



The GDP paradox

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ABSTRACT

Despite all theoretically and empirically motivated criticism of GDP as a social welfare and progress indicator, its role in economics, public policy, politics and society continues to be influential. To resolve this paradox, one has to recognize that many economists accept the criticism of the GDP indicator but deny its relevance. This paper evaluates the reasons for denial. This entails five steps: (1) a brief review is offered of the extensive literature showing that GDP per capita (growth) is far from a robust indicator of social welfare (progress); (2) the influence of GDP information on economic decisions by firms, consumers, investors and governments is examined; (3) behavioural explanations for a widespread belief in the relevance of GDP are discussed; (4) the customary arguments in favour of the GDP indicator are analysed; and (5) proposed alternatives to GDP are evaluated. The paper ends with outlining the implications of giving less attention to GDP information in policy and politics. It is argued that removal of the information failure which GDP represents, in monitoring economic progress and guiding public policy, will lead to decisions and developments being more in line with improving human well-being. Moreover, ignoring GDP information is consistent with a perfectly neutral stance regarding economic (GDP) growth. Indeed, an unconditional anti- or pro-growth imperative acts as an unnecessary constraint on our search for human progress.

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1. Introduction

Gross domestic product (GDP) is the monetary, market value of all final goods and services produced in a country over a period of a year.² The real GDP per capita (corrected for inflation) is generally used as the core indicator in judging the position of the economy of a country over time or relative to that of other countries. The GDP is thus implicitly, and often even explicitly, identified with social welfare – witness the common substituting phrase ‘standard of living’. This approach does

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² Gross domestic product (GDP) is the market output generated within a country's boundaries by both its citizens and foreigners. Gross national income (GNI) (formerly gross national product, or GNP) is the output produced by the citizens of a country, irrespective of where production takes place. For most countries the difference between GDP and GNI is not very large (a notable exception is Ireland). Moreover, the conceptual difference does not matter for our discussion here: all the shortcomings of GDP as a welfare indicator identified hereafter apply equally to GNI.

not follow from any theory about GDP as a measure of social welfare, but has grown to become like this in the course of time.³

For over half a century now, the GDP (per capita) has been severely criticized as not adequately capturing human welfare and progress. All the same, the GDP has maintained a firm position as a dominant economic indicator, which can be regarded as a paradox. Indeed, most economists in business and government, teachers of economics at various levels of education, and journalists, policy makers and politicians (regardless of their political preferences) continue to give much importance to GDP and calling for unconditional GDP growth. An innocent observer might conclude that they are ignorant of the widespread criticism of GDP.

To resolve the paradox, or explain its persistence, one has to recognize the ambivalence with which many academic economists approach the criticism of the GDP indicator: they accept it but deny its relevance. This denial comes in two forms: (1) a belief that the size of the impact of GDP information on economic reality is modest; and (2) a belief that despite all criticism the GDP still provides useful information. The first response in fact says that the shortcomings of the GDP indicator do not much affect the direction of economic development, while the second response suggests that the shortcomings are rather unimportant and hardly affect the social optimality of economic development. The arguments in support of either type of response will be examined here.

Although a slowly increasing number of economists explicitly recognize the shortcomings of the GDP indicator,⁴ a large majority of them seems to accept the role of GDP as a welfare or progress measure in empirical economics and politics as a fact of life. This is not just a paradox, but a very unsatisfactory state of affairs from the viewpoint of assuring a solid empirical information basis for public policy and human development. This article aims to arrive at a clearer, explicit position on what to do with the GDP indicator than earlier writings on this issue have accomplished. In particular, the question will be addressed whether the present use of GDP information in politics and public policy should be continued, whether an adapted or entirely different indicator should replace it, or whether GDP should anyway be ignored as an indicator of welfare or progress (though not necessarily as a model variable). For this purpose, we will briefly evaluate and compare available alternative aggregate indicators.

The discussion offered here has immediate relevance for economics and economists, and only indirectly for politics and politicians, or society at large. The reason is that as long as economics has not seriously dealt with the question “what are the full implications of the sustained criticism of GDP as a progress indicator?”, we cannot expect politicians to act as if the answer to this question is already known.

The organization of the paper is as follows. Section 2 briefly recaptures the main criticism of GDP as an indicator of welfare or progress. This section claims no innovation, but provides a necessary basis for discussions in subsequent sections. Section 3 examines the influence of GDP information on the economy and economic development, by considering impacts on private and public decisions. Section 4 offers a number of behavioural explanations of the widespread belief in the relevance of GDP. Section 5 evaluates the customary arguments in favour of the GDP indicator. Section 6 looks into the arguments for and against the main empirical measures of social welfare that have been proposed as an alternative to the GDP indicator. Section 7 outlines the implications of giving less importance to GDP information for public policy. Section 8 concludes.

2. Shortcomings of the GDP indicator

Since the 1960s, the use and implicit interpretation of GDP (per capita) as a proxy of social welfare – and regarding an increase in GDP as progress – has received much criticism. This criticism has come from some of the most respected economists of the 20th century, including various Nobel laureates. Important contributions include Kuznets (1941), Hicks (1948), Galbraith (1958), Samuelson (1961), Mishan (1967), Nordhaus and Tobin (1972), Easterlin (1974), Huetting (1974), Hirsch (1976), Sen (1976), Scitovsky (1976), Daly (1977), Frank (1985, 2004), Hartwick (1990), Tinbergen and Huetting (1992), Arrow et al. (1995), Weitzman and Löfgren (1997), Dasgupta and Mäler (2000), Dasgupta (2001), Ng (2003) and Kahneman, Krueger, Schkade, Schwarz, and Stone (2004a). The following provides a very brief summary of the most important criticisms (the Appendix offers more details, additional arguments and supporting references).

2.1. Principles of proper accounting

The use and calculation of the GDP indicator is inconsistent with two principles of good bookkeeping: (i) divide clearly between costs and benefits; and (ii) correct for changes in stocks and supplies. GDP really represents an estimate of the costs instead of the benefits of all market-related economic activities in a country. In addition, GDP does not capture all social costs as it omits external costs.

³ It is well-known that the GDP indicator was never developed for the purpose of welfare measurement. In 1665 Sir William Petty produced the first estimate of a national income, namely for England. His work aimed to determine which outlays on warfare could be supported by means of tax revenues. Work in the early twentieth century by Nobel Laureates Simon Kuznets for the USA and Richard Stone and James Meade for the UK allowed for the rapid diffusion of the GDP indicator in economic research and politics. Again, war acted as a stimulating factor: there was a need to determine the production capacity of the Allied Forces just before and during World War II.

⁴ Even *The Economist* (11 February 2006, p. 70) has characterized GDP as “badly flawed as a guide to a nation's economic well-being”.

2.2. Intertemporal considerations

Economics does not offer support for GDP as a measure of social welfare. Quite the contrary, optimal growth theory proposes models that explicitly use a theoretical (usually intertemporal) notion of social welfare that is not identical to a GDP type of criterion. More practically, a positive correlation between GDP growth in certain periods or regions with perceived progress should not be confused with the idea that GDP (growth) is a good measure of social welfare (progress) in general. If, by way of a thought experiment, one extrapolates a constant tempo of real GDP growth towards the distant future, it is evident that any correlation with social welfare will be lost somewhere along the way. To illustrate this, note that extrapolation of a 2% yearly growth rate 1000 years into the future would result in a GDP that is $(1.02)^{1000} \approx 400$ million times the current GDP. It is difficult to imagine that individual or social welfare could increase to such an extent. This suggests that if there is a positive (average) correlation between GDP and social welfare, it should be very close to zero.

2.3. Lexicographic preferences

Basic needs like water, food, shelter, company, respect and freedom cannot be traded off against luxury services and material goods. The latter often serve as a sublimation of the basic needs themselves (e.g., buying status goods to gain respect from peers). In other words, substitution between broad categories of consumption is limited. This is the core of the notion of lexicographic preferences, which is closely connected with the older idea of the Maslow pyramid in psychology. Within this framework, GDP per capita growth and the associated rise in material consumption is an imperfect compensation for a lack of satisfaction of basic needs, like serenity, clean air and direct access to nature. The problem is that the latter are not captured by GDP.

2.4. Empirical studies of happiness

A growing field of empirical subjective well-being studies has generated many insights about the determinants of happiness. One finding is that somewhere in-between 1950 and 1970, the increase in mean welfare stagnated or even reversed into a negative trend in most western (OECD) countries, despite a steady pace of GDP growth. This is confirmed by the 'Eurobarometer surveys', the half-yearly opinion polls of the inhabitants of the EU Member States, and by corrections of GDP like ISEW and GPI (Section 6). In this context the 'threshold hypothesis' has been formulated, which says that beyond a threshold income level the cost of growth exceed the benefits.

Subjective well-being studies further show that absolute individual income is not a suitable proxy of individual welfare. Relative income and various income-independent factors also influence individual welfare or happiness. It is therefore unlikely that the aggregation of individual absolute incomes in a GDP provides a robust indicator of social welfare at the national level.

A third important insight of this literature is that individuals may adapt or get used to changed circumstances. As a result, well-being may temporarily change but then returns to its baseline level. Since people do not realize the phenomenon of adaptation they keep striving for 'more'. The GDP, however, does not capture this adaptation phenomenon.

2.5. Income distribution, relative income and rivalry for status

The GDP per capita indicator emphasizes average income and neglects (changes in) the income distribution, even though an uneven distribution implies unequal opportunities for personal development and well-being. Furthermore, individuals or families with low incomes benefit relatively much from an income rise, because of the diminishing marginal utility of income. GDP per capita does not capture these features.

