

MPRA

Munich Personal RePEc Archive

Beyond GDP - Measuring the Wealth of Nations

Wenzel, Tina

The University of Birmingham, Department of Political Science and International Studies

1 January 2009

Online at <https://mpra.ub.uni-muenchen.de/87288/>

MPRA Paper No. 87288, posted 28 Jun 2018 10:27 UTC

The University of Birmingham
Department of Political Science and International Studies



Beyond GDP - Measuring the Wealth of Nations

Tina Wenzel

BSc Economics & Politics

Supervisor: Ronen P. Palan

Approximate word length:

13499

2009

ACKNOWLEDGEMENTS

I am grateful to Professor Ronen P. Palan for supervising this thesis.

I also express my gratitude to the various external correspondents like Professor Herman Daly (Professor of Economics at the University of Maryland) for insightful e-mail contact on the issue of SWEI, Sören Haffer (Conference Manager, Institute for International and European Environmental Policy) for answering questions on the relevancy of GDP in determining EU-policy; Mr. Martin Collier (Executive Director and a Managing Board Member, Glaser Progress Foundation) a for answering questions on the GDP relevancy and alternative indicators.

Further gratefulness shall be expressed to various UoB staff for their attention and advice in form of conversations and e-mail correspondences: Professor Rowan Jones, (Professor of Public Sector Accounting at the Birmingham Business School) and Professor David Alexander (Professor of International Accounting at the Birmingham Business School) for insightful discussion on National Income Accounting Issues and Public Sector Accounting. I also thank Dr. Matthew Cole (Reader in Economics, UoB) and Dr. David Maddison (Reader in Economics, UoB) for insights in environmental economics and the vivid attempt to discourage me from the empirical part. Further thankfulness shall be expressed to Dr. Nicholas Horsewood (Lecturer in Econometrics, UoB) and Dr. Joane Ercolani (Lecturer in Economics, UoB) for very helpful advise on questions regarding data handling and model specification in the empirical part, as well as Professor Somnath Sen (Professor of Development Economics, UoB), Dr Siddhartha Bandyopadhyay (Lecturer in Economics, UoB) and Professor Peter Sinclair (Professor of Economics, UoB) for sharing their opinion on the issue in personal discussion and e-mails.

Contents

Tables.....	
Prologue	
Introduction	
I. Desirability	
1.1. GDP – Definition and policy relevance	
1.2. Policy Relevance – Political Economy of the GDP... ..	
1.3. Changing World views and their Paradigms in Progress	
1.4. GDP - Its Rise and Demise	
II. Utility	
2.1. The Growth-living standard link: How much do we benefit, if GDP goes up?	
2.2. Common Problems of Alternatives.....	
2.3. Environmental Adjustment.....	
2.4. Social Adjustment.....	
III. Feasibility.....	
3.1. Case study: Green GDP in China	
3.2. Conditions required for policy effectiveness of an adjusted GDP	
Conclusions	
Bibliography	
Appendix	

Synopsis

The following work devotes analysis to the consistency of the idea to measure the Wealth of Nations beyond GDP. Looking at the desirability, utility and feasibility of the concept, the main objective is to outline whether a socially and environmentally adjusted GDP would be able to have a real policy effect in the direction of sustainability.

Section I discusses the desirability of the issue and suggests that our current paradigm of progress needs serious rethinking, as it rests on teleological presuppositions prevalent in the 17th and 18th century - an antiquated mechanical world view, developed by Descartes and Newton. In this context, the historical ascendancy of GDP is discussed, outlining its rise and demise.

Section II then discusses the utility of an adjusted GDP. Departing from an analysis of the growth elasticities of poverty (health and literacy in Annex), which gives empirical evidence on the insufficient correlation of GDP per capita and living standards, conventional GDP will then be weighed against the alternative measures. An environmental adjustment will thereby be found justified on the ground of efficiency gain effects occurring along the allocation of resources and health expenditure among others, suggesting that the conventional GDP is inefficient and an economically irrational model to guide progress. Concerns will however be raised about the possible inflationary effect of a social adjustment, which is politically unfeasible under the current paradigm of progress and requires further research in terms of measurement techniques.

Section III then suggests that the feasibility is a political question. Taking the Case study of the failed Green GDP attempt in China, lessons learnt will be formalised on which I conclude with suggestions under which circumstances an adjusted GDP would be able to have a real policy effect in the direction of sustainability.

Prologue

Over the last 2 decades, an increasing number of intellectuals and economists have argued that GDP as conventionally measured is far from a robust indicator of economic and social welfare and the source of large scale market and government failure, as it provides a "Grossly Distorted Picture" of our economies and abstracts from major challenges facing us. i They argue that an adjustment for social and environmental costs is therefore necessary, as authorities will not recognise that they are following the wrong priorities at the cost of the environmental degradation and social inequalities, as long as GDP keeps increasing. Opponents have repudiated GDP criticisms and reject a qualitative improvement of the GDP due to the severe measurement problems which make such undertaking pointless and prone to political instrumentalisation. As there is truth in both arguments, the idea of a qualitatively revised GDP has continued a dire existence in research reports and journals for almost a generation now.

Introduction

Since the first set of national accounts were developed by Simon Kuznets in the 1930s, the GDP has emerged as the single most important economic indicator for

government policies and businessmen. As it compounds a whole sphere of economic activity in a single number and can be decomposed in its contributing parts, it is an invaluable measure of aggregate production that proves extremely valuable for extracting specific information about the activities in a particular sector. By including factors like corporate profits, GDP also indicates potential future consumption opportunities, as corporate taxes, investment in research and human capital and equipment increase long-term economic welfare.ⁱⁱ Further, the GDP is the broadest measure of income existing and has the noble features of being easily quantifiable, internationally standardised and above all readily available relatively consistently for all countries. As such it provides by far the best available base for comparative analysis, gives valid information about the position in the business cycle and has therefore emerged as the “godfather of economic yardsticks” for policy making in the 20th century.

However indispensable it may be as a macroeconomic indicator for policy models and evaluation, it has stringent limitations which are binding when it comes to say something about the welfare and progress beyond well-being that can be measured in monetary terms. GDP statistics measure the volume and composition of final output and were never intended to track anything beyond. By definition, GDP excludes various crucial factors important to determine the level and progress towards sustainable economic well-being, so that there is no necessary link between the expenditure and welfare. The more these excluded factors diverge at a rate different from GDP growth, the more inconsistent GDP thus becomes as a measure of economic well-being.ⁱⁱⁱ

Further, GDP considers all types of expenses as unequivocally good, as long as they increase output. As all spending is by definition positive and no further value classification is attached, GDP includes many expenses that do not contribute the overall welfare and often rather impede it. This absence of value judgements implies that environmental depletion increases GDP, while cleaning it up increases it further. Neither is there a distinguishable difference between a hypothetical country that spends all of its income on military production and another country that spends everything on education. The

more accidents occur, the more cancer patients are diagnosed and the more frequent earthquakes and tornados stimulate internal demand, the better the economic welfare of a country in terms of GDP.

In a similar vein, GDP only includes a narrow range of factors that contribute to economic welfare. As it only measures goods sold at market value, public goods that have no market value like social capital, or voluntary work and social institutions are not taken into account. However, these activities are still productive work. Excluding these factors, thus confines the credibility of GDP as a measure a nation's total production. ivWhile valuing positive externalities like a low crime rate, intact environment or household work is indeed a delicate endeavour, these intangible factors are very significant in creating stability and an enabling environment needed for precipitating welfare. v

Another serious issue is that GDP abstracts from inequality in income and consumption. While a country may be rich in GDP terms, the prosperity may be centred in the upper income class, making the measure unrepresentative for the lowest income population. GDP per capita has partly rectified this issue, does however still give a different picture, when controlled for the distribution of income (i.e. Gini coefficient) and the incidents of poverty.

Clearly, relying solely on GDP as a normative indicator thus gives a distorted picture of economic well-being, as it cannot measure the quality of growth. Without differentiating between positive and negative growth externalities and specifying what is meant to grow, economic analysis might not reveal the sustainable path and trigger misleading policy conclusions. Including disasters and contra productive economic activity simply for the sake of demand, makes progress or retreat in development therefore indistinguishable and the strategy of pursuing mere GDP growth an audacious undertaking.vi

Now judging a positive indicator of aggregate production, like the GDP, for failing to measure quality in progress is absurd. As the introductory quotation illustrates, these

limitations were explicitly pointed out by its developer, who after formalising the first GDP, spent the rest of his life cautioning people, not to over-interpret this measure of aggregate output. Nevertheless, real GDP per capita has come to be employed as much more than a positive macroeconomic indicator of production and is in fact today the standard definition of a person's economic well-being, conceptually used synonymously with living standards. As will be shown, the association between this number and well-being is not formally based on economic theory. Rather under the modernist paradigm of progress, GDP has grown into this wider definition over time and enthusiastically become associated with a vague and intangible terrain of well-being, progress and development.vii If thus in critical awareness of its limits, the GDP has become bravely employed as the implicit target of what societies should strive for and increasingly denoted something that goes well beyond its deterministic definition, then it is this imputation and inappropriate use of GDP that legitimates judgement.

While being arguably the best available approximation for living standards, it provides at best a very deficient and incomplete picture of the latter and it is not without alternatives. It so happened that a plethora of alternative indicators have been developed, the most famous among of which one might mention the HDI (Human Development Index), the GPI (Genuine Progress Indicator) and the Green GDP. After a number of conferences taking place on OECD and EU-level, and large research projects on the topic being carried out at international organisations over the last 20 years, the topic is currently being analysed by a working group co-chaired by no one less than the 2 laureates Joseph Stiglitz and Amartya Sen, who were commissioned by Nicholas Sarkozy to develop a "measurement of economic performance and social progress" that is more responsive to environmental externalities and living standards than the conventional yardstick.viii

This high profile selection of researchers denotes the importance the issue has gained over the last years and underlines the serious concerns that persist about the adequacy of GDP used as a measure of living standard and progress. In an era where seemingly "soft issues" like the environment, food prices, public health, population growth and poverty ceded to be side-issues, arising as key determinants in geopolitics and even

threats to global well-being, the issue about how we account for what we value seems to be taking center stage. As these challenges are cross-disciplinary, do not shy away from the artificial divides of national sovereignty and the narrow pursuits of relative economic gain, this seems to reflect more than a trend and rather a growing need to develop functioning incentives for a priority change in the actions of governments and individuals.^{ix}

Internationally binding conventions such as the Kyoto protocol are one well intentioned option to overcome the tragedy of commons. However, legal agreements have limitations as they can by definition never cover all cases; are based on outside enforcement, rather than intrinsic motivation; and carry above all high monitoring costs without guarantee of compliance. xAs Paul Hawken remarks, “no plan to reverse environmental and social degradation can be enforced if it requires a wholesale change in the dynamics of the market”.

Some people, including myself, would therefore argue that changing the incentive structures of the system, would lie more closely to the root and solution of the problem. The key is to civilise capitalism, which requires correcting the defect in its accounting system. If the right ecological and social incentive structures are set, markets will work for the environment, thereby responding to the genuine interests of current and future generations.

I depart from this *raison d'être*, acknowledging that given the need for long-term thinking and the relevancy to future generations, the topic genuinely deserves to be treated in form of a political economy dissertation. As it not only raises issues in political philosophy, but has real world policy implications that could concern pretty much the future of the planet, it is worth scrutinising the value behind the idea of an adjusted GDP to shed light on its consistency limitations and political consequences. With this in mind, this dissertation aims critically evaluate the value of this idea by analysing its desirability, utility and applicability/feasibility in order to see, whether a socially and environmentally adjusted GDP would be able to have a real policy effect in the direction of sustainability?

