



The adequacy of GDP as a measure of well-being

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Rubén Núñez

al226188@alumail.uji.es

Tutor: Maite Alguacil

Abstract

The aim of this paper is to question the GDP as a measure of well-being. GDP has been used since its creation to measure the total economic activity. We critique its use by leading economists and politicians as a main indicator of overall progress. There are crucial factors, not considered in the calculation of GDP. Such as natural, social and human capital, that are benchmarks in several measures of sustainability and economic growth. Concretely, we try to determine to what extent the GDP per capita can be considered a good indicator of welfare. To do that, we empirically analysed the relationship between GDP per capita and most proper indicators regarded to human well-being. Using data for 95 countries, we find a positive relation between GDP and well-being. This result, although should be interpreted with caution, reveal that in spite of GDP clearly misses out some critical aspects, such are the environment and the self-perceived well-being, can be used as a good proxy of economic welfare.

Keywords. GDP, Well-Being, Human capital, Progress

[JEL Classification: A10, A12, O10.](#)

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The adequacy of the GDP as a measure of well-being

1. Introduction

In the tough process of leaving the last economic recession behind, many countries are experimenting a phase that is becoming broadly recognised by an increasing number of institutions and personalities. This is recognised as a period where even though the levels of Gross Domestic product are converging to the levels preceding the Great Recession, many countries have worst life conditions than before this shock crushed the global economy.

This shocking phenomenon has concerned the corresponding authorities and an entire movement labelled “Beyond GDP” is spreading across many economic and political institutions. The main claims of this movement are to promulgate the wrong scope that has been associated to GDP during the last century. One of the most determinant arguments is that the GDP was created under very different circumstances regarding on how the economy operates. By its creation, there was not such an interconnected global economy as it is nowadays. This means that a misunderstanding of how an economy is performing nowadays is much more prejudicial as a few decades ago. Where the instant global changing economy in such as we are has involved into new problems and challenges.

In a global economy as we have nowadays, new critical phenomenon's such us income and gender inequality, enormous suicide rates in developed countries, or environmental devastation or labour abuse are often ignored and not properly considered. These facts and many more are not taken into account on the GDP statistics. However, according to recent economics, it is crucial to detect these deficiencies and to encourage movements such as “Beyond GDP” in order to change the way economy performance is measured. These shortcomings of GDP are real struggle for the citizens now, so it is very important a wright measurement of the overall performance of the economies if we want to abolish those problems in the future. This movement is demanding political voice for measures that are not very likely for governments.

The development of alternative indicators of an economic situation is not a new concept. Lots of them were created during the second half of the last century. Although, the amount of it has increased exponentially in the 90s and the new century with many new indicators in further areas.

This tendency has indeed yielded to a notable involvement from part of prominent organisations. For example, the European Commission made a conference in 2007 which served as a benchmark. This conference was preceded by the creation of the Commission on the Measurement in Economic Performance, which published a final report in with the collaboration of two Nobel laureates like Joseph E. Stiglitz and Amartya Sen. Similarly, other institutions such as the OECD and the UNDP launch their annual reports focusing on different concepts regarding human development.

In this paper we try to find to what extent GDP per capita can be considered a good indicator of well-being. To do so we try to give a breakthrough scope following the achievements done by the "Beyond GDP" movement. We clearly explain and define what is well-being and which things are determinant to reach well-being. This is our corner stone, from this point we use the most proper indicators related to well-being and we try to find if there is a relation between GDP and the different indicators. We focus on well-being which we think is the attribute in which GDP fails the most and because it has an enormous importance in people's lives.

Well-Being is a concept difficult to understand because it covers many confusing aspects of life. It encompasses aspects from the intimately personal situation of everyone's till the circumstances of the external factors. Despite this complexity, we have held to the literature and we have distinct four different concepts of well-being: Subjective well-being, Objective well-being, human necessities and capabilities and functioning's. Each notion is explained in detail later on.