Related to distribution is the notion of relative income and context dependent preferences. This is characterized by comparing oneself with others resulting in rivalry through the purchase of positional or status goods. As the GDP completely omits the relative income aspect of welfare, it tends to overestimate social welfare or progress. Although an increase in relative income can improve the welfare of an individual, social welfare is not being served by it. The reason is that status is a very scarce good, causing rises in relative income and welfare to resemble a zero-sum game: what one individual gains, others lose.

2.6. Formal versus informal economy

GDP covers activities and transactions that have a market price and thus completely neglects informal transactions between people that occur outside markets. Actual GDP growth often results from a transfer of existing informal activities to a formal market. This means that the benefits were already enjoyed but the market costs were not yet part of GDP. This phenomenon applies to both developed and developing countries, and relates to such different activities as subsistence agriculture, voluntary work, household work and child care. Since the GDP does not recognize the value of informal activities and services, it will overestimate the welfare impact of fundamental changes involving transitions from an informal to a formal economy.

2.7. Environmental externalities and depletion of natural resources

An important subcategory of unpriced effects relates to use of natural resources and the environment. This involves negative external effects as well as goods and services delivered by nature. The presence of externalities means that the current set of market prices insufficiently reflects the total of private and external costs, which makes these prices unreliable signals and thus an incorrect basis for calculation of a social welfare indicator. Moreover, if air, water, or natural areas are being polluted any resulting damage does not enter GDP, but when pollution is being cleaned up this will increase GDP. In addition, the capital depreciation associated with environmental change (fish stocks, forests and biodiversity) and the depletion of resource supplies (fossil energy and metal ores) is missing from the GDP calculation. As a result, GDP suggests we are richer than we really are.

The previous list of arguments and the more extensive discussion in the Appendix make clear that it is difficult to defend GDP as a social welfare or general progress indicator.

3. How serious is the influence of GDP information on the economy?

Faced with so many fundamental criticisms of GDP as a measure of social welfare, a recurrent response in debates with colleague economists has been not to worry too much about the shortcomings of GDP as the latter does not have much influence on the real economy. Such a response is of course entirely consistent with the lack of urgency shown in repairing, or in any other way overcoming, the shortcomings of the GDP. Many signs, however, indicate that GDP information has considerable influence on reality.

In the first place, one wonders why governments invest structurally in calculating and predicting GDP. This investment is shared by all countries, and since the GDP is standardized through the United Nations System of National Accounts, it allows for an international comparison of countries in GDP terms. All of this would represent a forthright waste of money if GDP information indeed had no impact on the economy at large.

A more obvious explanation is that many economic agents regard GDP information as an important input to their decision-making. This is certainly true for politicians and public servants – witness the common appearance of GDP information in governmental documents on performance and goals of the economy, or the broad concern arising when GDP growth figures turn out to be substandard. The importance of GDP information for firms, investors and citizens/consumers is illustrated by the media – television, radio, newspapers, financial and other magazines, and internet – informing us on a daily basis about the status of our national GDP, both over time and in comparison with other countries. To illustrate the widespread influence of GDP, note that a search on internet on July 7th 2008 for “GDP” delivered 44,700,000 hits (and “Gross domestic product” 4,970,000 more). This is, for example, more than five times the number of hits for “social welfare”, viz. 8,470,000.

One can identify more concrete indications of the influence of GDP information on economically-relevant decisions. Financial markets are sensitive to realizations and predictions of GDP growth, which if positive create optimism and if negative pessimism about the “economic climate”. Central banks generally formulate their interest policy on the basis of expectations about growth and inflation. Private companies regard GDP growth as an important element of the general investment climate. Even the confidence of consumers, which determines their purchasing behaviour, is influenced by expectations of GDP growth.

Politicians want to avoid low GDP growth rates because they fear negative voter responses. To some extent this is motivated by the belief that insufficient growth will lead to economic instability characterized by much unemployment. If GDP does not grow according to hopes and expectations, politicians at both national and supranational levels become very nervous, and will not relax until GDP retains its old growth pace. With the formation of the EU, GDP growth has become an even more explicit and important goal, witness the unconditional 3% growth objective of the Lisbon strategy. In addition, GDP growth allows for rising tax revenues, as a result of which public expenditures can increase – a nice prospect for politicians in power. All in all, there is no denying that public and private agents assign much importance to the national GDP indicator.

The influence of GDP information is easily underestimated, as it runs through multiple channels – government, politics, public officers, private businesses, financial markets, investors, consumers and international agencies such as the IMF and the OECD. Moreover, these channels reinforce each other. For example, when growth rates go down, the media and financial markets will focus all attention on it, and politicians will respond with appropriate measures, objectives and promises, which again will make headlines in the media, which in turn will influence expectations and therefore decisions on financial markets. Over longer periods of time, the influence of GDP information is further established and reinforced as education at all levels, economic and financial research, and economic advisory councils of governments give much attention to GDP information. The newspaper reader is influenced by the media, and the student of economics by her education, with the idea that GDP growth is relevant. The consequence is a large influence of GDP information on consumption, investment and policy decisions, with evident repercussions for economic structure and social conditions.

A recent indirect but important effect of GDP information relates to climate policy. Among the most influential climate policy studies are economic analyses in which the policy cost is expressed in terms of a reduced rate of GDP growth (an early study is Nordhaus, 1991; for an overview see Tol, 2008; and for a critical evaluation Söderholm, 2007). This type of research has received much attention from policy makers, notably since it was widely diffused through reports of the IPCC (Intergov-

environmental Panel on Climate Change). In fact, in deciding to not ratify the Kyoto Protocol, the Bush administration referred to Nordhaus' work as providing an important motivation.

Various other policy links can be observed. Especially in the United States, many commentators in public media and on the Internet try to justify tax cuts or a flat tax by arguing that these will boost GDP growth. Apart from the fact that this is not generally true (as it depends on many conditions), irony wants that GDP information is used to justify policies which will negatively affect income distribution, whose neglect (or implicit treatment) is an important reason for the GDP indicator being an invalid measure of well-being (Section 2 and Appendix A.5 of the Appendix).

This is not the end of the story. Through pessimistic (optimistic) responses by individuals, firms, and governments to forecasts of a low (high) rate of GDP growth, GDP information creates a pro-cyclic effect. This resembles the way in which behaviour in financial markets is steered by perceptions, leading to herd behaviour which causes expectations to become true. Likewise, a large number of individuals acting on the basis of publicly available GDP information can give rise to a considerable macroeconomic response. Beliefs and expectations become then reality, i.e. a 'self-fulfilling prophecy' is at stake. At best, the effect of GDP information may be reinforcing the cycle. The recent financial (credit) crisis clearly illustrates this. Daily information in various news media about reduced GDP growth only serves to reinforce feelings of consumers, investors and others that things are going from bad to worse. The current financial crisis is illustrative of this phenomenon. We are overwhelmed by articles showing how little GDP growth the economy is expected to attain in the coming period. This creates a bleak atmosphere influencing expectations and through it behaviour of economic agents.

Unfortunately, rigorous empirical studies of the influence of GDP information on the economy are lacking. As economists study virtually everything, the reason must be that the topic does not seem to gather much interest. Anyway, readers who are not convinced by the arguments in this section and feel that GDP information does not have much impact on the economy at large should really be sympathetic to reducing the role played by GDP information in the public sphere, as it serves no purpose while its provision is costly.⁵

Taking the insights from this section and combining these with the conclusions of Section 2 gives the following overall conclusion: GDP not only is an inadequate proxy of social welfare but also has a considerable impact on public and private economic decisions. By implication, GDP represents a serious information failure.

4. Bounded rationality as an explanation of the widespread belief in GDP relevance

At this point, many readers may desire a meaningful theory of why so many people all over the world place such importance on changes in GDP (per capita). Aside from some of the arguments given in the previous section, insights from behavioural economics and innovation studies may provide possible explanations, linked to concepts like bounded rationality, historical accidents, increasing returns and lock-in.

Bounded rationality of humans can explain why the problem of evaluating the performance of a complex modern economy is simplified into a focus on GDP information. A simplified, aggregate indicator like GDP contributes to ease of transmission by education and media institutions, and allows for quick even though inaccurate comparisons. Conceptual simplification of choices is not an unusual strategy followed by humans, and has been well documented in the literature on behavioural economics. For example, human choice is often in accordance with the 'isolation effect', which represents a simplifying approach to compare the performance of complex alternatives (Kahneman & Tversky, 1979). It involves decisions being purely based on differentiating characteristics and not on shared characteristics of all prospects. It reflects bounded rationality as it gives rise to inconsistent choices (and preferences) when the same choice alternatives are presented in different ways.

In addition, conformism, docility, socialization and imitation can explain why GDP is without much criticism accepted by the majority of citizens and economic students alike. This is aided by repeated emphasis of the relevance of GDP in education and public media, including newspapers, television, radio and internet. Simon (1990) suggests that humans are generally docile in the sense of tending to depend on the information, recommendations and persuasion arriving through social channels. Docility allows one to quickly learn by absorbing ideas and suggestions from others in a rather uncritical way. Indeed, being critical on information obtained through social interactions, notably from parents and teachers, would hamper rapid learning and accumulation of knowledge. Docility affects both cognitive information and moral knowledge. The GDP indicator may in fact be seen to relate to both types of knowledge.