Section I discusses the desirability and approaches the question from a moral/philosophical point of view. I will describe how GDP has come to indicate what

societies should strive for and how, given the signs of climate change and increasing global inequalities, societies seem to have lost track of what we are chasing there? With reference to the different worldviews prevalent in different centuries, I will embark on a discussion of paradigms of progress, which emerged out of the particular historical context of a time, finding that our current paradigm in progress still shares many features with an outdated mechanistic worldview developed by Newton and Descartes in the 17th/18th century. Drawing then on the historical rationale of the GDP, its rise and demise in this framework will be outlined concluding on the need to redefine the narrow understanding of economic welfare going beyond GDP, giving way to rethink questions about what the wealth of nations should be and what progress we want?

Based on this analysis, Section II then accounts for the utility of a qualitative GDP. Looking for some evidence about the relevancy of GDP as a measure of welfare, an empirical analysis will first test the general assumption that GDP is associated with living standards, finding a weak correlation between the 2. The potential of broader definitions of progress indicators shall then be discussed with reference to mainly an adjustment for environmental (Green GDP) and for social costs. Given some general criticisms of all proposed adjustments, an environmental adjustment of GDP will be found an efficient ecological. Drawing on a Mc Kinsey study commissioned by the US government, evidence will be suggested that the longer we postpone environmental cost internalisation, the more costly this will be in terms of foregone growth due to inefficiently allocating resources. While this suggests that market economy and sustainable development are not mutually exclusive, the case of social cost internalisation will be found more difficult. Acknowledging the good intentions behind a socially adjusted GDP coherent with a very broad definition of progress, it will be outlined that the efficiency gain effect occurring with an environmentally adjusted GDP cannot be expected to occur when taking into account social costs. Rather, it will be found that additional social costs on aggregate levels will have to be transferred to the consumer, thereby making the desirable outcome politically very unpopular.

Section III then, argues that the feasibility of an adjusted GDP is a political question. Drawing on the case studies of China, where the attempt to implement a Green GDP has failed just a few years ago, lessons learnt will be analysed so as to draw possible generalisations to conclude and shows the conditions under which an adjusted GDP would be able to have a real policy affect in direction of sustainability and to what extend a

The main conclusions of the dissertation are that it is not rational to dismiss GDP as an indicator of welfare per se, but that it proves vital to adjust for environmental and some social costs, which not only reflect the social-economic situation more in the interest of society, but are equally balanced with utility so that the argument for an environmentally adjusted GDP can be made in terms of pure rational cost reasoning, while further adjustment for broader social cost inclusion would require a currently quite unrealistic change of mind set, as arguments cannot be made on cost grounds, which rather work against it and therefore requires further research.

The limitations of this dissertation are binding in terms of data availability, technical depth on indicators and amount of indicators reviewed. Largely reliant on UN data, the empirical part also had to make various simplifications in order to allow analysis. While the general findings of this analysis are compatible to previous findings, problems with non-stationarity in the data require a careful interpretation of results. Further, a discussion of measurement techniques went beyond the scope of this politics dissertation sothat the discussion was kept at a conceptual level.

1. GDP – Definition and policy relevance

1.1. Definition

The Gross Domestic product measures the size of an economy as captured by the market value of all goods and services sold within a given time period.

$$GDP = C + I + G + (X - M)$$

Based on the National Accounts, the GDP is a flow-measure of production, thus flows through the economy but non-productive financial transaction to avoid double-counting. Second-hand production like the purchase of stocks and bonds are therefore excluded, as they merely change ownership without additional creation of productive capital.

For policymakers, GDP is the preferred measure, as they are mostly concerned with the domestic economy. Over the years, a number of altered versions have been introduced with a slightly different focus, like the GNI and a nominal and real version have been developed to reflect different aspects such as geographic boundaries.

Moreover, the system of national accounts (SNA) on which the GDP indicator is based also provides information on the price level of output, and allows distinguish between nominal and real GDP. Nominal GDP denotes the total amount of money spent on output, while real GDP is adjusted for inflation. As it show the real value of goods and services, real GDP per capita has come to be used as an indicator of welfare and living-standard and its regional convergence has become a common indicator of development, narrow and simplistic in normative terms however as will be discussed later.

1.2. Policy Relevance – Political Economy of the GDP

As the most rigorous and most widely accepted economic indicator, the GDP it feeds into policy making in manifold ways. Not only does it epitomise the economic welfare of a country, given the thorough report on international, regional and industry accounts, it also provides the basis for a comprehensive examination of the impact of external and internal factors on the economy, as well as its components of final expenditure and income by industry sector and region.

As an easy-to-use barometer of business climate and for these reasons, its policy importance is substantial. On EU-level for example it plays a crucial role in shaping economic integration process by providing policy targets and eligibility criteria. Under the

Stability and Growth Pact for example, member states commit themselves that national debt should not exceed 60% of GDP and that the annual budget deficit should be below 3% of GDP.^{xi} Further, the target for overseas development aid of a member state is set at 0.7% of GDP and the resources of the Structural and Cohesion fund are allocated according to GDP per capita criteria.^{xii} In other policy fields it is even used as a direct measure of policy success. The most apparent example for this is monetary policy, where inflation is targeted according to whether or not it increases GDP as the key parameter. Given its crucial role in decision making as direct reference for policy analysis and essential economic yardstick to set policy criteria, targets and success indicators, it is unsurprising that GDP has been labelled “the godfather of the indicator world”.^{xiii}

Unsurprisingly, the GDP is therefore often used as a political tool, which has proven extremely effective in referring to growth and living standards at the same time. Politicians often stress that they have increased growth by..., suggesting how much they have made the country better off on their own and indeed, elections are won and lost on growth rates among others.^{xiv} This rather bold simplification has become the effective basis of a paradigm of progress which is very successful in perpetuating itself indefinitely. Adjusting the GDP, proponents argue, would uproot these polemics of growth and stop the abstraction from the biophysical and social reality we live in.

1.3. Changing World views and their Paradigms in Progress

The GDP has been the unrivalled yardstick for economic policy for such a long time that it might seem to most people as a totemic artefact. From a historic point of view however, the GDP stands at the recent end of the time spectrum, along which economic measurement standards grew out of their particular historical context and state of mind of an era. As civilisations developed from savage forms to peasants, manufacturers and service providers, so did their worldviews and the engendered mode of thought and values they accounted for. As Daly points out, it is only in the 20th century that this development seems to have come to a halt - stable or discontinued as one might phrase it.^{xv} A historical review

of the relation between the state of mind of a civilisation and their understanding of progress is therefore fertile as it allows insights into the understanding of value, welfare and progress over time, which lies at the heart of proposals of an adjusted GDP. Not only does it facilitate an understanding and unbiased account of the current system and how it came about, it is also crucial to project potential future developments, which is what the central idea of this dissertation is mainly concerned with.

What we account for depends on what we value. This has always been the case and, as we will see, is very closely connected to a particular understanding of progress in history. In the understanding of Greek philosophers for example, the world was the creation of an encompassing deity and was by definition perfect. In this theocentric understanding of the world, Plato and Aristoteles created a philosophy that perceived change in the established order as mere signs of decay. The world, they said, is subject to history as a cyclical decaying process, gradually moving from order to disorder, not progressing towards perfection over time.^{xvi} “Change meant corruption and disaster”, it was undesirable and suspicious and in an ideal order of society, it should therefore be avoided so as to slowdown the inevitable proceed of decay.^{xvii} One finds thus that the notion of growth and change were rather meaningless and had no association with value or progress. Progress was perceived as a horizontal process, where spiritual and intellectual satisfaction could be gained from the accumulation of knowledge. The ethos of the Ancient Greek world view hence implied that the salvation lay in preserving what was, for current and future generations – which sound like a hidden insinuation of modern environmental thought, sustainable development and steady state economics, which we shall come back to in due course. ^{xviii}

The world view shaped by theologians of the Roman Church in Medieval times was also “incompatible to the idea of progress.^{xix} Guided by the biblical concepts of “creation”, “redemption” and “last judgement”^{xx}, the Christian world view also suggested a picture of history that tended towards decay, without progressive features attached to it. History was also without direction, neither progressing towards perfection, nor backwards moving. God made history and mystical religious philosophies gave order to the structure of the Christian

paradigm which described a life fully guided by a moral code that left no room for human action to shape history as more than a mere participator, merely guided by duties and commitments, rather than desires and freedoms. Seeking salvation from the struggle of life between good and evil was crucial and rendered the idea of man as dominant of nature and history irrelevant. Again, the believe in progress or desire to measure it played no major role.

xxi

In the early 16th century however, the philosopher Francis Bacon challenged the theological authorities, by departing from the Greek traditional questions of *Why* to a scientific pragmatist research approach asking *How* exactly conditions could be controlled. Putting forth the idea that knowledge is power and that science can discover general laws without divine revelations and magic, his ideas were perceived as perverse blasphemy, but in due course this notion of history as a natural development should give rise to a progressive world view emerging in the late Renaissance where humans could manipulate their destiny on earth and direct it. Conjoint with the legacy of other enlightened thinkers like Abbe de Saint-Pierre, Voltaire, Turgot, Bodin and Montesquieu, Bacon eased the deification of human reason and a consequent admiration of objective knowledge and scientific proofs were signs of the belief of a new indefinite social progress gaining ground.

In the early 17th century then, the Cartesian world view became the scientific fundament of a philosophy where humans had finally become "masters and possessors of nature".^{xxii} Describing the underlying laws of a static mechanical world, Descartes had found "the source of all things" in mathematics and put forth an anthropocentric world view, where humans familiar with the laws of motion, were able to manipulate the latter towards their own divine ends.^{xxiii} Human reason then had finally gained supremacy over divine providence so that god was not needed anymore or at least lost his status as the ultimate reason for the unexplainable.^{xxiv} In the believe that the social world would follow natural laws, the Cartesian world view then also tidied up the previous paradigms of decay, chaos and confusion. As this view seemed to make everything explainable , thus controllable, the Cartesian spirit was irresistible, promising that a credible pursuit of perfection on earth was

controllable, providing mankind with the faith in progress which would make them the masters of the universe.

Newton then endowed people with the mathematical devices they needed to pursue such endeavour.^{xxv} In his *Magnus Opus Principia Mathematica* (1686), he formalised the laws of motion of earthly bodies in the mechanical system. Overwhelmed by the pragmatism, straightforwardness and predictability of these laws, the book impressed intellectuals across disciplines, so that intentionally or not, he had also created the measurement fundament of the mechanical world view.^{xxvi} Unsurprisingly, *Principia Mathematica* also became the foundation of economics as we know it today. In fact, pretty much everything formalised in the emerging economic sciences used Newton's mathematics. It brought with it an atomistic view of individuals who interacted mechanically in society - a clock-world view that is highly visible in later social science work. The analytically rigorous approach in Adam Smith's social model for example, owes much to Newton's "conception of nature as a law-bound system of matter in motion".^{xxvii} Just like nature, the social world in the *Wealth of Nations* obeys physical laws of motion. The obvious disorder in society, the logic goes, could therefore only be due to the fact that humans infringed on natural laws. Society thus needed to be rearranged so as to follow the natural order in the mechanical system in which maximising individuals, guided by self interest and the laws of demand and supply, would generate growth and create the *Wealth of Nations*.

