that there is a negative correlation ($R^2 = 0.61$) between GDP/capita and GPI/capita after about $6500 GDP/capita. This is also consistent with the "threshold hypothesis" proposed by Manfred Max-Neef, which states 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" (MaxNeef, 1995).

We can use this GDP/capita maximum from Fig. 4 to estimate the maximum global GDP/capita consistent with a nondeclining GPI/capita. By assuming the 2010 levels of global GDP/capita of approximately $67 trillion were to be divided equally among the population to provide each person with $7000, the population would have to stabilize at around 9.6 billion people. This could be possible with better access to family planning services in high population growth nations (Engelman, 2011). An important note is that variations in income would need to exist between and within nations, however, these disparities should be much smaller than they are today.

Many scientists argue that even current consumption levels are not sustainable (Daily and Ehrlich, 1992; Rees, 2006). The global Ecological Footprint/capita exceeded global biocapacity/capita around 1978. As of 2011, humans were using 135% of the resources that can be sustainably generated in 1 year (Ecological Footprint, 2011).

Provided the technical efficiency of global production can be increased by 35%—which appears to be feasible—the global GDP of $67 trillion that is required to provide a welfare-maximizing GDP/capita of $7000 for 9.6 billion people may be sustainable. Once reached, continuing improvements in environmental protection, full employment (distributional equity), and product quality would allow the GPI/capita to rise without the need for further increases in global GDP. It is possible to increase economic welfare without having to grow GDP.

Rising environmental costs are directly related to the rise in the rate of resource use and waste generation, which is due to the growth in GDP, despite technological advances. Environmental costs could be reduced by reducing material and fossil energy throughput to the global economy, some of this may come with efficiency advances, but some will result in reductions in GDP—recognizing that this may actually be welfare enhancing. In addition, a more equitable distribution of income and opportunities will allow the welfare contribution of a given level of consumption to be increased. Welfare benefits can also be increased through the production of higher quality, longer lasting goods and the social capital benefits of a fairer and more just society.

Divergence Between GDP and GPI

GDP was created after the Great Depression in the United States and WWII, when the world needed to repair its built infrastructure and financial systems (Fioramonti, 2014). Natural resources were perceived as abundant and inadequate access to infrastructure and consumer goods represented the main limit on improvements to human welfare (Daly, 1992). During this time, it made sense to create an indicator that ignored relatively abundant natural resources, and the distribution of wealth and focused solely on increasing the production and consumption of market goods and services, which were relatively scarce (Costanza et al., 2014).

However, as a result of our success, the world has changed dramatically over the past few decades. We now live in a world full of human infrastructure. The human footprint has grown so large that, in many cases, limits on the availability of natural resources now constrain real progress more than limits to consumer goods (Costanza, 2008; Beddoe et al., 2009).

Between approximately 1950 and 1975, GPI per person for the majority of countries was increasing. Much of this was due to the rebuilding effort after World War II when consumption and built capital were the limiting factors for improving wellbeing in many countries and environmental externalities had not yet become significant. However, around the mid to late 1970s, much of the infrastructure was rebuilt. However, rising income inequality and increasing external environmental costs began to cancel the growth in consumption-related benefits, causing GPI/capita to level off.

As stated below, GPI is not a measure of overall human wellbeing since it emphasizes economic welfare and leaves out other important aspects of wellbeing. It is, however, a far better indicator of economic welfare than GDP, which was not designed to measure welfare at all. Societal wellbeing or economic welfare ultimately depends on stocks of natural, human, built, and social capital, and because the GPI makes additions and deductions to GDP to reflect net contributions to these stocks it is a far superior measure of economic welfare than GDP (Vemuri and Costanza, 2006). The disconnect between GPI and GDP, beginning in 1978, shows the aspects of our economic welfare that have been declining since that time. It also provides focus areas where societal improvement is necessary and possible.

Problems With GPI and Possible Responses

GPI is not a perfect indicator and as it has become more widely used, it has been often criticized (Harris, 2007; Brennan, 2008; Neumayer, 2010). Criticisms include that: (1) certain components are estimated through inappropriate valuation methods; (2) it makes the assumption that built capital and natural capital are substitutes; (3) although the GPI includes certain aspects that contribute to human-welfare it excludes others, for example political freedom; (4) the GPI is subjective in the components it includes and sometimes various slightly between countries; and (5) it does not have a solid theoretical basis.