To overcome these difficulties we have done a research work trying to find data for the most accurate indicators regarding to each notion. We use four indicators, each one is the most suitable for its corresponding concept of well-being. The indicators are explained individually later in detail.

For the econometric analysis, we use both OLS and FE estimation with panel data. We make a crucial distinction between developed and developing countries in both models. This division is made in order to prove two facts: the differences in well-being between countries according to the inequality of GDP and the results within countries when these differences in wealth are less sharp.

Our results show a strong evidence between some indicators and GDP per capita such as the Legatum Prosperity Index and the Human Development Index (HDI). This occurs because those indicators take into account standards of living. For other indicators of well-being in which economic standards are not taken into account, such as the Happy Planet Index (HPI) or the Sustainable Society Index (SSI) this evidence

is not so clear. We observe divergences between countries for some indicators. We also see differences in the sign of the relations between the different indicators and the GDP. We have positive relations in the indicators that consider economic conditions, negative for the one that considers the environment and flat relationships in the ones that consider self-perceived well-being and sustainability.

In the following section, we present a review of the literature in this topic. Afterwards, we explain the different notions on well-being in a thorough way. We also explain the basic insights on the each indicators and the basic concepts on how the indicators are calculated. In Section 4, we make a detailed description of our data with summary statistics differing between countries. Next, we present our empirical analysis in which we describe and remark the different results obtained. We finish with the conclusions on which we justify the results obtained. Afterwards we encourage to carry out more extensive and deeper studies of this topic following a similar and clear framework as we outline in this paper.

2. Literature review

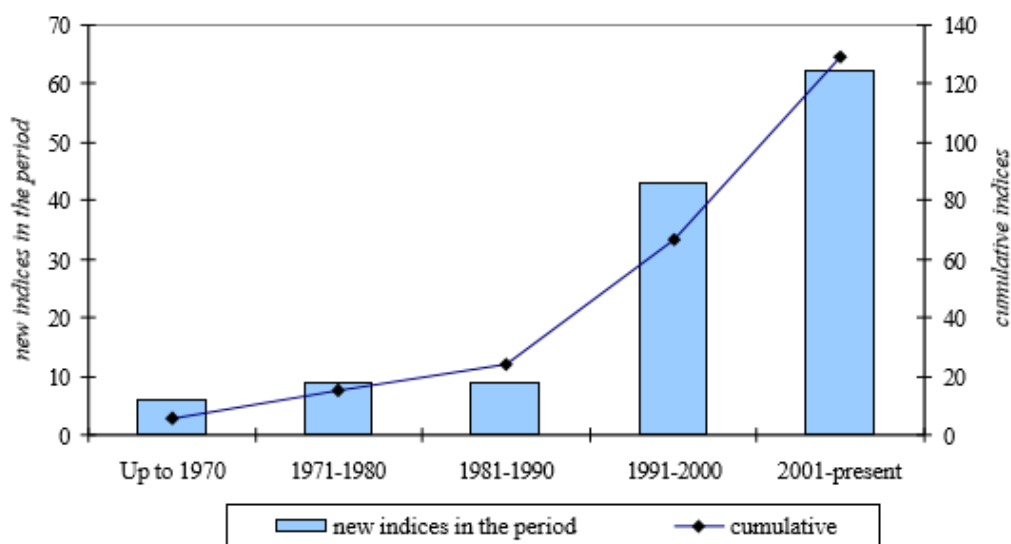
During the last half century, achieving economic growth has been one of the main goals of economic policy. This growth is measured by the changes on the Gross Domestic Product (GDP). Governmental policies often imply a series of measures aimed to impulse economic activities, covering from optimizing taxes to stimulate markets and trade to investing in education and public infrastructure. The justification for that importance associated to economic growth is that economic growth produces important benefits. First, economic growth raises the standards of living of a country's citizens and therefore it is seen as the main driver for reducing poverty. Second, economic growth stimulates not just employment but also capital investment and business confidence. Finally, an increase in economic activity generates a larger fiscal dividend for the government, through different taxation systems, which is often translated into a higher public investment resulting in better living conditions for the population.