For a moral philosopher like Smith, this was a very narrow approach, but it shows clearly the undoubted faith in the existence of a logical order in society and the rigidity of thinking at the time about public goods like protection, defence, culture or environmental infrastructure. The latter was considered a mere unordered system of matter of utility, a snapshot of which can be found in John Locke's *Second Treatise on government*. People "must become effectively emancipated from the bonds of nature" he urges, because "land that is left to nature...is called waste", - a rather blunt expression of contempt about the biosphere, which indicates ones more, how the essence of Newton's anthropocentric conception of the world had become internalised by contemporary thinkers.^{xxviii}^{xxix}

The fascination about precision and mathematics which emerged with the mechanical world view implicitly reduced the world to quantity looking at quality as a secondary matter. With measurable quantities, it seemed, the chaos and decay observed by earlier world views could be overcome. All that was needed was an understanding of the laws of nature and a reliable measure of it. These then seemed to be the ingredients to solve and control problems in physics while being equally applicable to the social sciences. Quantification promised to make events predictable in the machine age and with it progress started to encompass vertical traits, which gave rise to a paradigm of progress that saw material abundance as the sole purpose of attainment of terrestrial happiness. In fact in the *Wealth of Nations*, Smith doesn't even define wealth before he goes on to describe the system in which national income can prosper. ^{xxx}Amassing of material well-being, the logic went, would increase the order of society, and provided them with the stability needed for the pursuit of wealth and social well-being. As long as an honourable service like nature did not provide a tangible value that showed up in increased output, this could play no genuine role for a nation's well being. In their inherent features of intangibility and inconsistency, qualitative features of life and ideals of social well-being were unmathematical and had therefore fallen into disguise.

Despite the near hegemony of ad infinitum growth, there were also notable exceptions like John Stuart Mill. As one of the first political economists that plead for the conservation of the biosphere, he neither saw material abundance as an end in itself, nor believed that growth could be perpetuated endlessly. ^{xxxii} He departs from what he calls the "old school" of political economists and looks beyond the "kind of economical progress which excites the congratulations of ordinary politicians; the mere increase of production and accumulation." "Towards what ultimate point is society tending by its industrial progress?, he asks; When the progress ceases, in what condition are we to expect that it will leave mankind?"^{xxxiii} While being perfectly compatible with Newton's mechanical world view, Mill cautioned that the "conversion of all natural capital into man-made capital" was not progressive thereby putting the notion of boundless progress back into its physical limits. As

he could not observe endless growth in nature, he did not search for it in the social and economic world either. Rather, he pleads to aim for the stationary state, where capital and population is constant, while human improvement would continue to progress. “There would be as much scope as ever for all kinds of mental culture, and moral and social progress; as much room for improving the Art of Living and much more”.^{xxxiii} With this Mill had conceptualised the social world back on the ontological grounds within the physical world. While having been equally interested in the allocation and distribution issue in economics, he added the issue of scale, i.e the possible biophysical limits, which implied that relative growth, i.e. at replacement rate was the goal and not the end in itself. ^{xxxiv}

Advanced these thoughts might have been, the circumstances of the era did show no need to think beyond the mechanical paradigm, which most successfully satisfied what some people have labelled “industrial metabolism” at the time. ^{xxxv} Though Pigou had formalised the concept of externalities in the beginning of the 19th century, growth continued to be seen as the ultimate panacea and means to the end of higher living standards, with which it had found a rather awkward though fruitful association, that I think lies at the heart of many problems with which we are faced today. Mill’s balanced progress paradigm through steady state economics should only become important again in the 21st century, when resource constraints threatened military supply and the separate development of social sciences, ecology and economics had to be reconsidered. With these preliminary observations on different world views and their paradigms in progress, I proceed to a more detailed examination of the rise of the GDP as the “godfather of indicators” to its demise as a simplistic normative measure of living standard.

1.4. GDP - Its Rise and Demise

As the theory of progress gained ground with the mechanical world view, the need for accurate measures arose and with it the question what should be measured in the first place, which gave rise to the emergence of different meanings attached to the concept of production. Unsurprisingly therefore, that the first estimates of national production date back to this time. Thomas Petty’s approach from 1665 for example accounted for taxable capacity.

In France, at the same time, the physiocrats developed a measure with emphasis on agriculture, which they considered the most essential source of social welfare. Adam Smith for example then in his “national produce”, also included manufacturing^{xxxvixxxvii}, refused however to take into account “unproductive labour” with which he referred to the tertiary sector such as army, lawyers, churchman, musician. ^{xxxviii} These “menial servants”, “how honourable, how useful, or how necessary soever”, they were, did not produce anything “for which an equal quantity of service” could “afterwards be procured”. ^{xxxix}

Given these early forms, the Great depression was the initial event that created the urge to develop a reliable and comprehensive fundament of data on the basis of which an indicator of national income could be built. ^{xi} Prior to that, policy makers had no trustworthy basis for analysis so that policy design was impeded by unreliable information like stock price indices freight car loadings, and fragmented indices of industrial output. ^{xli} As this makeshift system which lacked consistency in measurement and coverage was severely put under stress by the Great depression, so called “experts” found themselves unable to advise the government on basic questions about the state of the economy. As the data they relied on was already two years old and of fragmented nature, the unsustainability of the situation became apparent and an obvious threat. The Department of Commerce drew conclusions and commissioned laureate Simon Kuznets to develop a comprehensive measure of aggregate economic output who then subsequently designed the prototype system of national accounts (SNA) which was the cornerstone of the GDP as we know it today.

As the first integrated set of accounts, it allowed countrywide policy evaluation and created the framework of reference for analysis of components of final output, income and demand of the entire economy. In his research report from 1937, he points out that the SNA are useful to evaluate the contribution of the economic system to the needs of consumption and of capital accumulation and constitute a comprehensive total for studying changes over time in the productivity of the economic system and in the differences in the apportionment of the total product among various significant groups. However, Simon Kuznets also stressed that GDP “is an approximation to the value of the total stock of commodities and services produced” and that its “narrow” definition “should be kept in mind in any attempt to

interpret it".^{xliii} In fact, Kuznets was well aware of the underlying "scheme of values or social philosophy" of his measure and when discussing which criteria should be chosen to define production.

While he clearly favoured a measure of "social productivity" and was well aware of the political importance and consequences of the "mechanical total", he also considered a broader measure beyond the measurable scope and chose to stick to the narrow definition as a good blueprint of a national, the limitations of which just had to be pointed out clearly to avoid misinterpretations:

Despite his efforts to outline the limitations, the 1930s provided an enabling environment in which the GDP was embraced as a tool to gain control over the situation and steer production in the "soon-to be wartime economies".^{xliiii} In an era of severe financial distress, naturally calling for greater public intervention and under the seminal influence of Keynes' *General Theory*, calling for government intervention, the GDP filled the gap of the needed easy-to-use measure to manage and coordinate economies during World War II.^{xliv} As laureate Robert Solow putted it, the GDP became the "anatomy" of Keynesian "physiology" and was the central guide for reconstruction and the post-war Keynesian hey-days, where it genuinely proved its value by "providing an integrated "birdseye view of the economy".^{xlv}

In the post-war period, growth theory had become the priority in economics so that in the 1950's, the statistical tool was strengthened by the formal definition of theoretical growth models. In essence, the growth models were just the formalised logic put forth by classical economists: As population increases, demand increases, employment increases, Output increases. Wages for manufacturing allow for larger families, which creates more demand, more employment, more production - a self-propagating cycle that implies that "more is better" - as the average amount of goods increases, people can choose what to consume, so they must be better off - thus the origin of which the pseudo relationship between growth and development. So far so good, no mention about multiple or bad

equilibria and with the GDP, one could measure where one stood on the way to progress and a better life.

By 1962, Kuznets observed the reigning “expansionism” to which he was thought to have contributed the holy grail of measurement. After its development, Kuznets spend the rest of his life cautioning the overenthusiastic interpretation of the GDP which he saw increasingly being used to “tell the public how much better or worse off it” was.^{xlvi} “Distinctions between quantity and quality of growth”, he warned, “must be kept in mind, between its costs and return, and between the short and the long run”. “Goals for more growth should specify more growth of what and for what.”^{xlvii} However, as business cycles became less extreme and more manageable since its introduction, this common sense was suppressed. Based on the Kuznets curve observation that inequality increases in the early stages of economic growth in order than to bottom out as societies get richer (a concept which was later reconstructed for environmental costs), conclusions were drawn that GDP growth was the remedy to decrease inequality, as growth trickles down while equally contributing to a cleaner environment in the long run, as people would start demanding more recreational space as they grow richer.

While the fallacy of the human/nature divide became visible in the 1950’s, as resource constraints started to create supply bottlenecks to military supply in the Korean War, the pundits of “growthmania” had already found an answer. Possibly resources maybe exhaustible, but luckily their substitutes were not, suggesting that an additional unit of technology will do it. Nevertheless, technology wasn’t the remedy, mankind proved less inventive than expected and failed to find a decent substitute for fresh air or drinking water, which challenged the believe that technology can solve the problems of a crowded planet and the increasing challenge of negative externalities.^{xlviii}

A few centuries before, classical political economists had been putting living standards at the ends for which they thought to have the means. Now, qualitative questions again would have necessitated a rethinking of the whole system which seemed to work quite

well anyway. Further, the SNA, on which the GDP was based, proved its capacity to respond to policy needs of a particular time and were flexibly expanded over the time, both of which contributed that the success story of the GDP was not discontinued and undertook constant revision and expansion such as the response to inflationary pressure in the 1960's and 70's, where measures of output were adjusted to reflect real expenditure patterns or a "quality adjusted price and output measures for computers".^{xlix} more recently to name just a few. These continued revision, underlines the responsiveness of the GDP and proves its ability to adapt to policy challenges of its time, so that I - who started up as a deep critic of the GDP and with a rather partisan attitude towards it - had to admit how essential the steady stream of consistent GDP data is and that from an overall perspective, it does not seem exaggerated in any sense to call the GDP one of the greatest inventions of the 20th century.

However, the limits to growth began to arise at the horizon and concerns arose about how much this number can tell about the complex world we live in? When nature started to cease reliant supply human needs as an object of consumption and means of production during the Korean War in the 1950s, president Truman commissioned a first study on exhaustible resources, in which he also instructed to give a broader and long-run picture of the issue.^l Published in 1952, the Commission Report found that consumption was rising faster than resources which therefore constituted a long-term problem.

However until the 1970s, the macroeconomic approximation given by the GDP and the underlying modernist anthropocentric paradigm of progress was able to successfully abstract from social and environmental externalities. But this climate changed. In 1968, Hardin illustrated the *Tragedy of Commons*, showing that free access to unlimited demand for exhaustible resources creates incentives for over-exploitation, with which he joined the group of disillusioned growth sceptics like Kapp, who speaks for a multitude when he observes that "capitalism must be regarded as an economy of unpaid costs, 'unpaid' is so far as a substantial proportion of the actual costs of production remain unaccounted for in

entrepreneurial outlays; instead they are shifted to, and ultimately borne by, third persons or by the community as a whole".ⁱⁱ

In the period that followed more and more people became disenchanted with the paradigms of Growth, underlying the GDP, which they accused to create unsustainable national priorities in terms of income distribution and the biosphere. A legacy of critical study started with the ' *Limits to Growth* Report to the Club of Rome showed that if we stay on the business as usual mode, "the limits to growth on this planet will be reached sometime within the next one hundred years".ⁱⁱⁱ More recent initiative include "Redefining Progress" (1995), aimed to redefine progress, calculating the GPI, a more comprehensive measure, finding that output and welfare measures began to diverged in the 1970s, and that therefore GDP can no longer be used to measures total economic and social well-being.^{liii}

From Grassroots movement to international agencies, people raised serious concern, over what is appropriately expressed by Paul Ehrlich, calling for "a life style which has its goal in maximum freedom and happiness, not a maximum Gross National Product"^{liv} As a consequence, NGOs, researchers, statistical agencies and all major international organisations have worked on the issue and produced a flood of alternative satellite indicators of all sorts, trying to develop a holistic measurement that would more appropriately reflect the world we live in and challenges we face.