Colander and Klamer (1987) concluded on the basis of data obtained with a questionnaire among students in six top-ranking graduate programs in economics that students are subject to a real socialization process. Revisiting this theme almost 20 years later, Colander (2005, p. 175) notes: "Individuals are not born as economists; they are molded through formal and informal training. This training shapes the way they approach problems, process information and carry out research, which in turn influences the policies they favour and the role they play in society. [...] In many ways, the replicator dynamics of graduate school play a larger role in determining economists' methodology and approach than all the myriad papers written about methodology." As part of economists' methodology, the widespread belief in GDP is something that is reinforced

⁵ Most economists who read this section agreed with its arguments and conclusion. Several, however, regarded a large impact as trivial and hardly in need of argumentation. A few commentators expressed the opinion that GDP information has a small, negligible impact on the economy, but they were unable to provide any evidence.

by economic education (and less by the criticism documented in Section 2). To take just one example, the textbook by Weil (2005), which is entirely devoted to the theme of economic (GDP) growth, does not contain a single reference in the main body of the text to the many critiques of GDP as an indicator of (welfare) progress. Only in the very last pages (pp. 508–510) a box is presented as a kind of afterthought, in which the question is addressed: “Will growth make us happy”. The answer given is twofold: “Income is not the only determinant of happiness, but clearly happiness rises with income ...” and “Thus, although growth will not make us as happy as we expect it to, it will still make us happier than we would be if there were no growth”. Neither statement is convincingly supported with data, arguments or studies. Nor are the fundamental criticisms summarized in Section 2 being addressed.

Next, the notion of historical lock-in, developed to understand dominance of certain technologies (Arthur, 1989), offers relevant insights. It clarifies the widespread belief among economists in, and their paradigmatic⁶ defence of, the usefulness of GDP information for politics and society at large. Perceived relevance of GDP is the outcome of a historical development that involved one or more historical accidents and positive feedback – or what economists call increasing returns to scale. The historical accidents include estimates of national incomes to determine tax revenues for war expenditures, development of national accounts, early econometric methods in need of aggregate data, and early macroeconomic models constructed around the GDP indicator. The increasing returns to scale relate to, among others, textbooks in economics stressing the importance of GDP information, macroeconomic studies uncritically or implicitly assuming GDP growth as the ultimate aim, improved availability of aggregate data, the use of GDP as a core indicator by various international organizations (IMF, OECD, WB), and the mutual influence of competing macroeconomic models. This is not the place to offer an extensive argumentation of this point, but the main idea should be clear. At the same time, lock-in does not necessarily have eternal life, and with respect to the GDP indicator, articles like the present one precisely aim to challenge the existing lock-in.⁷

5. Does GDP convey any useful information?

Another response by economists is to state that despite the shortcomings discussed in Section 2, the GDP indicator still conveys useful information. Here I review a number of common arguments in favour of this position.

Perhaps the most persistent argument is that GDP positively correlates with a number of indicators that try to capture elements of well-being or quality-of-life, such as life expectancy at birth, infant mortality, adult literacy rate, and indices of political and civil liberties (see especially Beckerman, 1976, 1999; Lomborg, 2001; Simon, 1981). Three comments are in order here. First, that such positive correlations can be observed for specific periods of time is not denied here. However, the empirical evidence from alternative aggregate welfare measures and individual happiness research (Section 2 and Appendix A.4 in the Appendix) indicates that the correlation ranges from close to zero to negative for many rich countries *beyond a certain income level*. Second, the various quality-of-life indicators mentioned represent partial rather than complete welfare evaluations. Their precise contribution to overall welfare is thus not evident. In fact, one can come up with another set of quality-of-life indicators, such as pollution, living space, serenity, direct access to nature, congestion and work stress, with which GDP per capita correlates negatively in certain income ranges. Third, correlation does not guarantee causality. Although liberty, health and literacy often will act as necessary conditions for sustained GDP growth they do not necessarily improve by continued growth beyond a certain income level. These various counter-arguments are supported by an extensive empirical study by Easterly (1999). It uses a panel dataset of 81 indicators covering up to four time periods (1960, 1970, 1980, and 1990) and seven areas: (1) individual rights and democracy, (2) political instability and war, (3) education, (4) health, (5) transport and communications, (6) inequality across class and gender, and (7) “bads”. Depending on the statistical method used, it is found that income per capita has an impact on the quality of life that is significantly positive for only 32, 10 or 6 out of 81 indicators. The author concludes that the results can be partly explained by long and variable delays between growth and changes in the quality of life, and that for many quality-of-life indicators global socioeconomic progress (\neq growth) is more important than home-country growth.

A specific argument is that economic growth increases the national pie, making it easier to solve distributional problems or invest in “expensive policies” (e.g., related to environment or health). But once the GDP has increased, nothing will have changed, and indeed the same argument can be endlessly used to postpone certain difficult redistribution and policy choices. A sub-argument is that the public budget will increase with income growth. This, however, raises the question whether an ever larger public budget is desirable in the first place. If the objective is to make people happier, it is difficult to know in advance whether the public budget needs to fall, rise or remain constant as a proportion of GDP if the latter increases.

A widespread belief is that GDP growth creates confidence and economic stability. But the pro-cyclic effect of GDP information discussed in the Section 3 implies that stability and instability go hand in hand, as negative expectations reinforce disappointing GDP growth rates. Expectations become reality through the perceptions and information about GDP. Without GDP information, this particular, fundamental cause of instability would therefore no longer exist. Of course, other sources of economic instability would still be present.

⁶ Kuhn's notion ‘paradigm’ is in fact close in spirit to the notion of ‘lock-in’.

⁷ P. Frijters, an expert on the ‘economics of happiness’, regards the idea of economic growth being so appealing to many people as an important unsolved mystery of economics. He suggests that people have “an abstraction in their head of their country as a whole and wish[es] that abstraction to ‘grow’, ‘compete’, and preferably ‘overtake’ the alternative nationalities. They take pride in the aggregate power and standing of their country, not the happiness of the individual citizens, because it's the former that corresponds to what they have in their heads.” (http://econrssh.anu.edu.au/~frijters/mysteries_pf.htm).

Related to this point is the belief that GDP growth is generally needed or sufficient for (close to) full employment. However, the empirical evidence for this view is weak (Saget, 2000). Instead, the long run equilibrium employment rate is likely to depend on other factors than the rate of GDP growth, notably effects of search time (jobs and employees), structural mismatches between education and work, the gap between gross and net income, and the gap between income and unemployment benefits (e.g., Pissarides, 2000). Further, GDP growth does not necessarily reduce unemployment for several other reasons: it may involve outsourcing associated with retaining much of GDP domestically while moving jobs to elsewhere; and growth often goes along with creative destruction, i.e. disruption of old economic activities, which in turn implies (temporary) unemployment in specific sectors or job types. Of course, employment in combination with wages or productivity will affect the GDP, suggesting the relevance of a reverse causality (and correlation at times).

GDP per capita is often interpreted to convey information about productivity. However, a correct productivity measurement needs to be related to the number of hours worked, which shows much variation between countries, as well as over time. GDP per hour is a more useful indicator of productivity than GDP per capita. In addition, it is evident that an increase of labour productivity cannot serve as an ultimate goal for a society. Productivity is indeed a very partial indicator from a welfare perspective.

Another often expressed view is that GDP provides a basis for estimating tax revenues. This might then allow one to forecast taxes, to evaluate creditworthiness in the case of providing loans to countries (as done by the IMF and the World Bank), or to determine fair financial contributions of member states to a federation of states (e.g., USA, EU). In this case, GDP does not function as a performance indicator but more modestly as a model variable.⁸ Of course, estimates based on disaggregated information (e.g. value added per sector) will be required in order to arrive at a sufficiently accurate estimate of tax revenues. In other words, for tax calculation purposes, there is no real need to aggregate national accounts into a GDP.

Within environmental economics the environmental Kuznets curve (EKC) hypothesis received much attention during the 1990s. It represents the idea that initially economic growth goes along with an increase in environmental pressure up to a turning point, after which GDP per capita and environmental pressure become delinked. One explanation for such a delinking is that the environment is a luxury good: once income levels are sufficiently high, voting and buying will be redirected to 'green' policies and products. Another explanation is the older idea that with a higher income more funds will be available for environmentally relevant innovations and investments. Empirical evidence for the EKC hypothesis shows, however, that it holds only for a subset of indicators. Moreover, these indicators are all partial in nature and often unrelated to long term environmental sustainability. In particular, problem shifting may occur to other countries or environmental dimensions not captured by the environmental indicator. In addition, findings usually depend on cross-section analysis and can not be used straightforwardly to predict intertemporal patterns for single countries (de Bruyn & Heintz, 1999; Stern, Common, & Barbier, 1996). What comes out of these studies is that nearby problems relating to human health, like local water and air pollution, are solved if income rises, but that many other environmental problems are not solved or at best shifted in space (e.g., export of solid waste, incineration) or time (e.g., landfills). In general, it is therefore not true that economic growth solves environmental problems. This means that GDP information is not as relevant to understand the dynamics of solutions to environmental problems as was initially believed.

It is customary to point to the importance of GDP growth for developing countries. One would expect welfare growth here to show a higher correlation with GDP growth than in rich countries (especially because of the arguments related to lexicographic preferences in Section 2). Even so, I have been unable to find a thorough study that supports this widely held belief. Kenny (2005, p. 10) summarizes the empirical evidence as follows: "There has been convergence across a wide range of indicators of the quality of life. Given that there has not been convergence in the standard income indicator, this may suggest that income is only one among a number of factors in determining quality of life outcomes. In turn, this suggests some hope that improvements can be sustained even in the absence of sustained income growth."

Finally, three common defences of a different nature need to be mentioned here as well. The first one emphasizes the role of GDP information as an input to (macro)economic models or analysis. Such a use of GDP information is not the particular aim of the criticism here, even though it is doubtful whether it is an important use, given that most empirical macroeconomic models are actually bottom-up models rather than developed around an aggregate notion of GDP.⁹ The central point to notice is that the foregoing discussion was not about using GDP as an intermediate model variable but as a goal variable with an implicit or explicit social welfare interpretation. An example of a constructive exercise using GDP as an intermediate variable is Bird (2001), who shows a positive statistical relation between measures of risk and the share of social spending in GDP and concludes that the Welfare State encourages risk-taking which in turn may stimulate innovative behaviour and activities.