Nevertheless, concerns about both the desirability and the sustainability of continued economic growth have gained importance over the years. As mentioned by Bleys (2009), the critics to this respect are related to three main topics: well-being, economic welfare and sustainability. In the recent years, some researchers and politicians have noticed this lack of adequacy of the GDP to these issues and have claimed of new ways of measurement the overall situation of the nations. This has led to a huge increase in the development and promotion of alternative measures for welfare and wellbeing since the 1970s.

Over the past 10 years, the spread of these measures has gained force as the "Beyond GDP" movement, which has been usually promoted by policy-makers and statistical officers. At the "Beyond GDP" conference organized by the European Commission in 2007 a strong political statement was made. The leaders of the Commission called for the development and further application of indicators that either adjust, complement or replace GDP. In 2008 the Commission on the Measurement of Economic Performance and Social Progress was created as an initiative of the French Government. Twenty months later, the Commission released its final report that became widely known as the Stiglitz-Sen-Fitoussi report. An extensive report in which two Nobel laureates were involved and in which a deep study on the determinant of human well-being and sustainability was carried out.

The increased interest in the “Beyond GDP” ideas led to a boom of alternative measures of welfare over the last 15 years. In an extensive review of composite indicators measuring country performance, in 2005 Bandura remarked two facts. First, a growing trend in both the quantity of indexes existing and the variety of institutions elaborating such indices. Second, an increasing cover of different topics, which were broadened to include gender aspects, environmental performance, corruption, globalization and competitiveness measures including technological aspects and innovation capacity. The increasing availability of information together with new global aspects arising and the growing demand for transparency may have been the propelling factors that explain such a rising trend.

Figure 1: Growth in the number of indices



Source: Bandura (2005), page 8.

Bandura (2005) found that 80% of the indexes in the study had been developed in the 1991-2005 period, and almost half of the indexes available in 2005 were developed after 2000 (see Figure 1). In a subsequently 2008 update, 43 indices were added to the inventory of alternative measures.

Among those institutions that have elaborated the indicators there are some with a huge influence worldwide such as the WEF¹, the OECD² or the UNDP³, which support and encourages the “Beyond GDP” movement with a wide number of discussions with the most influent personalities in the respective topics. In addition, these institutions are well known for its annual reports that serve as a guide for many researchers and politicians all over the globe.

Important personalities are also concerned about this issue. An example of this is the speech that the President David Cameron gave at the Google Zeitgeist Europe conference in May 2006: "It's time we admitted that there's more to life than money, and it's time we focused not just on GDP but on GWB - general wellbeing".

We introduce this information to remark the relevance of the topic covered in this research and the increasing impetus from some of the most influent institutions. They are showing that this problem is real and demands multiple solutions, within a major involvement not from the international institutions dedicated to study those problems but from the governments of nations itself

An outstanding review of the literature in this matter has been done by Bleys (2011). According to this author, the main issues that are not represented by the GDP can be classified as notions of well-being, economic welfare and sustainability. Other classifications have been done, this one seems to encompass better the different insights that appear when measuring all the aspects that GDP does not take into account. In this work, we focus on the first issue, well-being, which in our opinion, needs a special treatment. This is because well-being has an immense importance for the citizens and there is an insufficient understanding and measurement of this concept.

Before analysing the different existing indicators, we describe next the main conceptions on GDP to understand how it has become the dominant measure as economic performance. We explain which are the troubles of the dominance of GDP in order to understand in which aspects GDP statistics fail the most. Afterwards we can

¹ WEF: World Economic Forum which launches the Global Competitiveness Report: <http://reports.weforum.org/global-competitiveness-report-2015-2016/>

² OECD: Organization for Economic Development and Cooperation which launches the Better Life Index: <http://www.oecdbetterlifeindex.org/#/111111111111>

³ UNDP: United Nations Development Programm which launches the Human Development Report: <http://hdr.undp.org/en>

figure out which indicators we can select trying to the better supplements of GDP in order to reduce its deficiencies.