More recently, publications like the Stern Report on Climate change have had disillusioning effect onto our stubborn denial of the ontological reality of our planet, on which we continued to produce in a rather blind pursuit of an outdated paradigm of progress for so long. While still not being good enough of a proof for some people, the 2008 crisis with manifold faces in terms of food prices, migration crisis, worsening extreme weather phenomena, oil price hikes and above all a global financial crisis is hopefully a clear signal that the externalisation of real costs has resulted in a skewed economic policy. Today, it is not anymore about just using energy saving light bulbs and buying in charity shops, but that we may be the last generation to prevent the worst before climate change becomes

irreversible. Internalising these costs would show a different picture of the economy and the progress we're chasing there. As common sense may eventually suggest, our arbitrary circle of values which we draw with the conventional GDP might have brought us into a delicate situation where we are maximising something subject to expenses we might not be aware of as we do not account for them, but which we most certainly, cannot bear.

Today it remains to be acknowledged that GDP cannot measure welfare, and its use as a normative measure is about as counterproductive and unsatisfying as using a fork for cutting. It was a functional measure to track military production for wartimes, helped reconstruction afterwards and is now merely a good measure for an inherited economic model from an outmoded anthropocentric worldview with growth as the Holy Grail, which now misdirects policy due to a defect in the pricing system which sacrifices future against current well-being.^{iv} GDP growth is not the panacea, and keeps on sending wrong signals to the public, where "by the curious standard of the GDP, the nation's economic hero is a terminal cancer patient who is going through a costly divorce."^{vi} Our definition of Economic and social well being has little to do with genuine progress and is particularly unsuited for resolving social and environmental problems. Rather as an internationally recognised standard, GDP became associated with living standard, because it provided the politicised statistical proof for the successful implementation of adequate policies of governments - a positive growth rate suggests we're better off, which is useful during elections.^{lvii} The very fact that this debatable link between GDP and living standards evolved over time, was however the first sign of its demise. The very fact that it was asked to measure something it did not measure shows the genuine demand for expanding it into a measure of development and well-being. So far it only proved responsive to the need of the most lucrative industries, in terms of an expansion of the accounts beyond the incorporation of high tech and banking estimates, has however not responded as effectively to the social and environmental challenges we face, in terms of a reconsideration of wealth and progress. A general tendency to include new sustainable indicators into policy making worldwide is a sign that GDP alone is not sufficient anymore to satisfy the public, who is increasingly demanding an indicator that goes beyond GDP. The findings of the Stiglitz-Sen initiative working on the

development of a template measure of Economic Performance and Social Progress is therefore awaited with great expectations by many people, including myself. This section asked for a rethinking of our concept of production in terms of its real costs and concludes that an adjusted GDP is undoubtedly desirable if not necessary...or would you like your grandchildren talking about you in a similar fashion the after-war generation did about their racist parents:

2. Utility

Having discussed the desirability of an expanded GDP, it was concluded that cost internalisation is desirable, as it would provide a corrective lens for economic policy. While this might be intuitive, there is a legitimate question, to what extent alternative indicators would be able to provide a more holistic picture of well-being and how critical the measurement problems emphasised by its critics do impede the underlying good intentions by causing unexpected and unintended consequences in terms of its effect on prices and possible tendency to political instrumentalisation. In this section the focus shall therefore shift to the issue of utility, examining how much living standards improve for a given increase in GNI per capita, as a prior step to then scrutinising what utility one might expect from integrating social and environmental costs into GDP the consistency of 2 alternative measurement approaches against their accusations, whose major merits and limitations shall be outlined as well. proposals that take into account intangibles that may affect the economic and social welfare of a country.

2.1. The Growth-living standard link: How much do we benefit, if GDP goes up?

The fact that GDP per capita is the omnipresent measure used to compare consumptive potential between countries is attributable to the lack of consistent measurement of other composite measures of socio-economic well-being. As a consequence, GDP has implicitly become subverted for the purpose of referring to living standards directly. As mentioned, the origin of this normative flavour of GDP dates going

back to the 1950s early growth theories, following the basic logic that as output increases, employment and consumption opportunities increase, so people must be better off. But does a greater range of consumable goods readily imply higher living standards? As pointed out earlier, the numerous abstractions of the GDP when used as to assess qualitative concerns, suggest that this conclusion is far-fetched. The US for example outperforms Canada widely in GDP per capita terms. Nevertheless Canadians live longer, have a lower infant mortality and higher school enrolment rates.^{lviii} So clearly, the capacity to improve living standards given by a high GDP, gives at best a partial and distorted picture of the economic and social conditions of a country and can therefore not be expected to reflect changes in living standards. Or can it?

While most of the literature confirms the existence of a positive link between growth and societal well-being^{lix} and living standards of rich countries generally seem to show evidence for this, there is less agreement on how much exactly we benefit, as GDP per capita increases. There might be a link, but how strong is this link? This question is important, as it concerns the concrete utility of GDP as a normative indicator. In the following empirical investigation, I shall therefore devote analysis to how much living standards improved for a given increase in GNI per capita. Based on a panel dataset, in which I included 158 countries and 13 regions observed over a period of 15 years, the analysis was carried out using STATA to test how effectively growth has translated into improved living standards. As living standards have a known relationship to poverty reduction, health and education standards, we can estimate their growth elasticities to quantify the relevancy of the GDP-Well-being relationship.

Definition and Concepts

The growth elasticity of a dependent variable is calculated by the percent change in the dependent variable (poverty, literacy, health) with respect to a one percent increase in GNI per capita, which was selected for availability reasons and serves as a proxy for income or expenditure per capita.

The general definition of growth elasticity is given by:

$$\epsilon = \frac{\partial Pov}{\partial \left(\frac{Y}{Pop} \right)} \frac{\left(\frac{Y}{Pop} \right)}{Pov}$$

where *Pov* refers to the poverty measure and *Y/Pop* to per capita GNI. If interested in the growth elasticity of poverty this would then be interpreted as the poverty reducing impact of growth in terms of income - the greater the elasticity of growth (>1), the more pro-poor is economic growth.

The Model

$$\log Pov = \alpha + \beta \log \left(\frac{Y}{Pop} \right) + \gamma \log G + \epsilon$$

Following the methodological approach by Ravillion in a World Bank study, I estimated growth elasticity of poverty^{lx lxi}, where logarithms are taken, so as to get output in percentage terms and *Pov* refers to the poverty measure, α is a constant, β the coefficient for GNI per capita (*Y/P*) and γ the coefficient for the Gini Coefficient (*G*). The model was then expanded by estimating two further growth elasticities of living standard proxy that were health and education. Further, the amount of control variables was increased to compare the relative significance and impact of growth taken alone.

Growth elasticity of poverty (Table 1) – Main Findings

When estimating the extent to which GNI per capita decreases poverty, it was found that the growth elasticity of poverty varied between -0.81 and -1.32, that is, a 10% increase in GNI per capita reduces poverty (% of population living under 1\$ (PPP) per day) between 8.1-13.2%. This large range suggests that effect of poverty reduction through a rise in GNI per capita depends on what other variables we control for, i.e. how holistic we define welfare. Taken alone a 10% increase in income, poverty is reduced by 9.8% (Model 1), which is significant and able to explain 59% of the overall variance in the model ($R^2 = 0.5987$).

Controlling for income inequality (Model 2), the poverty reduction effect decreases slightly to 9.4%, while income inequality enters the equation significantly increasing the population below 1\$(PPP) per day by 6.3% with a similar model fit ($R^2 = 58.4\%$).

Further it was found that poverty becomes more elastic to growth, i.e. decreases more, when we include further control variables. In Model 3-6 poverty became therefore more responsive to an increase in GNI per capita, which now reduced poverty between 10-13%, income inequality increases it around 6% (Model 3-6 have biased estimators, due to the strong correlation between Gini and population with lowest income share), leaving a net growth elasticity of poverty of about 4 to 10%, depending on the extent of inequality. An increase in Life expectancy however, reduces poverty between 7.7-12.8% and an increase in the poorest 20% also proves to reduce poverty significantly by about 11%, which suggests that GNI in the prevalence of income inequality is likely to be a very ineffective poverty reducer.

Compared to earlier studies of this kind (Adams, 2004; Ravillion, 2003; Bourguignon, 2003), which usually found growth elasticity of poverty between -2.0 to -3.0%, (that is a poverty reduction of about 20-30%, given a 10% increase in GDP), the found poverty reduction between 10-13% is very low.^{lxii} A reason for that may be the difference in variables used. I used GNI per capita, which was the variable I could best work with. Previous studies used GDP per capita or other income measures. Also elasticities have the property to increase when observed over longer time series, so the lower elasticity found may be due to the relatively small interval observed, while previous studies looked a longer time series. These studies also did not net the poverty reduction by GDP with the poverty increase of the Gini¹ and did not control for other variables, which was included here to reflect the possible worst case scenario and to see the relative efficiency of growth to reduce poverty compared to other variables.

¹ See Son. H (2007) for interesting study on how much growth in mean income or expenditure will be required to offset a 1 percent increase in inequality, with poverty remaining unchanged.

Conclusions:

We thus find that growth reduces poverty by about as much as it increases. If corrected for income inequality, which increases poverty, as it rises, the Net poverty reduction performed by inequality-corrected growth is between 4-10%, thereby being partly outperformed by other variables, such as an increase in life expectancy or the poorest 20% income share.

With respect to health, again, the income variable alone was not found to be a very efficient indicator of living standard increases, decreasing child mortality between 2-6%. Also, the inclusion of other variable allowed amore holistic picture explaining child mortality. Once more the additional variables triggered a more elastic downwards response in child mortality, suggesting that GDP is a weak measure of living standards.

Looking at educational standards, no clear interpretation was possible. While literacy rates and primary school completion seemed to increase significantly with growth, the relationship broke down when including income inequality.

For the purpose of this dissertation, these results thus confirm the existence of the growth-living-standard-link which is reasonably strong in terms of poverty reduction about 1:1, less so in terms of health improvement and unclear in terms of educational standards. It also showed that the strength of this link depends on the nature of growth, which was simulated by including further control factors. In all models, this proved vital and challenged the conclusion that growth readily implies higher living standards. It appeared farfetched when inequality was prevalent and other variables proved similarly strong or more informative in reflecting changes in living standards, suggesting that GDP alone is not a sufficient proxy for the various factors that make up the dynamics of changes in living standards. This result thus backs the idea that an adjusted GDP would be able to give a better normative indicator as it allowed a more holistic picture.

2.2. Common Problems of Alternatives

Having seen empirical evidence on the weak correlation between GDP and living standards, it is clear that socio-economic progress in terms of growth elasticities of living standards is captured weakly by GDP, so that there is now a legitimate question about the utility of alternative approaches. The rising interest in a new “true cost economics” that takes into account negative externalities of growth, has let people to propose a wide range of new factors to be included, starting from environmental costs and unused stocks, to household production, leisure time, voluntary work, happiness, costs of crime, family split-up, social cohesion, etc..