A second common type of defence is that GDP growth is just one of multiple goals of macroeconomic policy, including also stable prices, low unemployment, acceptable income distribution, etc. However, from a methodological angle it should be clear that adding indicators does not undo or compensate for the shortcomings of the GDP indicator, certainly not if the specific GDP-related goal is *unconditional* GDP growth.

⁸ A corrected GDP – to accommodate the critiques documented in Section 2 – would lack a pure financial, cash flow interpretation ('taxable income'), which would be a disadvantage in view of goals like predicting tax revenues (unless taxable income would be redefined in line with the GDP corrections).

⁹ Some models for private companies or governments – to forecast car sales, credit losses (banks) or state revenues – may be top-down and use GDP as a starting point (which does not mean they work better this way).

Third, the existing international standard for national accounts and GDP supports the uniformity of data on GDP. Many observers regard this as a strong feature of the GDP indicator, as it contributes to a clear economic comparison of countries. It should be realized, however, that international comparability is a necessary but an insufficient condition for the usefulness of any indicator.¹⁰

In conclusion, the foregoing arguments in defence of GDP are unable to alter the view that GDP represents a serious information failure, as concluded in Section 3. The defences of the GDP indicator reflect mistaken beliefs, irrelevant considerations, or a focus on the role of GDP information as an intermediate variable. Moreover, all defences lack a clear interpretation in terms of overall social welfare and happiness.

6. Evaluating alternatives to the GDP indicator

It seems wise to remove an indicator that is seriously misleading, irrespective of whether an acceptable alternative is available. Hence, the removal of GDP information would be an enormous improvement because a structural information failure would be eliminated. In other words, ignoring or abolishing GDP should be unconditional upon the availability of substitute indicators. Nevertheless, since many commentators seem to be of the opinion that one should not ignore or abolish GDP until a good alternative is available, the main alternatives are briefly reviewed hereafter.

There are four types of alternative indicators available in the literature. A first type is based on rather pragmatic accounting adjustments to GDP. The most influential example is the Index of Sustainable Economic Welfare (ISEW: [Daly & Cobb, 1989](#)). Derived indicators are the Genuine Progress Indicator (GPI), and the Sustainable Net Benefit Index (SNBI) ([Lawn & Sanders, 1999](#)). All these represent a correction of the regular GDP by repairing important deficiencies through adding or subtracting certain partially-calculated money amounts to/from GDP.¹¹ The various applications of the ISEW show that, whereas GDP follows a rising trend, the ISEW shows a constant or even decreasing pattern after a certain time. The temporal breakpoint varies with the country, but lies somewhere in-between the late 1960s and the 1980s. The various ISEW (and GPI) studies suggest that the costs of economic growth now outweigh the benefits, leading to “growth that is uneconomic” (paraphrasing Herman Daly).

A second type of indicator also starts from GDP but focuses entirely on environmental externalities and natural resource depletion. Corrections here give rise to ‘sustainable’ or ‘green(ed)’ GDP type of indicators. ‘Sustainable income’ denotes a level of income that is based on a reproducible economic and environmental base. Recalculation of a GDP with externalities ‘internalized’ is not simple, as it implies a completely different set of prices in the economy. It is not surprising, then, that there have been few empirical exercises aimed at calculating a green or sustainable income. The best known is the Sustainable National Income (SNI), which has been calculated for the Netherlands ([Gerlagh, Dellink, Hofkes, & Verbruggen, 2002](#)). It is based on the conceptual work by [Huetting \(1974\)](#). This can be seen to reflect the notion of ‘sustainable income’ as expressed by [Hicks \(1948\)](#), with the assumption that individuals are better off if vital environmental functions remain available ad infinitum ([Huetting, 1974](#)). The SNI approach uses a general equilibrium model that calculates the impact on national income of imposing sustainability constraints for the nine most important environmental themes (for the Netherlands). The policy interpretation of this approach is then that an economy is submitted to a strong sustainability policy with a tremendous impact on national income. [Hofkes, Gerlagh, and Linderhof \(2004\)](#) analyse SNI over the period 1990–2000, for 1990–1995 and 1995–2000. They find that although it increased substantially in this period and the relative gap between SNI and GDP decreased, the absolute gap between them increased. This suggests that production in the Netherlands became less sustainable over the studied period. Over the whole period 1990–2000, the enhanced greenhouse effect appears to be the binding environmental constraint.

A third type of indicator is genuine savings (or genuine investment). This focuses on maintaining or increasing wealth, defined as the sum of economic, human and natural capital ([Dasgupta & Mäler, 2000](#); [Hamilton & Clemens, 1999](#)). Recently, genuine savings (GS) has been adopted as a central indicator by the World Bank, under the name of ‘adjusted net savings’. GS can be defined as traditional net savings subject to a number of corrections ([Bolt, Matete, & Clemens, 2002](#)): (i) the value of depletion of natural resources is deducted; (ii) the costs associated with pollution damage, including economic and health effects, are deducted; (iii) expenditures on education are treated not as consumption but as savings/investments in human capital; (iv) net foreign borrowing is deducted, while net official transfers are added; (v) capital depreciation (capital consumption) is deducted. Categories (i) and (ii) are the most difficult to estimate. Nevertheless, the World Bank has produced estimates for most countries in the world. Genuine savings turn out to be negative for the Middle East and North Africa, and Sub-Saharan Africa regions, positive for OECD countries, and the highest for the East Asia/Pacific region ([World Bank, 2006](#)). One main disadvantage of the GS indicator is characteristic of weak sustainability, namely that losses of natural capital are not regarded as worrisome as long as they are compensated by economic and human capital (known as ‘weak sustainability’). Another main shortcoming of the GS approach is that it only overcomes few imperfections of the GDP indicator, namely neglect of capital depreciation and (partially) valuation of informal activities.

A fourth and final type of indicator of social welfare is a composite index that combines indicators that are considered to capture relevant aspects of human well-being. Unlike the previous types of indicators, this does not generate a monetary

¹⁰ Unfortunately, the international standard also acts as a barrier to the implementation of changes in the GDP calculation which undo some of the shortcomings discussed in Section 2.

¹¹ This approach goes back to [Nordhaus and Tobin \(1972\)](#).

value. The best-known example of this type is the Human Development Index (HDI) of the United Nations, which aggregates a number of indicators: GDP per capita (in PPP), life expectancy at birth, adult literacy rate, and combined primary, secondary, and tertiary gross enrolment ratios. The incorporation of GDP per capita reflects, through a log-transformation and a maximum income limit, a decreasing marginal utility of income. This already means an improvement over GDP/capita (i.e. average income). A shortcoming of the HDI approach is that the selected components and aggregation procedure are somewhat arbitrary. Publications on the HDI argue that potential extensions of HDI with additional components are hampered by measurability problems. But income inequality is in any case measurable and clearly an important criterion for evaluating the position of, and changes in, developing countries. Moreover, it would in principle be feasible to develop quite objective indexes of political freedom,¹² time use (work, leisure, commuting), and available public health services. Other approaches to aggregate the components of the HDI are available, such as the Human Poverty Index (similar components as the HDI but differently weighted) and the Borda ranking (Dasgupta, 2001, Chap. 5). Various proposals have been made to extend or adjust the HDI so as to address some of the omissions (e.g. Hicks, 1997; Noorbakhsh, 1998). But potential extensions of HDI with additional components turn out to be hampered by measurability problems. The HDI can be considered more useful to evaluate changes in developing than developed countries. A main disadvantage of the HDI in comparison with the other alternative indicators is a complete neglect of (environmental) sustainability.¹³

The previous evaluation demonstrates that at present there is no ideal alternative to GDP (per capita) available.¹⁴ Worse, all available approaches are far from perfect and do not succeed in systematically repairing the list of shortcomings of GDP as in Section 2. In particular, lexicographic preferences (basic needs), relative income and rivalry (status goods) are neglected. At the same time, one must recognize that each of the considered alternatives provides a much better approximation of social welfare than GDP. ISEW (and GPI) are perhaps the most complete in that they try to repair multiple shortcomings, as opposed to SNI and GS which are restricted to corrections for environmental damage and natural resources use. A main disadvantage of ISEW, however, is that it is based on rather partial corrections. Finally, all alternatives except HDI address environmental (capital) sustainability in one way or another, where ISEW and SNI adopt a strong and GS a weak sustainability perspective. SNI has the advantage of taking into account general equilibrium effects of corrections. An ideal indicator of social welfare might require an approach that takes its starting point in the findings of research on happiness and subjective well-being (Kahneman et al., 2004a).

7. Policy implications of ignoring GDP

7.1. Removing an information failure

It has been argued in Sections 2 and 3 that GDP not only provides misleading information about social welfare but also exerts a large influence on economic reality, and therefore on the daily life and well-being of all people. One can frame this phenomenon as a serious form of information failure, which is an instance of the general case of market failures, or given the fact that the government generates GDP information, as an instance of government failure. GDP information influences all agents in the economy: consumers, savers, investors, banks, stock and option markets, private companies, the government, central banks and international organizations. Because of the misleading nature of GDP information, economic agents take wrong decisions from the perspective of social welfare. Given the many shortcomings of GDP as a measure of social welfare and the economy-wide effects of GDP information, year after year, one has to reckon with a large loss of social welfare. This is especially true in the long run, due to cumulative effects of structurally misleading information, which imply socially undesirable directions of investment and innovation. Economists have insufficiently recognized this potentially huge, dynamic information failure associated with GDP.

7.2. A better world without GDP?

Without the availability of a GDP indicator decisions will be more aimed at welfare improvement, since the systematic and cumulative error resulting from economic behavioural responses to misleading GDP information will be gone. The removal of GDP information (without necessarily replacing it with an alternative indicator) will mean the substitution of the systematic, cumulative error by a white noise type of error (random drift).¹⁵ Panic responses and economic instability

¹² In fact, the UN published a Human Freedom Index (HFI) in 1991 and a Political Freedom Index (PFI) in 1992 (Johansson, 2004).