2.1 The use of GDP at a global scale as a measure of economic progress

Since its creation, economists has warned that GDP is a specialized tool, and treating it as an indicator of general well-being is inaccurate and dangerous. Despite this, economic growth, which is measured by the growth of GDP, has become the overriding measure for economic progress. The creator of the GDP Simon Kuznets (1962) warned against the incoming problems of the obsession for economic growth. According to his own words: "Distinctions must be kept in mind between quantity and quality of growth, between its costs and return, and between the short and the long term. Goals for more growth should specify more growth of what and for what."

When dividing GDP by the number of inhabitants in a country, GDP per capita is obtained. This indicator is considered a measure of the living standards in a particular country, as per capita GDP indicates the amount of money each person in that nation has available for consumption. GDP and System of National Accounts (SNA) methodologies were initially developed in the United States and the United Kingdom between the 1930s and 1940s. President Roosevelt's government used the available data and statistics to justify policies and budgets with the purpose of leaving the Great Depression. GDP estimates were used to show that the economy could provide enough supplies for combating World War II while maintaining enough production of consumer goods and services.

The use of GDP at a global scale as a measure of economic progress was further fortified in the Bretton Woods Conference. Improving economic well-being was thus essential for creating steady world peace. Growing the economy was viewed as the path to raise economic well-being.

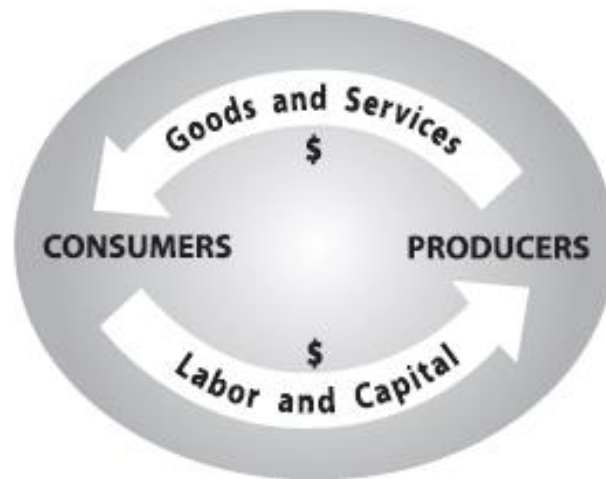
Besides per capita GDP is commonly used to compare quality of life in different countries. Governments often use changes in GDP or GDP per capita as an indicator of the success of economic and fiscal policies. Internationally, changes in a country's GDP are used both, the IMF and the World Bank to guide policies and determine how and which projects are funded around the world. Nowadays GDP concretely and economic growth generally is referred by leading economists, politicians and the media as an issue that represents overall progress. An enlightening fact is that a report released by the World Bank claims that nothing apart from long-term high rates of GDP

growth can solve the world's poverty chronic condition. These conclusions forget many problems that exist in many countries in the recent times.

2.2 Main problems derived from using GDP to measure well-being and economic progress

According to Costanza (2009), "GDP is an estimate of market throughput, adding together the value of all final goods and services that are produced and traded for money. It measures the flow of goods and services produced within the market and some 'nonmarket' production like defence spending and health care" (see Figure2). Undoubtedly, crucial activities for the functioning of the economy and society are not taken into account in the GDP measurements. Many important economic activities such as house work and volunteer work, the cost of crime and the depletion of natural sources are entirely excluded from GDP measurements. Something is missing and we need to go beyond GDP to get there.

Figure 2: Components reflected in GDP



Source: Costanza (2009), page 3.

As it is well known, GDP is highly correlated with a lot of the things that we prize in a society: good education, quality infrastructure, effective markets. However, as has been also long recognized, this concept it is missing several parts of the puzzle. In essence, it is an economy that should work better for the citizens, and not the other way around. For instance, concerning to a growing inequality crisis, GDP tells us nothing about the

distribution of growth. Because GDP measures only monetary transactions related to the production of goods and services, it bases on an incomplete picture of the system within which the human economy performs.