While being undoubtedly interesting ideas, the indicators constructed on this basis share common problems. Critics have argued that measuring intangibles like well-being and other non-market values are too subjective and can therefore not be realised, which is partly true. Indeed, attaching monetary value to all direct and indirect burdens occurring along the process of production is a delicate issue, as there exists no ready-to-use formula for it and people have different preferences and the appreciation of recreational area for example varies greatly between people. ^{lxiii} Garlikov even sees a “moral book-keeping nightmare” at the end of the road, leading to a situation, where we have to pay when asking for the time or to get passed the salt. ^{lxiv}

However, an adjusted GDP does not aim to take into account virtually everything that we currently do not measure. Rather, the argument is to adjust for the challenges we are facing, in terms of environmental externalities and some social factors such as inequality. Concerning the measurement problem then, substantial progress has been made in environmental economics and welfare economics in resource accounting, the development of social indicators and generally quantification of intangibles drawing on techniques such as hedonic pricing, contingent valuation, entropic measurement. So, the methods and techniques are around the corners which enable us to measure whatever progress we want to move towards whatever society we want to live in.

The problem remaining is that one would have to agree upon which factors to include and which weight to attach to them in an index number. As this ultimately depends on personal judgment, there are many ways to justify a particular weighted structure and as they depend on individual circumstances, surely all are legitimate for their purpose. The attempt to overcome the major sin of GDP not capturing non-market values therefore also implies sacrificing the major virtue of the GDP, in being the aggregate objective measure of subjective choices of “billions of consumers and producers who jointly determined world prices”.^{lxv} However, this is an issue arising along the construction of any indicator including the GDP. The apparent objectivity of GDP is rather due to the unawareness about the implicit acceptance of underlying value judgments with which priorities about what should be considered “productive activity” were set in the first place.^{lxvi} What an adjusted GDP would do is a mere shift the subjective priorities set during the development of the conventional GDP. Once there is agreement on what type of growth should be standardised, this will allow to aggregate a new objective measure.

In this same line of argument, critics have emphasised that “replacing GDP with more sophisticated yardsticks could prove to be the slippery slope to daddy-knows-best”, i.e. make it prone to political instrumentalisation.^{lxvii} A commonly noted example for this is indeed the beginning of the Sen-Stiglitz initiative, instigated by Stiglitz. Regarding the Maastricht criteria that the public deficit should not exceed 3.6 percent of GDP, which France violated over several years, critics of an adjusted GDP heard found political reckoning in this seemingly well intentioned endeavour. Indeed, this critique is serious and precaution has to be taken that new measurements are not instrumentalised for vested interests, à la “If GDP will not grow as you wish, use an alternative that will.”^{lxviii} Having been one of the people, who thought similarly about this surprisingly progressive idea proposed by a hyperactive and controversial figure such as Sarkozy, I must however acknowledge that once there is legislative agreement on measurement techniques used and the respective weights to attach, the issue of political instrumentalisation of an adjusted GDP should not be prevalent.

Another underlying issue often pointed out by critics is that cost internalisation on macro level will translate hidden costs on the microeconomic level. While there are intuitive ethical arguments suggesting that environmentally and socially harmful economic activity should not be added to the GDP in the conventional way, critics argue that this additional taxation will be reflected mainly in higher consumer prices. The price of a car for example, was estimated to increase by about \$40,000, when taking into account noise pollution, as well as air and other types of pollution.^{lxix} This issue is important, as it relates crucially to the feasibility of the whole endeavour to measure welfare beyond GDP. If prices should rise too much, this will be politically unpopular. At this point, it makes sense to look at environmental and social costs separately, as I would suggest, they differ in their macro-micro pass-through.

2.3. Environmental Adjustment

As far as environmental costs are concerned, there are 2 issues at stake. How do current costs compare to future costs and how do individual costs compare to social costs? Now, taking the example of climate change, we acknowledge that the question is not anymore whether or not to stop it, but when?! As the consequences of climate change are very likely to increase in the time we just talk about it, the trade-off seems to be between costs of stopping it sooner or costs of stopping climate change later plus the costs of irreparable consequences. A rather bleak trade-off, choosing between paying now or paying more later.

But there is a lot of evidence, suggesting that an inclusion of environmental externalities would not be prohibitively expensive. A good illustration of this is a Mc Kinsey study published in 2007, which analysed how much greenhouse gases, can be reduced at what cost in the US?^{lxx} This case study seems vital, as it was presented 2 weeks after the IPPC published the Stern Report thereby benefiting from the attention the most comprehensive statement on climate change had received, while providing a concrete plan to tackle it. Further, it was produced by Mc Kinsey, i.e. very fact-based rational people, ready to sell themselves to the highest bidder. It was very pleasing to hear “Greenpeace”

conclusions from very profit-oriented people: “Using a Mix of wide range of proven of high tech abatement strategies, the US could reduce greenhouse gas emissions by 2030 by 3-4.5% gigatons of Carbon dioxide equivalent, which would involve marginal costs as little as 50\$ per ton abated”, while the CO₂-emission savings would actually generate 40% net national savings, gained through higher energy efficiency, new technology” and a massive coordinated “action across all sectors”.^{lxxi}

Table 2: Major findings of McKinsey study (Creyts, Derkach, Nyquist, Ostrowski, Stephenson, 2007, p. 67)

MAJOR FINDINGS AND CONCLUSIONS
<ul style="list-style-type: none"> • Government sources project US GHG emissions to rise 35 percent by 2030 • Our project identified 3.0 gigatons (mid-range) to 4.5 gigatons (high-range) of CO₂e reductions vs. the 2030 reference case emissions forecast of 9.7 gigatons • Low cost opportunities are distributed widely across sectors and geographies • 40 percent of reductions identified could generate net savings to the economy • Savings can substantially offset the remaining total capital, operating, and maintenance costs • Five major “clusters” of reduction potential identified • Success requires strong, coordinated, economy-wide action that begins in the near future
<p>Source: McKinsey analysis</p>
<p>The U.S. could reduce GHG emissions in 2030 by 3.0 to 4.5 gigatons vs. the reference case emissions forecast of 9.7 gigatons, using tested approaches and high-potential emerging technologies. Abatement opportunities are highly fragmented and widely spread across the economy, with almost 40 percent of the potential available at negative cost. Making reductions at the lowest cost to the economy will require strong, coordinated economy-wide action that begins in the near future.</p>

A Mc Kinsey study concluding that avoiding climate change has negative costs and that it is in fact entirely inefficient and economically irrational to ignore environmental externalities, gives good reason for thinking that while individual costs of internalising environmental costs may vary, the consequences of not doing so will be increasingly costly and born unequally by the whole society. Further, McKinsey proposed that most efficient abatement opportunities are “time perishable”, i.e. every year of delayed action, will

decrease the potential savings and increase the costs which may become irreparable in foreseeable time. When they conclude calling for a sudden global coordination, which McKinsey sees as a requisite of success, to me this sounds very much like what an adjusted GDP would do best. There is no more direct and decentralised way to send the right signals to individuals other than prices and there is no better coordinated economy- and sector-wide action than adjusting the GDP. Conventional GDP is a great point of departure, as it is widely acknowledged and has proven its effectiveness over the last 2 generations. An adjustment for factors agreed upon, would bring a sustainable correction of it, so as to subsequently benefit from its relatively automated mechanism, with which it aggregates the principle of individualism in the market system. If these incentives are set correctly and applied to the macro-micro and meso-level, then I think the relationship between sustainable development and economic growth would not seem to be a trade-off anymore, but be perfectly compatible with moral principles working in a market economy thereby offering a possible solution to the tragedy of Commons. ^{lxxii}

2.4. Social Adjustment

We pass now to the more difficult case of social cost adjustment, which was the proposed response to the frequent observation and concern that the “real” amenities of life have declined even though economies have grown. While empirical research shows no clear evidence between growth and inequality, crime rates and family split-up, these are frequently referred to be worsening in a growing economy. The social Kuznets suggests an explanation for the first phenomenon that income inequality increases in the earlier stages of growth and then decreases. As people get richer, it also seems comprehensible that more criminals are attracted. Further, a wealthier society is more independent and individualistic rather than family based, which would be a possible reasoning for explaining higher family split-up rates. However, empirical evidence is contradictory on these factors. In more recent empirical studies, income inequality for example is as often found to be positively related to growth, as negatively, that is it seems to be neutral to growth and cannot be sufficiently explained through changes in growth rates.

Nevertheless, it is clear that a broader definition of progress would include many of these non-income social dimensions, for which high standards would be set in a framework of genuine progress. This would include factors like social cohesion, leisure time and man's ability to enjoy the amenities of life. Proponents of a social adjustment refer to Aristotle for example, who argued that leisure is a requisite for intellectual ability and should therefore be included as it contributes to the quality of life.^{lxxiii} As they observe growth being associated with a general decline in these indicators of well-being, progress indicators were developed which include these factors, but also voluntary work, household work, parental time spent with children, family split-up...etc. The essence of this philosophy was realised in 1972 with the GNH (Gross National Happiness), which serves as the official GDP equivalent in Bhutan. Based on the concept of sustainable development and Buddhism, it includes mental wellness, workplace wellness, social wellness, political wellness as 4 of 7 components that make up the happiness indicator.^{lxxiv}

Now, whether or not social costs are caused by growth or not, accounting for them in the national account would be worth consideration as from a certain point onwards, social costs like very high crime rates or very high inequality, become constraints to growth, generally causing loss of social cohesion and economic insecurity and potentially also social unrest or terrorism. However, the question remains whether this would be useful? As far as an environmental adjustment concerned, an efficiency effect was observed. The money spent on technology change and coordination, was found to pay off in net savings. As much as I agree with the desirability of a social adjustment, particularly for inequality, it seems that for a social adjustment this efficiency effect could not be expected to pay off in monetary terms. While an inclusion of inequality, crime rates...and other broad social dimension would generally create an incentive for policy makers to maximise wellbeing, the argument in favour of it could not be made on the grounds of efficient resource allocation, would have to appeal on the grounds of spiritual development, which may be feasible for a Kingdom of 672,425 Buddhists in Bhutan, but is too esoteric for the world. Rather, criticisms about the hidden costs that critics have raised as mentioned earlier are very likely to hold true in this case. A broad inclusion of these factors on macroeconomic level, would be likely to be

passed through to consumer prices and therefore be politically unpopular having almost communist traits. Further, I consider the criticism of political instrumentalisation mainly valid for the inclusion of social costs. Though progress has been made in the measurement of experienced utility and well-being in the fields of psychology and neuroscience, this is “with some accuracy” and “open to multiple interpretations”^{lxxv}. While such survey and approximation might be working for Bhutan Buddhists, the absence of a mathematical definition would be very prone to political instrumentalisation if applied over regionally. While I would therefore support a more pronounced distinguishment between uneconomic activity like crime and military expenditure in the national accounts, I do not belong to the proponents of a broad social adjustment for the time being, which is a mere call for the continuation of the research agenda on the measurement of the intangible social dimension of human wellbeing, particularly concerning inequality.

Concluding this section, it was shown that the desirability of an adjusted GDP can be verified empirically, where the growth-living standard-link was analysed, which underlies our paradigm of progress. A weak correlation of income to living standard was found, which when controlled for other variables appeared insufficient to allow legitimating this association as verified. Given the empirical evidence on the desirability of an adjusted GDP part of the proposed adjustment was found balanced by economic utility, clear-cut in terms of environmental costs and requiring further research in terms of social costs, which currently cannot be judged useful and would require an even more radical reconsideration of the underlying paradigm of progress than an environmental adjustment would.

3. Feasibility

Now having set the moral/philosophical background of the issue, which outlined, why an adjusted GDP should be desirable in terms of sustainability and genuine progress, which was argued, is partly economically useful, a case study shall now give vital insights into the feasibility of the idea. Drawing on the experience of a Green GDP in China, feasibility shall be evaluated in order to draw conclusions and lessons learnt from the Chinese experience on the general applicability.