¹³ Sen (2000, p. 318, note 41) states: "Indeed, getting public attention has clearly been a part of UNDP's objective, particularly in its attempt to combat the overconcentration on the simple measure of GNP per head, which often serves as the only indicator of which the public takes any notice. To compete with the GNP, there is a need for another – broader – measure with the same level of crudeness as the GNP. This need is partly met by the use of the HDI ...". He adds that the HDI has attracted much more attention than other indicators that are more informative as they contain disaggregated information about diversity at the micro level.

¹⁴ Other alternatives are mentioned in the literature, but these have not proceeded beyond the stage of conceptualization. Bleys (2006) offers an overview. See also Ng (2008) who proposes an indicator that is the product of the average happiness (or life satisfaction) index and the life expectancy index, to evaluate positively long and happy lives but negatively external costs of environmental disruption.

¹⁵ One referee wondered whether this is not a plea for social engineering. However, it seems more correct to interpret the opposite strategy, i.e. the use of GDP information in politics, policy and society to influence the economy, as such, especially in view of the socialization/indoctrination of economic students and newspaper readers regarding the relevance of GDP information (as documented in Sections 3 and 4).

due to the threat of stagnating GDP growth are no longer possible. One will less dogmatically deal with stimulating developing countries to enter a transition to a formal economy (for that matter, the World Bank and UNDP has already moved a long way in this direction but do not seem to dare taking the step to discard GDP entirely). See further Frank (1985, 2004), Ireland (2001) and Layard (2005) for a number of examples of alterations in economic policy that are in line with replacing the GDP indicator by information obtained from the subjective-empirical welfare literature: e.g. regulatory taxation of working overtime and status goods, limiting commercial advertising, and restricting flexible labour contracts. Although from a GDP growth perspective these look like unnecessarily limiting measures, they are more positively evaluated from a real welfare or happiness perspective. Ng (2003) shows analytically that systematically striving for GDP growth leads to an over-spending on private consumption and an under-provision of public goods, which may cause economic growth to be welfare-reducing.

Without GDP, there will also be less resistance against policies which improve social welfare at the cost of GDP growth. Whereas from a GDP perspective such policies might look as a sacrifice, from a social welfare angle they would seem very logical. A very topical example is the case of climate policy. Most economic studies of climate policy have analysed the development of GDP under alternative climate (policy) scenarios, and therefore have focused attention on the trade-off between GDP growth and risks related to climate change (Kelly & Kolstad, 1999). But this trade-off represents a misplaced conceptualization of the problem as GDP is not a good measure of social welfare. Moreover, this trade-off concerns a period of 50–100 years in the future, during which the GDP of the rich countries will have grown far beyond any welfare-maximizing level.¹⁶ From a real welfare perspective, one would arrive at conclusions about climate policy which likely support a more stringent reduction of greenhouse gases. This is illustrative of the difference that (absence of) GDP information can make in the context of concrete policy.

7.3. *Different implications for developing, middle income, and rich countries*

Does GDP per capita serve a more useful function in evaluating processes and policies in developing countries – defined by the World Bank as having an average GDP per capita of less than US\$6000 – than in developed countries? It is often believed that especially poor countries require GDP growth in order to improve the well-being of their citizens. In Section 2 (point 6; see also Appendix A.6 in the Appendix) it was suggested, however, that in many cases income growth here just represents a shift of activities from the informal to the formal sector. Particularly in very poor countries this may be accompanied by a loss of local community and subsistence agriculture, as well as migration of farmers to urban slums, with predictable negative consequences for food availability, health and quality of life. Moreover, income inequality may increase during the process (the initial part of the well-known Kuznets curve). Such very poor countries dominate among those that the World Bank classifies as ‘low income countries’ and the UN as ‘low human development countries’ (according to the HDI). Middle income countries may often show a positive correlation between income and welfare growth. However, negative impacts on welfare and health may result here from severe environmental pollution and resource degradation. This is illustrated by the current development of China. Finally, moving on to high income countries, the results reported in Section 2 (point 4; see also Appendix A.4 in the Appendix) support the idea that GDP growth there does not contribute much to welfare growth (the ‘threshold hypothesis’). Indeed, welfare seems to have stagnated for the richest countries in the world, despite continuing growth of GDP per capita. This is not surprising given that in these countries all basic needs are more than satisfied, so that the consumers in these countries are mainly involved in adaptation to economic changes, and a zero-sum rivalry game of income and status consumption.

7.4. *Abolishing GDP should not be confused with ‘anti-growth’, ‘anti-innovation’ or ‘anti-accounting’*

Many people responding to an early draft of this paper concluded that the author must be against GDP growth. But they seem to confuse ‘no GDP indicator’ with ‘no GDP growth’. It is important to realize that without a GDP indicator GDP growth is no longer measured. Ignoring GDP information reflects the irrelevance of GDP growth and not an anti-growth position. Given that GDP is not a good welfare indicator, one should not be in favour of unconditional (always) GDP growth (or “growth-fetishism”). To strive under all circumstances for GDP growth puts an unnecessary constraint on the space within which we search for welfare growth.¹⁷ In fact, it means that GDP growth cannot be traded-off against something else. History shows that, with the availability of a GDP indicator, structurally striving for (GDP) growth is not just a risk but inevitable. Evidently, the temptation is too large.

Ignoring GDP information in policy must not be confused with a plea to restrict individual income growth. Individual income growth can mean satisfaction of more (basic) needs or more happiness due to an improved relative income position (Section 2, points 3 and 5; see also Appendices A.3 and A.5 in the Appendix). From an individual perspective it can therefore

¹⁶ Azar and Schneider (2002) show that the costs of reaching what the IPCC considers “safe” concentrations of CO₂ in the atmosphere, for the world as a whole, fall in the range US\$1 tot US\$20 trillion. Although these are impressive figures, they imply less than 3 years delay of reaching a certain income level 100 years from now (given 2% GDP growth). Interpreted this way, the costs of a stringent climate policy are marginal in economic terms in the long run.

¹⁷ Using the same logic, there is no reason to be generally against GDP growth. In fact, growth critics or anti-growth proponents should seriously consider shifting to oppose GDP information instead of GDP growth. The logical position on growth that follows is a neutral one.

make sense to strive towards income growth. Moreover, even if individuals do not get happier from individual income growth (e.g. due to adaptation), then still status-seeking will make them strive for more. However, as argued in Section 2, from a social perspective continued income growth ultimately results in what is at best a zero sum game and possibly, given e.g. environmental externalities, a negative sum game. For this reason, a society and its government should not foster economic growth as a goal in itself.

In addition, ignoring GDP does not imply a plea against innovation. It will, though, result in attaching more value to innovations that improve social welfare than to innovations that will promote GDP growth but have less clear or even negative social welfare benefits. Innovations with a positive welfare effect and negative growth effect will become more attractive. Interestingly, many of these can be found in the area of sustainable technologies, such as renewable energy and energy-efficient production and housing. Removal of the GDP information failure is likely to change, through its effect on financial markets, investors and public policies, the incentives for innovations in the direction of welfare improvement as well as sustainable production and consumption.

Furthermore, it should be stressed that criticism of GDP as a welfare indicator and its role in public debates and policy preparation should not be seen as a critique of the system of national accounts. Whereas GDP is the most aggregated description of the economy, the national accounting system provides a detailed, disaggregated picture of the flows of goods and services along with complementary monetary transfers. As a result, the national accounts can support economic modeling and forecasting, analysis of productivity growth of sectors, and financial planning by the government. Interestingly, national accounts are being transformed and extended to eliminate various shortcomings related to informal markets, natural resources and environmental damage. But despite such improvements, the method of GDP calculation has remained largely the same.

Finally, is it realistic to think that the information failure associated with GDP can be removed? Recalling the conceptualization of the GDP paradox as a problem of lock-in (Sections 3 and 4), one will understand the difficulties involved. Economists and their training play a central role in maintaining the idea that GDP information matters. To begin with, therefore, economic education should pay due attention to the shortcomings of GDP information, and the entire curriculum (notably macroeconomics) should be screened for any uncritical use of GDP information. This will inevitably imply a thorough revision of many textbooks. Next, economists should consistently and explicitly advise politicians and journalists to reduce attention and concern for GDP in the public arena. Research and related publications by economists should be filtered for use of GDP as an ultimate goal.

8. Conclusions

This article has examined the paradox that despite all theoretically and empirically motivated criticism of GDP as a social welfare and progress indicator, its role in economics, public policy, politics and society remains influential. To support the starting point of the analysis, Section 2 summarized the large literature which has identified the imperfections of GDP. This delivers the unambiguous conclusion that GDP suffers from many serious shortcomings.

To understand the 'GDP paradox', one has to recognize that many academic economists accept the criticism of the GDP indicator but deny its relevance. This denial was suggested to come in two forms. The first is a belief that the size of the impact of GDP information on economic reality is modest. Section 3 examined this view and arrives at an opposite conclusion, namely that GDP information has a large impact on both private and public decisions, and therefore on the economy at large and the direction of long term economic development. Section 4 then explained on the basis of various aspects of bounded rationality – including the tendency to conceptually simplify complex problems, conformism and docility – in combination with uncritical or even biased information provision by education and public media, why so many people believe in the relevance of GDP information.

A second type of denial of the relevance of GDP criticism is that despite its shortcomings, GDP still provides useful information. Section 5 considered this view, and concludes that the various arguments commonly mentioned in favour of GDP do not have a clear structural association with, or interpretation in terms of, social welfare. Moreover, the arguments reflect mistaken beliefs, irrelevant considerations, or a focus on the role of GDP information as an intermediate variable. Combining the insights of Sections 2–5 gives the conclusion that GDP represents a serious information failure: it suffers from many shortcomings and has a large influence on socioeconomic reality.