Figure 3: View of Economy as Part of a Larger System



Source: Constanza (2009), page 8.

Figure three shows that the economy draws benefits from natural, social and human capital and that the quantity and quality of such capital is affected by net investment from the economy. Measures of income, such as per capita GDP, are generally poor measures of well-being since they reduce the evaluation of the multi-dimensional concept of well-being to a single monetary dimension. GDP ignores changes in the components of the community capital on which societies rely for a continued existence and well-being. Therefore, GDP not only fails to measure key aspects of quality of life, it encourages activities that are counter to long-term community well-being.

The shortcomings of GDP as a measure of welfare have become even more striking in today's much more complex world of rapidly evolving technologies, demographic shifts, rising income inequalities and the urgent need to reduce pressure on the physical environment. It is not just how much is produced that matters but how the gains are distributed and the extent to which growth translates into broad-based improvements in living standards, reaching all citizens rather than the lucky few.

The ways of measuring national-level well-being have been used to address the growing realization that GDP is a measure of economic quantity, not economic quality or welfare.

In sum, while instructive in many ways, GDP is a partial, short-term measure, whereas the world needs more wide-ranging and responsible instruments to inform the way we build the economies of the future. Many organizations are working in particular areas to foster a better understanding of what we need to ensure sustainable progress. Our hope is that these efforts will lead to the widespread use of more relevant targets for measuring economic progress. The crucial step comes with our political leaders who need to nurture a human economy, and they need to protect other things that are just as important as GDP-growth.

“The gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything in short, except that which makes life worthwhile.”

Robert F. Kennedy (In a speech at the University of Kansas on 18 March 1968)

This quote give us an idea on why we need to measure other indicators, aimed to analyse if the objective of a better life in an economy is being achieved regardless of its economic size.

2.3 What do people understand by Well-being?

To begin well-being is an ambiguous and wide-ranging concept lacking a universally definition and often it is involved in confusing interpretations. Traditionally, wellbeing has been identified with a unique purpose: material progress measured by income or GDP per capita. McGillivray (2007) defines well-being as a concept in which we encompass all the factors that affect to a person´s life situation in a multidimensional way. There is a huge controversy on the research field, with regard to which is the best way to measure the overall well-being because it includes interchangeable terms such as life quality, happiness, or life satisfaction are the most used ones. One appropriate way to classify those terms is by using a two-dimension approach, the objective approach and the subjective approach. The first one is based on objective measures, which go through certain observable facts such as economic, social and environmental statistics, traditionally this is how wellbeing has been identified with a single objective dimension: material well-being measured by GDP per capita or income. The second one measures well-being through subjective measures such as self-reported happiness and life satisfaction, which capture people´s feelings or real experience in a direct way.

Both approaches are opposed to each other despite one and the other are fundamental to measure well-being in the broadest possible way. The main difference between those measures is the way they are obtained. The objective approach come from compiling social statistics while the subjective one needs a deep survey research. Policy-makers commonly use a single contrast between subjective and objective measures of well-being that tends to oversimplify. Thus, it is necessary to make several distinctions on the measures that we are going to analyse.

Regardless of the difficulties to englobe all the features of well-being there are some notions extracted from the literature on philosophy that can be used to understand this concept. The most important ones are utilitarianism, the fulfilment of human needs and capabilities and functioning's

2.4 Different notions on well-being

As Bley's (2011) defines, the assumption that the choices between different options to allocate scarce resources are made using a preference ordering that is represented by utility function, based on utilitarianism that is one of the pillars of economic theory. There are two conceptions of utility that have been developed: the ordinal conception and the cardinal conception. The first one is based on rankings and has resulted in the behaviourist, or revealed preferences, interpretation of choice theory. This conception supports the idea that observed consumption can be used to measure well-being. This idea is opposite to the one of some economists, such as Conceição and Bandura (2008) who argue that the link between income and well-being rests on the assumption that income allows increases consumption and consumption increases utility. The dissent is on how increases consumption represent improvements in wellbeing. In the case in which large increases in GDP are turned into growth in investment instead of consumption, then GDP itself does not necessarily mean improved well-being. Furthermore, even though all the extra income obtained by economic growth was destined to consumption it is necessary to formulate the following question: Is it accurate to assume that more consumption leads to more utility?