3. 1. Case study: Green GDP in China

While Bhutan could have been considered here, China was interesting for several reasons. With a GDP of \$7.8 trillion (2008) China is not only the second largest economy in the world but with 6.2 gigatons of CO₂ equivalent of emissions, it is also the largest polluter in the world.^{lxxvii} Secondly, China has experienced both unprecedented growth and unparalleled and premature deaths due to environmental pollution. Further, there are few countries that are as fixated on growth as China. If one government would have to be identified that epitomises the modernist paradigm belief in growth as a state religion, China's pseudo communist government would be a serious competitor. There are in deed very few countries where governments are almost solely promoted on the basis of the growth they produced. Finally, the Green GDP attempt in China is interesting because it failed.^{lxxviii}

While most developed countries went through a period of rapid growth in the course of their industrial revolution, where environmental pollution increased sharply and subsequently had to be cleaned up, China experiences both of this at an unprecedented scale. With double digit growth rates, China has thereby also gotten to a point where environmental pollution is the second most frequent cause of premature death. 16 of the 25 most polluted cities are in China.^{lxxix} Against this background of global importance, China commissioned Alexander Wang with a study on an environmentally corrected GDP to see the real cost of Chinese industrialisation. What was subsequently called the "Green GDP" corrected for pollution, environmental degradation and resource depletion thus being the first attempt to quantify the true progress empirically. The conclusions presented in the report for 2004 were staggering to some people. It found that economic loss due to environmental pollution was 511.8 billion Yuan that is 3.05% of GDP in 2004.^{lxxx} Once published, the results became an anathema to provincial leaders, who substantially relied on heavy industry as major income source. As provinces saw their growth rate reduced dramatically, this clear signal that something is wrong with their success strategy, was received with great opposition to the initiative. With an increasing number of opponents in the local government system, the project was then withdrawn the official status, so as to continue it debased to just another academic side-project. Official reason for the

cancellation were “immature” measurement techniques, while it was more than obvious what tremendous effort the industrial lobby would have had to mobilise, had the initiative been carried out further. As an alternative to the Green GDP, the Chinese government then included environmental factors into the categories for promotion of provincial leaders. However, still if you can increase GDP in your province, “you’re the man”, that is decisions are mainly based on performance in terms of wealth and employment creation with an additional environmental component as a matter of beauty. So clearly, incentives favour growth over environmental protection. ^{lxxxix} Interestingly, the second report due to be published in 2007, was announced to be “delayed indefinitely” by the responsible agencies.

^{lxxxii}

3. 2. Conditions required for policy effectiveness of an adjusted GDP

Though the initiative failed, the lessons learnt from this case study are very relevant for projecting them onto answering the general question, under which conditions an environmentally adjusted GDP would be able to have a real policy effect in the direction of sustainability?

1. Given the underlying incentive structures, the project was doomed to failure

In a country, where the economic system has been “geared” over the last decades to grow its way out of poverty, it is in fact even surprising that the first report got published at all. ^{lxxxiii} While the Chinese government seemed to have the aim to genuinely tackle the pollution problem, opposition was provoked as the provincial leaders, reliant on heavy industries, rather hysterically observed GDP decreasing. As the same incentive structures are operating everywhere, this implies that industries will react with disguise, as long as lower growth rates imply lower success rates and fewer promotion opportunities, which may be not necessarily the case.

2. Project promotion in the industry to transmit awareness for economic benefits

After the political failure of the Green GDP, the Chinese government pursued an alternative strategy to tackle the issue, by establishing ambitious targets to reduce pollution

and increase energy efficiency. Being very strict with these targets, the industry was unable to meet them, so the strategy was doomed to fail as well. As outlined earlier however, the case for an environmental adjustment can be made on rational grounds. If awareness for the gains from energy efficiency would have been created beforehand, the project could have been received differently.

3. Paradigm shift

Given that cost internalisation of undesirable outcomes would raise prices possibly substantially for some products in the polluting industries, a change of mind set would be needed showing that current prices may be kept artificially low, while the true price is paid by the entire society. Prices are thus not rising, but simply returning to their true cost level. Keeping them artificially low creates incentives to keep producing at this level, thereby only increasing the cost that is both born society (Tragedy of Commons). Stopping to treat "the scarce as if it were non scarce, and the non scarce as if it were scarce" is the paradigm shift that is required and depending on how broad the qualitative definition of the desired progress will be, societies will have to ask themselves how much they are willing to pay for an inclusion of social well-being factors on a global scale.^{lxxxiv}

4. Green GDP failure shows its effectiveness

Intriguingly, the reasons for which Green GDP failed in China, are precisely the reasons for which it would be effective on a global scale. The strong resistance in the industry proved that the problem was taken by its root and sent a genuine signal to reconsider priorities, also did the withholding of the second report for 2005 show that the industry was seriously scared of the true cost reality. Further, the failure of the alternative target-strategy proves that the problem is unlikely to be tackled only by legislation, Kyoto, MDGs and the like. Effectively, these targets were nothing but internalising the true costs by another policy mean, that is law. The efforts spend on monitoring whether people really comply or just figure out how to meet the targets somehow without changing their actual behaviour, stands however in no comparison with the decentralised effect that an adjustment in the accounting system would send through on all levels.

5. Macro-Meso-Micro approach

As an official initiative, the Green GDP was initiated following a top-down approach and failed at the micro level, where its price was seemed prohibitive. This illustrates that an environmentally or socially sensitive political economic model must be pursued on all levels, working at micro-macro and meso level where the pass through of the accounting change has to be analysed carefully in terms of whether accounting changes is able to change behaviour. Potential explicit policy measures could include a reformation of national accounts into cost and benefit accounts on macro level, an ecological tax reform on meso level and limit on income inequality on micro level. ^{lxxxv}

Conclusions

This dissertation evaluated the idea of an environmentally and socially adjusted GDP in terms of its desirability, utility and feasibility. Approaching the question from a moral philosophical point of view, it was outlined how an understanding of progress and our current paradigm in progress emerged over time and on which mechanical mind set it is based. It followed an approach from a utility point of view, which took a more analytical and empirical stance to the question and was concerned with testing the strength of the alleged link between GDP and living standards and the consistency of alternative measures. The section showed that utility depends on the agreement on a common measurement, which is necessary in terms of credibility and the effect on prices, which is also crucial to make the project politically feasible. An optimistic conclusion could be drawn for an environmental adjustment, which based on evidence from a McKinsey study could be presented to be nothing but economically perfectly rational in terms of pure cost and resource allocation reasons. Further it was found that a social adjustment requires further research, as it is problematic in terms of measurement problems, which still leave results open to varied

interpretations, thereby making it still prone to political instrumentalisation. As a last part, the question was approached using a case study in China, where a Green GDP attempt failed in 2007. Lessons learnt from this were projected to point out the necessary conditions required for policy effectiveness of an adjusted GDP.

Having lived for 200 years in a growing economy, we may now have to admit, that mankind has come to live in a paradigm of progress beyond the physical limits. In our unfettered believe in an ever-progressing growing economy, we may have realised too little that growth no longer makes us happier, when social cohesion evades at the same time as we announce proudly announce a booming economy. Abstracting from the amount of money that we spend on cleaning up environmental pollution may have long been acceptable for the sake of just having more growth. But more growth of what? Progress where to and for what price? What are we chasing there? Maybe the time has come to remind ourselves of what classical political economists like John Stuart Mill have said about a steady state economy – a situation where we only grow at a replacement rate closely in concurrence with the physical boundaries. Four our generation, the issue of sustainability is no longer about just using different light bulbs and buying in charity shops, we may well be the last generation to prevent climate change becoming irrevocable. An adjustment of the GDP would be a powerful tool to achieve this, as it approaches the problems more direct and on all levels in a unique and comprehensive way. In the wake of a triple crisis experienced lately, 2009 may provide an enabling environment for change. The Sen-Stiglitz initiative is therefore of crucial importance, enabling us to redefine progress that we want with a measure that is responsive to the things that we really value. Otherwise, and the story has been told many times, it remains to be repeated that if we keep on living beyond those natural limits that we depend on and ignoring the true social costs of our lifestyle, we will realise painfully that inequality has economic costs and that nature does not need us.

Word count: 13499

Bibliography

ADAMS, R.H. (2004) Economic Growth, Inequality and Poverty: Estimating the Growth Elasticity of Poverty Worldbank Research Paper (available online: <http://www.sciencedirect.com/science/article/B6VC6-4DPYH91-3/2/9f219743c3a238cb58a5e51f2650da5d>, accessed: 01.01.2009).

ADGER, N. (1992) Sustainable national income and natural resource degradation: Initial results for Zimbabwe (available online: http://www.uea.ac.uk/env/cserge/pub/wp/gec/gec_1992_32.pdf, accessed: 16.06.2008).

BENNEWITZ, J. (2006) Application of the Main Laws of Thermodynamics on the Economy (available online: http://search.ssrn.com/sol3/papers.cfm?abstract_id=969980, accessed: 16.06.2008).

BERGHEIM, S. (2007) The happy variety of capitalism, Deutsche Bank Research Paper (available online: http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000209864.pdf, accessed: 16.06.2008).

BOURGUIGNON, F. (2003). "The Growth Elasticity of Poverty Reduction; Explaining Heterogeneity Across Countries and Time Periods," in EICHER, T & TURNOVSKY, S. (2003) ed. Inequality and Growth. Theory and Policy Implications (Cambridge: The MIT Press) (available online: <http://povlibrary.worldbank.org/library/view/13565/>, accessed: 01.01.2009).

BRUNDT LAND COMMISSION (1987) Global Change and Our Common Future (available online: <http://www.un-documents.net/wced-ocf.htm>, accessed: 10.02.2009).

BURY, J.B. (2003) The idea of progress: An Inquiry into its Origins and Growth, 10th edition (available online: <http://mirror.pacific.net.au/gutenberg/etext03/ideap10.txt>, accessed: 01.01.2009).

CHAUDHURI, D. (Nov. 2007) Work for Everyone and Amartya Sen (available online: <http://sanhati.com/articles/611/>, accessed: 16.06.2008).

CHEFFERS, M. & PAKALUK, M. (2005) Understanding Accounting Ethics, Second Edition (Manchaug: Allen David Press).

CHINA DAILY (30.04.2004) Green GDP Plan Still Needs Much Work, (available online: <http://www.china.org.cn/english/environment/94383.htm>, accessed: 16.06.2008).

CMEPSP (Commission on the Measurement of Economic Performance and Social Progress) Survey of existing approaches to Measuring socio-economic Progress (Online Working Paper available at: http://www.stiglitz-sen-fitoussi.fr/documents/Survey_of_Existing_Approaches_to_Measuring_Socio-Economic_Progress.pdf, accessed: 01.01.2009).

COBB, C. & COBB, J. (1994) The green national product: a proposed Index of sustainable Economic welfare (Lanham: University Press of America).

COBB, R., HALSTEAD, T., ROWE, J. (1995) "If the GDP is Up, Why is America Down?" The Atlantic Monthly, Online Edition, October 1995 (available online: <http://www.theatlantic.com>, accessed: 01.01.2009).

<http://74.125.77.132/search?q=cache:p5pgp87T3TsJ:www.economischegroei.net/file/14+The+welfare+of+a+nation+can+scarcely+be+inferred+from+a+measure+of+national+income.+If+the+GDP+is+up,+why+is+America+down%3F+Distinctions+must+be+kept+in+mind+between+quantity+and+quality+of+growth,+between+costs+and&hl=de&ct=clnk&cd=9&gl=de>, accessed: 01.01.2009).