A widespread view among economists is that we should not get rid of GDP until a good alternative aggregate indicator is available. Two counterarguments were given here. First, the many efforts to develop an improved indicator of social welfare and progress show that it is unlikely that a perfect indicator will arise in the near future. All current alternatives suffer from various shortcomings, even though most of them represent a clear improvement over GDP. Second, regardless of the availability of perfect alternatives, it seems wise anyway to remove the GDP indicator as it is seriously misleading information. One should especially take into consideration that this information failure is structural and affects long term economic structure through its influence on investment and innovation decisions by private and public agents. Removal of such an information failure really deserves an unreservedly enthusiastic response from economists. It is possibly the largest information failure we are facing, given that GDP is a central indicator in all countries and supranational governance structures.

Section 7 offered various additional arguments and examples to show that dismissing GDP as an indicator to monitor economic progress and guide public policy will lead to public and private decisions that are more in line with improving human well-being. Economists can create a better world simply by pleading in favour of a reduced role of GDP information in the public arena, rather than continuing to assume that GDP growth is necessary and sufficient for progress. The constraint of unconditional GDP growth unnecessarily limits the space in which we search for human betterment.

Despite the fact that many respected economists have expressed or supported the fierce criticism of GDP as a welfare or progress indicator, the large majority of economists, journalists, civil servants and politicians are not concerned at all about the imperfections of GDP information. The support for the GDP indicator thus turns out to be rather dogmatic or at best habitual, instead of well reasoned. As a result, changing the tide will be very difficult. It was argued here that one can understand the GDP paradox as a 'lock-in' of the idea that GDP growth means progress. By definition, it is hard to escape from a lock-in situation. At least a large shock is needed. Economists could cause such a shock, by pleading together in favour of ignoring GDP information. To accomplish this, a critical mass of economists is needed who frankly and openly recognize the large information failure associated with GDP.

It was made clear that arguing in favour of a diminished role of GDP is not a plea against growth. Without a GDP indicator GDP growth is not measured, which reflects a neutral opinion regarding GDP growth, and definitely not an anti-growth position. This subtle point has not been well recognized, by neither unconditional proponents nor opponents of economic growth. In addition, a plea to ignore GDP information in public policy should not be interpreted as a statement against innovation, national accounting, or the use of GDP as an intermediate (model) variable.

To assure that policy more systematically incorporates insights about what matters for real welfare, including lessons about lexicographical preferences, relative income, status and rivalry, it is pertinent that expertise on subjective well-being and happiness finds its way to policy makers and politicians. In particular, subjective indicators obtained with studies and comparisons of happiness via surveys can form a basis for innovative indicators of welfare. This would suggest a role for (economic) psychologists in macroeconomic policy preparation and advice (see also Diener & Seligman, 2004; Kahneman et al., 2004a). Given the findings of the happiness literature, one should also be prepared to accept that welfare can reach a maximum, that is, growth of welfare may ultimately tend to zero, and for many countries possibly already has reached this point.

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Appendix A. Main criticisms of GDP per capita as an indicator of social welfare or progress

A.1. Principles of proper accounting

The use and calculation of the GDP (per capita) indicator is inconsistent with three principles of good bookkeeping: (i) divide clearly between costs and benefits; (ii) correct for changes in stocks and supplies; and (iii) use accurate measures for all social costs (=private + external costs). If a commercial company were to employ the method that is the basis for calculating GDP, its accounts would not be legally approved. The fact that the GDP calculation method continues to coexist with institutionalised, legal rules for financial accounting of firms is somewhat of a mystery.

Whereas firms employ separate accounts for benefits (revenues) and costs (outlays), the GDP adds benefits and costs together. According to Stiglitz (2005) "No one would look at just a firm's revenues to assess how well it was doing. Far more relevant is the balance sheet, which shows assets and liabilities. That is also true for a country." In addition, a decline in stocks that represent value or welfare is not taken into account (e.g. natural gas in the earth). An additional shortcoming is that GDP covers the costs of the provision of certain public goods, such as national defence, even though it is evident that the costs of public goods cannot serve as an adequate measure of the benefits associated with these goods. Finally, many private goods show diverging private and social costs because of all kinds of market failure, including imperfect competition, price agreements and technical-physical externalities.

Mishan (1967) and Daly (1977) conclude that GDP must be considered as an estimate of the total cost of all market-related economic activities in a country. Their actual benefits or real welfare effects are unobserved, that is, not measured by means of GDP.¹⁸ As an implication, GDP growth should not be considered as an indicator of progress, but as a reflection of

¹⁸ Daly (1977) has proposed the notions of "ultimate means" and "ultimate ends". He considers economic activity as an intermediate end (or an intermediate means), so that it is best regarded as a cost factor from the perspective of ultimate ends.

increasing costs of economic change (whether progress or decline). This explains why GDP and welfare growth do not necessarily coincide. At a certain moment, GDP growth creates more costs than benefits, so that an optimal scale of economic activity will be surpassed (Daly, 1992). Economists are happy to argue in favour of cost-benefit analysis as a general method for policy evaluation and support. When it comes to the direction of the economy as a whole, many of them suddenly are satisfied with only information about costs, that is, GDP information.

Finally, the correction of GDP for inflation is required to make estimates comparable over time. This leads to the particular problem that the correction is based on an average consumption basket, which is regarded as representative for the entire population. However, the more skewed is the income distribution or the more heterogeneous in terms of consumption (purchase) behaviour is the population, the more inaccurate and thus less representative this procedure will be.

A.2. Intertemporal considerations

Macroeconomics, and within it especially economic growth theory, is concerned with the dynamic aspects of the economy as a whole. Macroeconomics does not offer any support for GDP as a measure of social welfare. Quite the contrary, optimal (normative) growth theory proposes models that explicitly use some theoretical notion of social welfare resulting in an objective function (based on continuous or overlapping generations) that does not generally come down to a GDP type of criterion. Weitzman (1976) has shown that under rather severe restrictions the national product can serve as a proxy (stationary equivalent) of a utilitarian intertemporal welfare function formulated as a net present value of future consumption flows. Vellinga and Withagen (1996) have generalized this result. Three objections can be raised against the relevance of these theoretical findings. First, the instantaneous utility function is approximated by consumption (Weitzman) or by a Taylor series in the arguments of utility – consumption and capital (Vellinga and Withagen). Second, one needs to assume that there is no pure time dependence in the form of, for instance, exogenous technical change or exogenously changing world prices; time can only enter in the form of a time preference rate. Both these choices imply a deviation from actual social welfare. Third, a specific intertemporal function is posed, without any empirical support, as a suitable representation of social welfare. However, one might instead adopt an egalitarian or Rawlsian welfare approach, or any other (hypothetical) social welfare function.

Next, the fact or belief that GDP growth in certain periods or regions has correlated positively with progress (however measured) should not be confused with the idea that GDP (growth) is a good measure of social welfare (progress) in general. In other words, the correlation may be low or even negative in certain periods and regions. If, by way of thought experiment, one extrapolates a constant tempo of real GDP growth towards the distant future, one will end up with an incredibly high GDP. But it is very unrealistic to suppose that social welfare will reach a comparably high level. To illustrate this, using 2% as a conservative estimate of the average yearly GDP growth rate over the past decades, extrapolation of this rate 1000 years into the future gives a GDP that is $(1.02)^{1000} \approx 400$ million times as high as the current GDP. Surely, no one can believe – if only on the basis of introspection – that individual and social welfare can increase to such an extent. This shows that, in the long run, GDP can not serve as a good indicator or even rough approximation of social welfare. Definitely, at some point a de-linking of GDP and welfare must occur. In fact, it is very well possible that such de-linking has already occurred for many rich countries in the world. This is in fact suggested by a number of empirical studies (Section 2.4).

A.3. Lexicographic preferences

People have various basic needs, such as air, water, food, sex, shelter, company, respect and freedom. These cannot be traded off against luxury services and material goods – in fact, the latter often serve as a sublimation of the basic needs themselves (e.g., status goods to gain respect from peers). In other words, substitution between broad categories of consumption is limited, even though within categories it may be present (e.g., one type of food for another). This is the core of the notion of lexicographic preferences (Day, 1971; Encarnación, 1964; Georgescu-Roegen, 1954; Tversky, 1972), which is closely connected with the older idea of the Maslow pyramid in psychology. Lexicographic preferences can be defined as having two characteristics: (i) individuals have limited needs in certain goods or services, as feelings of satisfaction occur after consumption reaches a certain level; (ii) ‘lower’ needs (e.g. the removal of thirst and hunger) need to be fulfilled before ‘higher’ needs (e.g. recreation) can appear. Within this framework, income growth and the associated growth of material consumption, notably in urban and polluted environments, is an imperfect compensation for a lack of satisfaction of basic needs, such as relaxation, space, serenity, clean air and water, and direct access to nature. As a result, one cannot be sure that (individual and social) welfare will increase, despite GDP and individual income growth.

The previous point does not mean to suggest that GDP growth always implies more material consumption. It is quite possible that it comprises an increase in services. What this in turn yields in terms of welfare is difficult to say in general. Sen's (1999) concept of individual ‘capabilities’ may be useful here. This tries to bring goods and services into a single denominator by emphasizing freedom and opportunities to choose, as well as context-dependent functionality of goods and services, based on taking into account the peculiarities and environments of individuals. Examples of the latter are being disabled versus being perfectly healthy, and living in a dense, busy city versus living in the countryside: different goods and services may be needed to realize the same level of welfare in these alternative circumstances. Income indicators do not correlate well with capabilities and opportunities in these various welfare-relevant dimensions.