Point 1: The use of cumulative cost as a valuation method for certain environmental items in the GPI is often criticized. This can be seen in components such as the cumulative cost of land degradation, lost wetlands, and long-term environmental damage. The

cumulative cost approach is used with these environmental costs due to the "strong sustainability" assumption (Lawn, 2005). One the major goal of GPI is to measure the economic welfare generated by economic activity. The assumption is that economic activity requires natural capital. Thus GPI to subtracts the *permanent* loss of natural capital services.

There are many possible ways to measure these permanent losses. The most obvious way is to assume that the current welfare cost equates to the amount that existing people should be compensated for inheriting a diminished stock of natural capital. To be consistent with strong sustainability, appropriate compensation should approximate what it would have cost past generations to have kept the stock of natural capital intact. This is equivalent to the cumulative rather than annual cost of some environmental losses.

Point 2: The second often heard criticism about GPI is that it assumes that built and natural capitals are substitutable. This criticism is based on the fact that GPI values and then combines the costs and benefits of these two forms of capital. By combining these two capitals into a single index, the assumption is that decreasing natural capital and turning it into built capital will make up the difference.

It is true that if one component is decreased by the same amount another component is increased, then one does compensate the other. This does create a substitutability situation. However, this does not mean that the total economic welfare currently being enjoyed is sustainable. If it were assumed sustainable, it would be wrongly assuming substitutability of current welfare benefits with the substitutability of the capital that yields the welfare benefits.

For example, benefits to welfare of a wooden table exactly match the costs of the losses of the forest that timber came from, than welfare remains unchanged. However, a forest provides many more services then a table or any other furniture can provide, including being a source of oxygen, carbon sink, and life-support services that are needed to sustain humanity and its economic activity in the future, which includes production of new wooden furniture. Although current costs and benefits have been offset for the present, in the long-term, the ability to create additional in the future has declined. GPI was never designed to be a measure of sustainability and only does measure the current value of welfare, not that of long-term potential. Other indicators, such as the ecological footprint, need to be used in conjunction with GPI to determine whether current use and conversion of resources is sustainable.

Point 3: Unfortunately it is not possible to measure every component that contributes to human welfare. Hence, GPI will not be able to measure every aspect. GPI was designed to measure the total economic welfare generated by economic activity. It is confined to measuring whether a certain economic activity is increasing or decreasing welfare, basically to measure whether marginal benefits of GDP growth are higher or lower than the marginal costs.

Because political freedom is not a benefit that is created by economic activity, it is not, and should not be, part of GPI. On the other hand, if greater political freedom has a positive effect on economic activity, that will be measured by other components of GPI, for example in lower inequality, crime, and underemployment. Hence, greater political freedom may be reflected in GPI, but indirectly. To include it separately would be double counting.

All indicators that are made up of various components are subjective. It requires judgments to decide which components to include, which to leave out, and what weights to give each component. This is also true about GDP. GDP is made up of hundreds of components that were decided by individuals as being most critical. These GDP components have also changed over the years as society has developed and new economic activities became important.

GPI 2.0

Over the past few years, as a growing number of GPI studies have been performed globally, a divergence in methodologies has occurred. This lack of standardization is due to variations in data availability, varying needs to ensure policy relevance in specific regions, and identification of new issues such as treatment of nonrenewable resources, government spending, and others issues as stated above. To address these variations, an international effort has recently started to update the current methodology of the GPI with the most up-to-date science. The goal of such an update is to ensure that GPI 2.0 has greater comparability between studies and an increased policy relevance (Bagstad et al., 2014).

Efforts in Use of Alternative Measures

In the United States, progressive states have turned to the GPI as a tool to assist state government in identifying public policy priorities and in the application of outcomes-based budgeting. Maryland, the first state to adopt GPI as an official indicator and the one that has progressed furthest in its use, has formalized GPI calculation and reporting (McGuire et al., 2012). Vermont, in 2013, became the first state to establish a system for GPI data collection by legislative mandate (Erickson et al., 2013). Other states, with little legislative support, have calculated GPI: the Colorado Fiscal Institute, the Utah Population and Environment Coalition, and the Hawaii Department of Health (Bagstad et al., 2014).

A Shareholder's Report

As demonstrated in previous sections, the GPI moves one-step beyond earlier benchmark categories, suggesting a "full cost" accounting system for economic growth. GPI assigns monetary value to flows of natural, human, social, and built capital and

their degradation or enhancement in the course of our economic activity. The GPI adjusts gross domestic product (GDP) to account for the effect of income inequality on personal consumption expenditures, adding the value of time spent at socially enhancing unpaid work such as volunteering, and deducting "unfortunate" expenditures for social ills such as crime, and the depreciation value of our natural resources. The result can be expressed as a GPI Net Income Statement.