COLMAN, R. (2001) Measuring Real Progress (GPI Atlantic publication) (available online: <http://www.gpiatlantic.org/pdf/general/realprog.pdf>, accessed: 01.01.2009).

COSTANZA, R. (1997) An Introduction to Ecological Economics (New York: CRC Press) (available online: <http://books.google.de/books?id=W8IrfPJLihEC&printsec=frontcover&dq=An+Introduction+to+Ecological+Economics&ei=hKaWSeq5CpX8ygTK9Z3vAg#PPA32,M1>, accessed: 01.01.2009).

CREYTS, J.; DERKACH, A.; NYQUIST, S.; OSTROWSKI, K.; STEPHENSON, J. (Mc Kinsey) (12.2007) Reducing U.S. Greenhouse gases: How much at what cost?: U.S. Greenhousegas Abatement Mapping Initiative(http://www.mckinsey.com/clientservice/ccsi/pdf/US_ghg_final_report.pdf, accessed: 16.06.2008).

DALY, H. (2008) A Steady-State Economy - A failed growth economy and a steady-state economy are not the same thing; they are the very different alternatives we face. (Sustainable Development Commission, UK Research Paper) (available online: http://www.steadystate.org/Files/Daly_UK__sust_dev_com_copy_with_ten_policy_addendum.pdf, accessed: 10.01.2009).

EASTERLIN, R. (1974) Does Economic Growth Improve the Human Lot? Some Empirical Evidence(available online: <http://graphics8.nytimes.com/images/2008/04/16/business/Easterlin1974.pdf>, accessed: 01.01.2009).

ECONOMIST (Jan 13th 2008) "Happiness is a warm baguette" Economist Online (available at: http://www.economist.com/blogs/freeexchange/2008/01/happiness_is_a_warm_baguette.cfm, accessed: 16.06.2008).

ECONOMIST (Mar 13th 2008) Grossly Distorted Picture (Economist online edition 2009) (available online: http://www.economist.com/finance/displaystory.cfm?story_id=10852462, accessed: 01.01.2009).

EKINS, P. ed. By MANFRED A.M. (1992) Real-life economics: Understanding wealth creation(London: Routledge). (available online: http://books.google.de/books?id=EF8OAAAAQAAJ&dq=Real-life+economics&printsec=frontcover&source=bn&hl=de&ei=D4mUSbXIJYyugbu65z8CA&sa=X&oi=book_result&resnum=4&ct=result, accessed: 01.01.2009).

EKINS P. (1992) Wealth beyond measure: an atlas of new economics (London : The Gaia future series).

EKINS, P & NEEF, M. (2000) Economic growth human welfare and environmental Sustainability.

HAWRYLYSHYN, O. (1974) A Review of Recent Proposals for Modifying and Extending the Measure of GNP, (Statistics Canada).

FRIEDMAN, B (2005) The Moral consequences of economic growth (New York: Knopf).

FROYEN, R.T. (2000) GDP: One of the great inventions of the 20th century, Survey of Current business (available online: <http://www.bea.gov/scb/pdf/beawide/2000/0100od.pdf>, accessed: 01.01.2009).

FROYEN, R. T. in LANDFELD (no References given in the article concerned).

GEORGESCU- ROEGEN (1971) The Entropy Law and Economic Process (Cambridge Mass.: Harvard University Press).

GERMINO, D. (1972) Modern Western Political Philosophy: Machiavelli to Marx (Chicago: Rand McNally).

GREENE, J (1961) Darwin and the Modern World View (Baton Rouge).

HARDIN

HAGGART, B. (2000) The Gross domestic product and alternative economic and social indicators, PRB 00-22E (Ottawa: Parliamentary Research Branch, Library of Parliament) (available online: <http://dsp-psd.tpsgc.gc.ca/Collection-R/LoPBdP/BP/prb0022-e.htm>, accessed: 01.01.2009).

HAWKEN, P.; LOVINS, A. & LOVINS, H. (1999) NaturalCapitalism: Creating the Next Industrial Revolution. (Boston: Little, Brown and Company).

HAUKIOJA, T. (2007) Sustainable development and economic growth in the market economy (PhD thesis) (available online: http://info.tse.fi/julkaisut/vk/Ae6_2007.pdf, accessed: 01.01.2009).

HERSCHEL E. (1997) A General Statement of the Tragedy of the Commons, Population & Environment Vol. 18, No. 6 (pp.515-531).

HERMAN E. & COBB, J. (1990) For the common good : Redirecting the economy toward community, the environment (London : Green Print).

HOLDEN, M. (2003) Per Capita GDP: An appropriate measure of living standard? The Case of New Foundland and Labrador (Parliamentary Research Branch: Library of the Canadian Parliament) (available online: <http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/PRB-e/PRB0314-e.pdf>, accessed: 01.01.2009).

JACKSON, T. (2004) Chasing Progress: Beyond measuring economic growth (London: New Economics Foundation) (available online: <http://portal.surrey.ac.uk/pls/portal/docs/PAGE/ENG/STAFF/STAFFAC/JACKSONT/PUBLICATIONS/MDP.PDF>, accessed: 16.06.2008).

JASAY, A. (2008) The Demise of the GDP is premature (available online: <http://www.econlib.org/library/Columns/y2008/Jasaygdp.html>, accessed: 01.01.2009).

JELLINEK, S. & EBRO, K. (2005) Beyond GDP, New measure of Wealth shows that manw developing countries are in the red (UNEP publication) (available online: <http://www.unep.org/greenroom/documents/worldbank-wealthofnationspr.pdf>, accessed: 16.06.2008).

JIANTAO, S. (October16, 2007) "Green GDP plan stays back-burner", South China Morning Post(available online: www.archive.scmp.com/showarticles.php, accessed: 01.01.2009).

JUN, M. (2007) "After green GDP, what next?" Chinadialogue (available online: <http://www.chinadialogue.cn/article/show/single/en/1219>, accessed : 10.01.2009).

KAHNEMANN, D., DIENER, E. (1999) Well-being: Foundations of hedonic psychology, ed. (New York: Russell Sage Foundation Press).

KAHNEMANN, D., KRUEGER, A., SCHKADE, D., SCHWARZ, N., STONE. A. (2004) Toward National Well-Being Accounts (available online: <http://www.krueger.princeton.edu/Toward%20Well-Being.pdf>, accessed: 01.01.2009).

KAHNEMANN, D. & KRUEGER, A.B. (2006) "Developments in the measurement of subjective well-being", Journal of Economic Perspectives, 20:1, 3-24 (available online: <http://www.krueger.princeton.edu/PDF%20of%20Kahneman%20Krueger%20paper.pdf>, accessed: 01.01.2009).

KAPP, W. (1971) The Social Costs of Private Enterprise (New York: Schocken Books).

KELLER, D.R. (2005) Prolegomenon to Any Future Environmental Economics (available online: <http://www.davidkeller.us/publications/Keller-Sustainability.pdf>, accessed : 01.01.2009).

LOCKE, J. (1967) The Treatises of Government (available online: <http://www.lonang.com/exlibris/locke/>, accessed: 10.02.2009).

LANDFELD, S.J. (2000) GDP: One of the Great Inventions of the 20th Century, Survey of Current Business (Bureau of Economic Analysis:Department of Commerce).

LAWN, P. (2004) "To operate sustainably or not to operate sustainability?—That is the long-run question", Futures Vol. 36, No.1 (pp.1–22) (available online: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V65-49272TM-3&_user=658968&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000035758&_version=1&_urlVersion=0&_userid=658968&md5=4e3a0947e54bdd2c6a9103cd9f7c2b2f, accessed: 16.06.2008).

LOZADA, G. (2006) "Entropy, free energy, work, and other thermodynamic variables in economics", Ecological Economics Vol. 56, No. 1 (pp.71– 78) (available online: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VDY-4FMBKBB-1&_user=658968&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000035758&_version=1&_urlVersion=0&_userid=658968&md5=8c11c8f2781d1856595ba04923f1c586, accessed: 16.06.2008).

MARCUSE, H. (1964) *The One-dimensional man: The Ideology of Industrial Society* (London).

MEADOWS, D; RANDERS, J & BEHRENS, W. (1972) *The Limits to Growth - A Report to The Club of Rome* (available online: <http://www.clubofrome.org/docs/limits.rtf>, accessed: 01.01.2009).

MESSINGER, H (1997) *Measuring Sustainable Economic Welfare: Looking Beyond GDP, Preliminary Draft*, (Statistics Canada) (available online: <http://www.csls.ca/misc/cea9731.pdf>, accessed: 01.01.2009).

MILL, J.S. (1848) *The Principles of Political Economy* (available online: <http://www.econlib.org/library/Mill/mlP.html>, accessed: 01.01.2009).

NAREDO, J. (2006) *Raices economicas del deterioro ecologico y social: Mas alla de los dogmas*(Madrid: Siglo XXI de Espana Editores, S.A.).

NEILSON, W. (2001) *Harvard Classics Vol. 51* (New York: Bartleby.com) (available online: <http://www.bartleby.com/60/193.html>, accessed: 01.01.2009).

NORDHAUS, W. & TOBIN, J. (1973) 'Is Growth Obsolete' in Moss, M. (ed.) *The Measurement of Economic and Social Performance* (New York: Columbia University Press).

NEW YORK TIMES, *Choking on growth*, A series of articles and multimedia examining the China's pollution crisis (several interactive resources) (available online: http://www.nytimes.com/interactive/2007/08/26/world/asia/choking_on_growth.html#story3, accessed: 01.01.2009).

OECD (2006) *Economic Policy reforms: Going for growth 2006*;Chapter 6: Indicateurs alternatives du bien-être (available online: http://www.oecd.org/document/7/0,3343,en_2649_34325_35995079_1_1_1_1,00.html, accessed: 01.01.2009).

OKERKE, C. (2005) "Global environmental sustainability: Intragenerational equity and conceptions of justice in multilateral environmental regimes", *Geoforum*, Vol. 37, No. 5, September 2006, (pp. 725-738) (available online: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V68-4K1X5T0-1&_user=658968&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000035758&_version=1&_urlVersion=0&_userid=658968&md5=87356825f2b61924f8c643212ab2c096, accessed: 16.06.2008).

PATTERSON, K. & HERAVI, S. (1991) "Direct estimation of entropy and revisions to the national income accounts", *The Statistician*, Vol. 40, No. 1 (pp. 35-50) (available online: <http://www.jstor.org/stable/2348222>, accessed: 16.06.2008).

QUEK, T. (October 19, 2007) "Green GDP unlikely to be revived soon", *Straits Times* (available online: <http://www.telegraph.co.uk/earth/greenpolitics/international/3301207/Chinas-green-audit-put-on-hold.html>, accessed: 01.01.08).

RAM, R. (1992) Income, Distribution and welfare: An Intercountry Comparison, *Economic Development and Cultural Change*, Vol. 41, No. 1, (pp. 141-145) (available online: <http://www.jstor.org/pss/1154224>, accessed: 16.06.2008).

RYAN, M. (2007) Better economics through...chemistry? (available online: <http://www.enterstageright.com/archive/articles/0307/0307econochemistry.htm>, accessed: 20.06.2008).

RAVILLION, M. (2004). Pro-Poor Growth: A Prime, World Bank Policy Research Working Paper No. 3242 (available online: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2004/06/09/000009486_20040609104122/Rendered/PDF/wps3242growth.pdf, accessed: 01.01.2009).

RIFKIN, J. (1980) *Entropy: A new world order* (New York: The Viking Press).