A.4. Empirical analysis of individual happiness and social welfare

A growing field of subjective well-being analysis on the basis of empirical data has produced many insights about the determinants of welfare or happiness.¹⁹ Studies of this type are being undertaken by economists, psychologists and sociologists. This research has first of all delivered the insight that, somewhere in-between 1950 and 1970, the increase in welfare stagnated or even reversed into a negative trend in most western (OECD) countries, despite a steady pace of GDP growth. Blanchflower and Oswald (2004) offer such an analysis for the UK and the USA.²⁰ This insight is confirmed by the 'Eurobarometer surveys', the half-yearly opinion polls of the inhabitants of the EU Member States, as well as by corrections of GDP that seem to point more in the direction of social welfare (e.g. the ISEW indicator of Daly & Cobb, 1989; see Section 6 on this). The income level at which de-linking occurs between GDP and (subjective) social welfare has been estimated to approximate \$15,000 (Helliwell, 2003). This has been referred to as a 'threshold hypothesis', reflecting that the costs of growth exceed the benefits (Max-Neef, 1995, p. 117): "... 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."

Subjective well-being studies also show that, at the individual level, income does not perfectly correlate with welfare – indeed much less than is often taken for granted – so that absolute individual income is not a good, general proxy of individual welfare (Easterlin, 2001; Ferrer-i-Carbonell, 2005; Frey & Stutzer, 2002; van Praag & Ferrer-i-Carbonell, 2004). Relative income is relevant (see Section 2.5). In addition, other – income-independent – factors influence individual welfare or happiness. Important ones are: being employed, having a stable family (and having a partner), being healthy, personal freedom (political system), having friends, and belonging to a tight social community. This type of research further shows the relevance of unobservable or not easily observable factors, notably a pessimistic or optimistic attitude towards life in general. A recent empirical study by Ferrer-i-Carbonell and Frijters (2004) concludes, on the basis of an analysis of the effect of this attitude, that the belief that "being rich makes people happy" can better be replaced by "happy people are more likely to be rich". For it appears that optimistic individuals are on average relatively happy and successful in life (*ceteris paribus*), and on the basis of the latter enjoy a relatively high average income (see also Lyubomirsky, King, & Diener, 2005). In addition, this type of research indicates that the well-being of men on average responds differently to income changes than that of women. Responses also differ among income brackets. Now if income does not render a reliable and robust measure of happiness at the micro-level, then it is very unlikely that the aggregation of individual incomes in a GDP provides a robust indicator of social welfare at the national level.

Another important insight of this literature is that individuals adapt or get used to changed circumstances, such that their subjectively felt well-being does not increase (Frederick & Lowenstein, 1999). This relates to the fact that our senses can only handle a limited amount of stimuli, so that beyond a certain threshold a feeling of satisfaction or boredom arises. A change in circumstances can of course create a one-off or ephemeral welfare effect, but this typically will quickly fade away. Since people do not realize the phenomenon of adaptation they keep striving for 'more'. Terms like 'addiction', 'hedonic adaptation' (Helson 1964), 'hedonic treadmill' (Brickman & Campbell, 1971) and 'preference drift' (van Praag, 1971) are used in this respect. There is further evidence that individuals adapt more when confronted with changes in pecuniary versus non-pecuniary categories (Graham, forthcoming).

Utilizing subjective well-being indicators for a large number of countries – on the basis of World Values Surveys data (Inglehart, Basanez, Deiz-Medrano, Halman, & Luijckx, 2004) – Layard (2005) concludes that, whereas countries with high incomes show little variation in average reported happiness, this is quite different for countries with low incomes. The first group is dominated by countries of Protestant origin, which may point to a religious factor at stake. In addition, one cannot exclude a serious influence of climate conditions and political systems (notably communism versus enlightened capitalism) on happiness. This suggests that, at best, the relationship between GDP and happiness or welfare is conditional on various other aggregate features. In addition, the country comparison by Layard clarifies that happiness is characterized by diminishing returns of increases in GDP per capita.

Happiness evidently depends on leisure. But leisure is not captured by GDP. Quite the contrary, it has an opportunity cost of not being productive in terms of contributing to GDP. A study by the OECD (2006) makes adjustments of GDP by valuing leisure at average income (GDP) per worked hour, and finds that the result (in per capita terms) leads to a different ranking than according to GDP per capita. In this ranking, The Netherlands scores best of all OECD countries. Two factors contribute to this: the inactive part of the working force is relatively large, and part-time working is very common (de Groot, Nahuis, & Tang, 2006).²¹

¹⁹ No sharp distinction is made here between notions like utility, welfare, well-being and happiness. One reason is that disciplines such as economics, sociology, and psychology have developed their particular jargon, even though this is not always well defined or consistently used. More importantly, empirical research does not make a sharp distinction between these various notions. In fact, differences between them are so subtle that they defy measurement. This does not deny the relevance of different interpretations or types of happiness.

²⁰ The original influential study is Easterlin (1974).

²¹ The introductory chapter in Bruni and Porta (2005) offers a discussion of different interpretations of happiness (short-term feelings of euphoria or long-term feelings of satisfaction). It notes a fundamental distinction between subjective hedonism ("seeking pleasure and avoiding pain") and objective eudaimonia ("striving for perfection that represents the realization of one's true potential").

A.5. Income distribution, relative income and rivalry for status

Sen (1976, 1979) considers the implicit treatment of income distribution as the main objection against GDP as a measure of welfare. The GDP per capita indicator emphasizes average income. An unequal distribution implies unequal opportunities for personal development and well-being.²² Furthermore, individuals or families with low incomes benefit relatively much from an income rise, because of the diminishing marginal utility of income. GDP per capita does not, however, distinguish between the expenditures of the poor on basic goods and of the rich on luxury (and often status) goods. In fact, given the higher prices of the latter these implicitly receive a relatively high weight. Of course, GDP growth can occur with a decrease in income inequality, but this is not a general fact. The Kuznets (inverted U) curve is often considered as indicative of the temporal relationship between income level and income inequality as countries undergo economic development (Kuznets, 1934). Nevertheless, it is too simple and deterministic in describing countries beyond a certain higher income level, as then complex interactions between economic and political cycles will affect the income distribution and thus social welfare of a country. For example, a higher national income might offer more financial room for public expenditures that redistribute income, e.g. through social security systems, which in turn may contribute to a higher social welfare (*ceteris paribus*). However, this will depend on the political context and possibly other factors, which may differ between countries despite having comparable per capita income levels.

A related but more subtle aspect of distribution is that individual welfare cannot be separated from the welfare of other individuals in the relevant social environment, also known as the 'peer group'. The resulting relative income and context dependent preferences (Tversky & Simonson, 2000) is characterized by an urge to compare oneself with others, rivalry ("keeping up with the Jones's") and "reference drift" (Kapteyn, van Praag, & van Herwaarden, 1978). This is another finding of empirical studies on the basis of subjective well-being. The relevant social context of individual welfare does not need to be fixed, but can change over time as a result of information and the media. Globalization means that the media transfer consumption images across the planet, with possible consequences for peer group size and associated welfare. Easterlin (1995) concludes on the basis of analyses of data on happiness, material norms, and income for various countries that material norms on which judgments of well-being are based increase proportionally with income. This means raising the incomes of all does not increase the happiness of all. Consistent with the notion of relative income is the idea that poverty has a relative dimension (here Sen's notion of 'capabilities' is relevant too). Subjective well-being research has shown that poverty often means that individuals are unhappy because they can consume much less than the majority of individuals in their social environment. Consumption surely is not only driven by (basic) needs but also by imitation and search for status.

The striving towards conspicuous consumption (Veblen, 1899), "positional goods" (Hirsch, 1976) and "status goods" (Howarth & Brekke, 2003) are at the core of rivalry in consumption. On the basis of experiments and surveys, Alpizar, Carlsson, and Johansson-Stenman (2005) find that relative consumption not only plays a role in the case of goods like houses but also holidays and even insurance.²³ Earlier, Solnick and Hemenway (1998) assessed that a majority of respondents would rather opt for being poor in absolute terms and rich in a relative sense than vice versa.²⁴ Ever since Darwin, biologists have known that the function of conspicuous and extravagant features of animals is to attract sexual partners and repel competitors.²⁵ Humans are no exception – we are animals after all. Moreover, it is confirmed by studies across time and cultures (e.g. Buss, 1989). The fact that individuals who already have a partner and offspring still keep seeking for status through consumption is the mere result of the automatic nature of this type of behaviour, which became fixed in our genes through repeated sexual selection within our species and its predecessors. Striving towards individual income growth is thus completely understandable²⁶ but will not necessarily lead to an increase in happiness when others aim at the same goal. Consumption of status goods generates negative, positional externalities as it directly affects the welfare of others (Frank, 2004). The GDP completely omits these relative income and positional aspects of welfare.

Relative income is closely related to changes in preferences. Consumer preferences are to a large extent formed by the media that in turn is steered by commercial (business) interests. Here ample use is made of individuals' feelings of rivalry. In other words, advertising (mis)uses our sensitivity to status and imitation or fashion. Children show the utmost sensitivity to advertising aimed at fostering rivalry, but adults do not behave fundamentally differently. The rivalry in the striving towards individual growth of income and consumptive outlays is referred to as the "rat race" and the "affluenza virus" (e.g. Layard, 2005). Income growth almost always goes together with new products and related changes in preferences, but no

²² According to Stiglitz (2005) median rather than average GDP serves a better job in capturing inequality. He emphasizes that average GDP per capita in the US has been steadily rising whereas median (household) income has been falling over the last decades.