The GPI Net Income Statement offers a substantially more complete accounting of economic activity and its impact on our quality-of-life than conventional GDP-based measures of progress. But net income is only one part of any financial report. As the shareholders and stewards of a country's or state's natural and other resources, citizens would be best informed by seeing GPI full-cost accounting applied to the remaining components of a shareholders' report: a balance sheet and cash flow statement. Just as an income statement does not tell shareholders about a company's net assets or shareholder wealth, GPI does not tell us about either the quantity or quality of stocks of natural, human, social, and built capital. Neither does it reveal anything about the region's accumulated liabilities, such as the cost of infrastructure maintenance, stores of toxic waste, or health problems caused by loss of leisure time. It is the balance sheet that signals whether an organization is either creating wealth for its shareholders by making wise investments, or endangering its future by accumulating liabilities and degrading or depreciating its capital assets.

As an example, one of the GPI indicators, Net Forest Cover Change, assumes an underlying value for the functions performed by a healthy forest ecosystem. In addition to producing marketable products such as timber, our forests provide a range of valuable services, such as storage and filtration of water, oxygen production, soil formation, nutrient cycling, wildlife habitat, and human recreation—to name a few that typically go unnoticed and unvalued. Unsustainable timber harvesting actually increases GDP, without accounting at all for the reduced asset value on the public balance sheet from lost forest cover. GPI is an improvement in that it accounts for the lost forest cover, subtracting it as an "unfortunate" cost of economic activity. But a GPI balance sheet would actually inform us as to our total stock of forest cover, accounting for each year's net change as an increase or diminution of total asset value. Like any capital asset, that value would be determined by calculating the net present value of the flow of goods it will yield and the services it will perform over its useful life. Regional funds spent to protect or restore forest cover would be characterized as investment to the extent that they increase our forests' value. Without this full accounting for the stock and value of our forest cover, it is difficult to evaluate the financial benefits of conserving versus depleting it.

Constructing a GPI Balance Sheet will require creating a chart of accounts that includes each of the domains addressed by GPI, and taking inventory of our accumulated assets and liabilities as they are found among those domains. Assigning value to multiple domains of capital, many of which are made up of nonmarket assets that have never been monetized, is a challenging endeavor. But it is one that some progressive governments and subnational entities have begun, with pioneering methodologies. The UK's Office of National Statistics released an experimental estimate of its human capital stock, including a detailed methodology for valuing the productive capacity of citizens (Jones and Chiripanhura, 2010). The United Nations' System of Integrated Environmental and Economic Accounts (SEEA) has been revised to include a framework for valuing the market and nonmarket goods and services provided by our natural capital. The Province of Nova Scotia, Canada, has officially committed to the task of valuing natural, human, and social capital, in addition to built and financial capital, toward the goal of producing "a new form of budget estimates, a new set of accounts, and a new economic paradigm" (Pannozzo and Colman, 2009). Canada has extended its System of National Accounts to value volunteerism and the nonprofit sector as an element of its social capital (Haggar-Guenette et al., 2007). Meanwhile, the most developed conceptual framework for expanded GPI accounting has been described by the Pembina Institute for the Province of Alberta, Canada (Anielski, 2001).

The balance sheet prototype proposed here for GPI accounting is an approximation in need of considerable development and refinement. Ultimately the identification of a regions assets—public goods, natural endowments, and accumulated commonwealth—should be informed, in part, by how citizens conceptualize quality of life.

Embarking upon the project of GPI balance sheet accounting would place a country at the vanguard of an emerging trend in progressive, public sector full-cost accounting. Over the next several decades, policy-makers at all levels of government around the world will develop methods to value the nonmarketed contributions to our common wealth from previously unaccounted-for sources. Just as corporations have established methods to value intangible assets such as patents, goodwill and brand names, we need to develop standardized methods for valuing assets such as strong civic engagement, good health, and an educated populace. Our quality of life and its sustainability depend on it.

Conclusion

If we hope to achieve a sustainable and desirable future, we need to rapidly shift our policy focus away from maximizing production and consumption (GDP) and toward improving genuine human wellbeing (a version of GPI or something similar). This is a shift that will require far more attention to be paid to environmental protection, full employment, social equity, better product quality and durability, and greater resource use efficiency. These changes are clearly within our grasp, and are underway in several countries and regions. Alternative measures of progress, like GPI, are useful to help chart and guide the course if appropriately used and understood. The future we want is within our grasp, but not while we remain in the grasp of a measure of progress (GDP) that has clearly outlived its usefulness. It has often been said that you get what you measure and we need to begin to measure what we really want if we have any hope of achieving it.

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