RRF (2006) *Worldwide Environmental Rankings: Will Nations Compete to Be Green? A conversation with Dan Esty and Jim Boyd* (Resources for the Future Publication) (available online: http://www.rff.org/Documents/RRF-Resources-161_EnvRankings.pdf, accessed: 16.06.2008).

SEPA & NBS (2006) *China Green National Accounting Study Report 2004* (available online: http://www.gov.cn/english/2006-09/11/content_384596.htm, accessed: 01.01.2009).

SMITH, A. (1776) *An Inquiry into the Nature and Causes of the Wealth of Nations* (London: W. Strahan and T. Cadell) (available online: <http://www.bibliomania.com/2/1/65/112/7050/1/frameset.html>, accessed: 01.01.2009).

SHAFFER, B. (2004) *Save the Universe!* (available online: <http://www.lewrockwell.com/shaffer/shaffer61.html>, accessed: 16.06.2008).

SHEIKH, A. & TONAK, E. (1994) *Measuring the Wealth of Nations: The political economy of national accounts* (Cambridge: Cambridge University Press). HJ 2005

SIMON KUZNETS (1937) *National Income and Capital Formation, 1919-1935 - A preliminary Report* (New York: National Bureau of Economic Research Publications in Reprint) (available online: <http://www.nber.org/books/kuzn37-1>, accessed: 01.01.2009).

SOLZHENITSYN, ALEKSANDR, I. (1974) *Letter to the Soviet Leaders* (New York: Harper & Row).

STEVENSON, B. & WOLFERS, J. (2008) *Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox* (available online: <http://bpp.wharton.upenn.edu/betseys/papers/Happiness.pdf>, accessed: 01.01.2009).

STEWART, K. (1974) *National Income Accounting and Economic Welfare: The Concepts of GNP and MEW*, (Research Paper Federal Reserve Bank of St. Louis) (available online: http://research.stlouisfed.org/publications/review/74/04/Accounting_Apr1974.pdf, accessed: 01.01.2009).

STIGLITZ, J (2008) *Discussion at the Courtesy of Asia Society* (New York) (available online: http://fora.tv/2008/02/05/Joseph_Stiglitz_Economics_of_Information#Green_Gross_Domestic_Product_Green_GDP, accessed: 01.01.2009).

STRAUSS, L. (1953) *Natural Rights and History* (Chicago: University of Chicago Press).

SUN, H (2007) *Interrelationship between Growth, Inequality, and Poverty: The Asian Experience* (Asian Development Bank Research Paper) (available online: <http://www.adb.org/Documents/Periodicals/ADR/pdf/ADR-Vol24-2-Son.pdf>, accessed: 01.01.2009).

TSALIK, S. & SCHIFFRIN, A. (2005) *Covering Oil – A Reporter's guide to Energy and Development* (New York: Revenue Watch: Open Society Institute) (Available online: http://www.soros.org/initiatives/cep/articles_publications/publications/covering_20050803/osi_coveringoil_20050803.pdf, accessed: 01.01.2009).

UNITED NATIONS (2003) *Integrated Environmental and Economic Accounting 2003: Handbook of National Accounting* (<http://unstats.un.org/unsd/envAccounting/seea2003.pdf>, accessed: 16.06.2008).

VAN DEN BERGH, J.C.J.M. (2007) *Abolishing GDP*, Tinbergen Institute Discussion Paper (Vrije Universiteit Amsterdam, and Tinbergen Institute) (available online: <http://www.tinbergen.nl/discussionpapers/07019.pdf>, accessed: 01.01.2009).

VAN DIEREN, W. (ed.) (1995) *Taking nature into account: a report to the Club of Rome; Toward a sustainable national income* (New York: Springer-Verlag).

VAN DIEREN, W. & HUMMERLINCK M. (1979) *Nature's price : the economics of mother earth* (New York: Rizzoli).

VIDAL, J. & ADAM, D. (19 June 2007) "China overtakes US as world's biggest CO2 emitter" *Guardian* online (available online: <http://www.guardian.co.uk/environment/2007/jun/19/china.usnews>, accessed: 01.01.2009).

WORLD BANK (2005) *Where is the wealth of nations?: Measuring capital for the 21st Century –* (Washington, DC: The World Bank) (available online: <http://siteresources.worldbank.org/INTEEI/214578-1110886258964/20748034/All.pdf>, accessed: 16.06.2008).

YONES, M (2005) *Gross National Happiness Index Survey*, (Las Vegas, USA: The International Institute of Management) available online <http://www.iim-edu.org/polls/grossnationalhappinesssurvey.htm>, accessed: 16.06.2008).

ZHU, X. & WEIKARD, H. (2003) *Discounting and environmental quality: When should dual rates be used?*, (Paper prepared for the 12th annual EAERE conference, Bilbao, Spain) (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VB1-4GSC2N5-1&_user=658968&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000035758&_version=1&_urlVersion=0&_userid=658968&md5=0f34f5187e64e79f596a517ce6fc02e2, accessed: 16.06.2008).

OTHER MEDIA:

BEYOND GDP: http://www.beyond-gdp.eu/press_coverage.html

BEYOND GDP video: <http://www.youtube.com/watch?v=Ep4DWx1--sY>

OECD Conference companion material 1: <http://www.youtube.com/watch?v=sh6esxa2e3o>

*** = significant at level 0.01

** = significant at level 0.05

* = significant at level 0.10

Datasources:

- % of Population below \$1 (PPP) per day (source: Millenium Development Indicators)
- GNI per capita, PPP (current international \$) (source: (source: World Bank Development Indicators)
- Gini Coefficient (source:World Income Inequality Database, WIID)
- Employment in thousands (source: The Conference Board and Groningen Growth and Development)
- Income share held by lowest 20% (source: World Bank Development Indicators)
- Government expenditure percentage of GDP (source: World Resource Institute, WRI)
- Malnutrition prevalence, weight for age (% of children under 5)(source: World Bank Development Indicators)
- Immunization, measles (% of children ages 12-23 months) (source: World Bank Development Indicators)
- External debt, total (DOD, current US\$) (source: World Bank Development Indicators)
- Services, etc., value added, % of GDP (source: World Bank Development Indicators)
- Life expectancy at birth, total years (source: World Bank Development Indicators)
- Primary completion rate, total (% of relevant age group) (source: World Bank Development Indicators)

ⁱⁱ Holden, 2003, p.2

ⁱⁱⁱ Haggart, 2000, p.6

^{iv} Stewart, 1974, p.19

^v Holden, 2003, p.4

^{vi} Cobb; Halstead & Rowe, 1995, p. 5

^{vii} Harvie, Philp, Slater, 2007, p.3; Holden, 2003, p.4, Van den Bergh, 2007, p.5

^{viii} Stiglitz, Den, Fistoussi, 2009, <http://www.stiglitz-sen-fitoussi.fr/en/index.htm>

^{ix} Bruntland, 1987, Foreword, Online edition

^x Cheffers & Pakaluk, 2005, p.34

^{xi} Europea, http://europa.eu/scadplus/glossary/convergence_criteria_en.htm

^{xii} Europa, http://europa.eu/scadplus/glossary/convergence_criteria_en.htm

-
- xiii Investopedia, <http://www.investopedia.com/university/releases/gdp.asp>
- xiv Stiglitz, 2008, Discussion at Courtesy of Asia Society
- xv Daly, 1995, p.4
- xvi Rifkin, 1985, p.22
- xvii Bury, 2003, online edition, Chapter I
- xviii Bury, 2003, online edition, Chapter I
- xix Bury, 2003, online edition, Chapter II
- xx Rifkin, 1985, p.24
- xxi Rifkin, 1984, p.24
- xxii Descartes, 1637/1986, p.67 in Bury, 2003, online edition, Chapter II
- xxiii Bury, 2003, online edition, Chapter II
- xxiv Rifkin, 1985, p.31
- xxv Rifkin, 1985, p.31
- xxvi Rifkin, 1985, p.33
- xxvii Greene, 1961, p.88
- xxviii Strauss, 1953, p.258 cited in Rifkin, 1985, p.35
- xxix Locke, 1967, p.315 cited in Rifkin, 1985, p. 36
- xxx Bullock, 1909 in Neilson, 2001, Part III, Online edition
- xxxi Costanza, 1997, p.32
- xxxii Mill, 1848, Book IV, Chapter 6 – Of the Stationary State
- xxxiii Ibid.
- xxxiv Keller, 2005, p. 108
- xxxv Naredo, 2006, p.42
- xxxvi Cobb; Halstead & Rowe, 1995, p. 4
- xxxvii Cobb; Halstead & Rowe, 1995, p. 4
- xxxviii Smith, 1776, Online edition, Chapter 3, p.1
- xxxix Ibid.
- xl Haggart, 2000, online edition
- xli Froyen in Landefeld, 2000, p.1

-
- xlii Kuznets, 1937, p.7
- xliii Haggart, 2000, p.3
- xliv Haggart, 2000, p.3; Landefeld, 2000, p.7
- xlv Cobb, Halstead & Rowe, 1995 in Haggart, 2000, p.4
- xlvi Hawrylyshyn, 1974, p. 12.
- xlvii Haggart, 2000, p.1
- xlviii Keller, 2005, p.121
- xlix Landefeld, 2000, p.7
- ^l Truman Library, <http://www.trumanlibrary.org/publicpapers/index.php?pid=221&st=&st1=>
- li Kapp, 1971, p.231
- lii Meadows, 1972 Limits to Growth, p.1
- liii Redefining Progress, www.rprogress.org
- liv Paul Ehrlich cited in Nordhaus & Tobin, 1973, p.509
- lv eMagazine, <http://www.emagazine.com/view/?655&printview>
- lvi Cobb, Halstead & Rowe, 1995, p. 8
- lvii Stiglitz in Tsalik & Schiffrin, 2005, p.15
- lviii Holden, 2003, p.6
- lix Easterlin, 1974; Stevenson & Wolfers, 2008
- lx Ravillion, 2004; Bourguignon, 2003
- lxi World Bank,
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPGI/0,,contentMDK:21932026~menuPK:5461555~pagePK:210058~piPK:210062~theSitePK:342771,00.html#references>
- lxii Adams, 2004; Ravillion, 2004; Bourguignon, 2003
- lxiii Garlikov, 2009: <http://www.garlikov.com/EPFE/chap22.htm>
- lxiv Ibid.
- lxv Jasay, 2008
- lxvi Stewart, 1974, p.19
- lxvii Ibid.
- lxviii Ibid.

-
- lxi Garlikov, 2009: <http://www.garlikov.com/EPFE/chap22.htm>
- lxx Creyts; Derkach; Nyquist; Ostrowski; Stephenson, 2007
- lxxi Mckinsey, Ibid. (<http://www.mckinsey.com/client-service/ccsi/greenhousegas.asp>)
- lxxii Haukioja, 2007
- lxxiii Colman, 2001
- lxxiv Yones, 2005, <http://www.iim-edu.org/polls/grossnationalhappinessurvey.htm>
- lxxv Kahnemann; Krueger; Schkade; Schwarz; Stone, 2004, p. 429
- lxxvi Vidal & Adam, 2007 (<http://www.guardian.co.uk/environment/2007/jun/19/china.usnews>)
- lxxvii Creyts, Derkach, Nyquist, Ostrowski, Stephenson, 2007, p. 5
- lxxviii NYT, 2007
- lxxix Wang in NYT: Choking on growth
- lxxx SEPA & NBS, 2006
- lxxxi NYT, 2007
- lxxxii Jun, 2007
- lxxxiii NYT, 2007
- lxxxiv Daly, 2008, p.12
- lxxxv Daly, 2008, p.12