²³ The study also assesses an absolute welfare effect. A derived question, the answer to which is not easy, can be formulated as: To what extent does technological change, in particular product innovation, contribute to happiness through an increase of absolute (as opposed to relative) welfare of consumers? The relationship between GDP growth, technical change and welfare or happiness deserves critical examination. But even if technological change turned out to always be welfare enhancing (which has not been proven), one should not *ex ante* assume that the best technological and therefore welfare-enhancing strategy would be 'GDP growth no matter what'.

²⁴ The analytical-theoretical work starts with Duesenberry (1949). Recent contributions are Arrow et al. (2004), Hopkins and Kornienko (2004) and Daly et al. (2007).

²⁵ In biology the fact that only individuals with a high physical or mental quality can carry the costs of extravagance is denoted by the term "handicap principle". That one can waste means to seemingly useless – but certainly not 'fitness-less' or 'function-less' – consumption provides a signal of superiority and quality, which increases the social status, as a result of which the probability of finding a suitable sexual partner and therefore fitness increase.

²⁶ Kahneman, Krueger, Schkade, Schwarz, and Stone (2004b) mention the 'focusing illusion', the tendency of people to overestimate the contribution of any single factor on their well-being. They test this illusion for the factor income and find it holds true.

one guarantees that creating new preferences contributes to people's happiness. Reference drift can then ultimately result from a combination of advertising and comparing with, as well as imitating, others.

The phenomenon of relative income and context-dependent welfare does not just explain why humans strive for income rises. It also clarifies that an increase in relative income can improve the welfare of the respective individual, whereas social welfare is not being served by it. The reason is that status is a very scarce good, causing rises in relative income and welfare to resemble a zero sum game: one individual loses what another one gains (Frank, 1985, 2004; Layard, 2005).²⁷ In other words, you cannot make everyone increase in relative income. The relatively rich are generally happier than the relatively poor; this has always been so, and GDP growth will not change it. The rise of the relative income of an individual can be regarded as a negative external effect (external cost) on the welfare of the one whose relative income drops as a result of it. As is well known, externalities are harmful to social welfare, and need to be corrected.²⁸ The important conclusion of the foregoing for our purpose here is that, by being unable to consider relative income and rivalry in consumption, GDP will overestimate welfare/progress.

A.6. Formal versus informal economy

In general, GDP just covers activities and transactions that have a market price and thus completely neglects informal transactions between people that occur outside formal markets. The formal market dimension of human activities can comprise a large or small part of total human activity, depending on whether one observes OECD countries (a large part), economies in transition (medium) or less developed countries (small). The fact that the informal economy is left out of consideration explains why GDP per capita for many countries in the latter group can be so extremely low. At the same time, it can easily give a wrong picture of how (un)happy people really are.²⁹ This is amplified by the problem that the size of the informal economy relative to that of the formal economy may change considerably over time, both in developing and developed countries (Bos, 2006).

Actual GDP growth often comes down to a transfer of existing informal activities (unpaid labour) to the formal market. This means that the benefits were already enjoyed but the market costs were not yet part of GDP. This clearly illustrates the earlier point by Mishan and Daly (Section 2.1) that GDP reflects the costs of reaching a certain, unknown welfare level and not that welfare itself (i.e. the benefits). With transfer of existing activities from the informal to the formal circuit, economic growth means that the costs increase more rapidly than the benefits, and in the worst case only the costs rise. This holds, for instance, when informal activities like subsistence agriculture in developing countries, voluntary work, household work, and child care disappear. Such activities originally took place within the informal family circle and the local community. Transfer from the informal sphere to the formal market also occurs when people are born, die or are nursed in a hospital instead of at home.

The GDP therefore does not recognize the value of all kinds of informal activities and services. As a result, public policy is often aimed at cutting back and discouraging informal activities. This can be interpreted as a strongly normative goal that is not entirely without risks for social welfare. The transition from an informal to a formal economy in itself offers no guarantee for a rise in happiness or welfare. For example, local social contacts – that form the basis for stable and happy lives – are much stronger and occur more frequently within informal than formal economies. In other words, 'society' in the strict meaning of the term has a value that is not captured by GDP.

Obviously, it is not my intention to defend the extreme position that a transition from an informal to a formal economy automatically works out badly for social welfare. It is evident that labour division and specialization can be carried through more extensively in a formal than in an informal economy. It is possible, though not certain, that as a result of this productivity increases, labour conditions improve and the choice spectrum (diversity of products) for consumers is widened.³⁰ These advantages do not neutralize the earlier mentioned negative welfare consequences of a transition to a formal market economy. Indeed, many other negative aspects should be taken into account. For example, if the labour market grows in scale, it stimulates commuting (distances), as well as people changing their house for a job. This erodes local community structures, with negative effects on individual happiness. In developing countries, the trajectory towards the formal economy often goes together with a large-scale migration of 'subsistence' farmers with big families to the slums of large cities.

The main message here is that GDP cannot serve as a measure to judge the welfare impact of fundamental changes that involve transitions from an informal to a formal economy. The expansion of markets to include informal activities is not al-

²⁷ Empirical studies even suggest asymmetry in the sense that the 'poor' lose more happiness than the 'rich' gain (Ferrer-i-Carbonell, 2005). This would imply a negative-sum game. This asymmetry was already suggested a long time ago (Duesenberry, 1949).

²⁸ In addition, the attention for 'market consumption', including search, gathering information about (new) products, spending much time in shops and malls, and buying things that are hardly ever used, can divert adults as well as children from activities that contribute much more to happiness, such as more leisure (less working, less spending), playing with your kids, taking time for the extended family (grandparents), friends and neighbours, etc. (Schorr, 1998).

²⁹ For a large number of African and a small number of Asian countries, GDP has been regularly subject to corrections and adaptations based on estimates of the value added of the informal agricultural sector. Such corrections are less common for Latin-American countries (Charmes, 2000).

³⁰ According to recent field and experimental studies by psychologists a larger choice set may have a direct negative effect on individual motivation and welfare because of "choice overload", caused by incomplete information, search costs, and too much dependence on information offered by experts (Iyengar & Lepper, 2000). Herbert Simon's notion of bounded rationality, i.e. limited brain capacity to process information and 'satisficing' behaviour, offers an additional, complementary explanation of this phenomenon (Simon's famous statement "...a wealth of information creates a poverty of attention ..." is also relevant here).

ways good for social welfare, even if GDP is raised. One might suspect that a certain combination of informal and formal (market) relationships between people would render the best of both worlds. With the GDP indicator, however, one cannot judge this in any way, since GDP omits the informal dimension of the economy. In the light of the continuous, idealistic public debate on the (un)desirability of expansion of the market domain it is therefore of utmost importance to not rely on GDP but to use adequate, real welfare indicators.

A.7. Environmental externalities and depletion of natural resources

The previous point is a specific case – through conceptually a very important one – of the more general criticism that GDP omits the value of non-market goods and services. Another example of unpriced effects relates to the natural environment and resources. This involves negative external effects as well as goods and services delivered by nature. The presence of externalities means that the current set of market prices insufficiently reflects the total (private + external) costs, which makes these prices unreliable signals in whatever calculation aimed at producing a social welfare indicator. Moreover, if air, water, or a natural area is being polluted any damage does not enter GDP, but when pollution is being cleaned this increases GDP. In addition, the (capital) depreciation associated with environmental changes (fish stocks, forests, biodiversity) and depletion of resource supplies (fossil energy, metal ores) is missing from the GDP calculation.³¹ As a result, we are considering ourselves ‘richer’ than we really are (Atkinson et al., 1997). It makes sense to define real, meaningful income as sustainable income: namely, as the maximum amount of income (or consumption) in one period without depleting capital or without harming the capacity to generate the same or higher level of income in future periods (Hicks, 1948). Maintaining this capacity requires sustainable capital utilization, regardless of the type of capital: human capital, machinery, and natural capital (natural resources and ecosystem services). Here we focus on sustaining the latter.

A fundamental consequence of neglecting sustainability of natural capital has already been mentioned: namely, that the use of GDP as an indicator of welfare and progress means regarding substitution of basic conditions – like space, serenity, and direct access to nature and water – by market goods – like large houses, roads, cars, sewage systems and water purification, and expensive holidays in exotic locations – as progress. This in turn will unnecessarily stimulate the replacement of ‘nature’ by the ‘market economy’. A correct economic welfare approach would only characterize changes as real progress (welfare improvement) if they are accompanied by a sustainable use of environment and nature. Huetting (1974) already recognized this early on, and his elaboration of a measure of a green or sustainable income is based exactly on this insight (Gerlagh et al., 2002).

The previous list of arguments is non-exhaustive.³²

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³¹ Non-renewable resource depletion presents a special problem. It is widely agreed upon that the method proposed by El Serafy (1989) should be followed here. This transforms the finite income stream from a non-renewable resource stock into a (lower) infinite stream of income from other types of capital (manufactured and human capital). The method computes the difference between these two income streams and deducts the resulting cost. The latter is referred to as the ‘user cost’ of non-renewable resource extraction. This approach thus assumes that (and works only if) one can sustain an infinite stream of income by substituting the non-renewable resource by other types of capital. Hartwick (1977) provides the theoretical basis for this line of thought.

³² For example, Dasgupta (2001) suggests that expenditures on defence, a significant part of GDP, in many countries contributes to GDP overestimating social welfare. He notes: “But in poor countries the machinery for warfare is all too frequently used by governments against their own people ... This means we can ignore defence expenditure ...” (p. 53). Laband and Sophocleus (1988) and Dougan (1991) further draw attention to the enormous rent-seeking costs of modern economies, which boost GDP (e.g. through the activities of lawyers). Clark, Kahn, and Ofek (1988) use hedonic price techniques (based on income compensation) to assess the impact of urbanization on social welfare. Their findings suggest a GNP-as-welfare deflator in the order of 6–7%, which steadily increases at a rate of half a percent per decade.

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