To grasp the aspects that the ordinal conception of utility misses it is necessary the cardinal conception. This concerns about personal experiences and provides the happiness interpretation of utility. It can be used as a starting point for subjective indicators that look at what a person feels in terms of utility, necessities fulfilment or happiness.

Moving now to the fulfilment of human necessities, there are different theories on which are the basic human necessities. This were based on John Rawls (1971) who considered the provision of primary social goods as the foundation of well-being as well as basic rights and social advantages. There are multiple hierarchical or non-hierarchical lists of “basic” needs before focusing on higher-level classifications.

Current well-being is also linked to the needs of future generations; the ideas of ecological sustainability and development are combined into a new vision on society. Hence, we obtain the concept of sustainable development, which it focuses on the needs of both the present and future generations so it was decided to include sustainable development indices as a subgroup of well-being measures.

In 1985 the capabilities-functioning’s approach was shaped by Amartya Sen. According to this author, it encompasses two levels: the level of observed outcomes (achieved functioning’s) and the level of opportunities (capabilities). Both concepts are clearly different, but there is a big dilemma on how to distinguish some capabilities in different lists. Anyhow the broader picture here is that what an individual is able to do and its chances to do something he want affect to its well-being

Once we have explained the different notions of well-being, we focus on the comparison between GDP per capita and four different well-being indicators in several countries in order to check if any correlation between the GDP per capita and those indicators exists. The indicators chosen here satisfy the following three conditions:

1. Availability of data to build our database.
2. Accessible data for both developed and developing countries.
3. Available data for different years.

In concrete, we use one suitable indicator per each notion in order to check the relation of the different concepts of well-being with the GDP per capita. We employ four indicators that represent the approaches above mentioned: the objective well-being, the subjective well-being, the sustainable development referring to the human needs and the capability-functioning’s approach. With this analysis, we try to answer the

question that if variations in economic growth, mainly measured by changes on GDP is always translated into improvements in well-being.

3. Measuring well-being: different indicators

We have divided the different indicators of well-being into four main approaches: objective well-being, subjective well-being, human needs approach and capabilities-functioning's approach. In particular, we select one suitable indicator for each approach according to the variables that the indicator takes into account and the goals of each indicators.

3.1 Objective well-being

GDP per capita is the overriding measure of objective well-being. It could be a proper indicator to measure this dimension of well-being but, as we have seen above its shortcomings affect not only the capability to measure broadest concepts of well-being, such as happiness or life satisfaction, but also to size many measurable aspects of the economy. This economic measure does not take into account many crucial activities.

To overcome the limits of GDP per capita for measuring well-being, we have chosen the Legatum Prosperity Index as an indicator of the objective well-being in our sample. The Legatum Prosperity Index is an indicator developed by the Legatum Institute, a British think tank that promotes alternative measures and scopes to GDP. Concretely, they focus in prosperity and the pursuit for a virtuous life through different programs. This is the indicator that, according to us, accomplish better the conditions mentioned above. It embraces many of the measurable aspects that are not grasped in the GDP statistics, but also it considers wealth. Thus, it serves such a complement of GDP in a broadest view of the performance of the studied nations.

The Legatum Institute defines prosperity as wellbeing, not just wealth, it assesses a wide range of indicators. Specifically it is sustained in eight pillars: economy, entrepreneurship and opportunity, governance, health, safety and security, personal freedom and social capital. The index ranks countries according to their performance across those eight equally weighted sub-indexes.

The index has been developed following these steps:

1. Variables selection: A final number of 89 variables is selected which are spread into eight sub-indices
2. Standardization of the variables: All variables are standardised by subtracting the mean and dividing them by the standard deviation.
3. Variable weights: Regression analysis is used to determine the weight of each variable. A variable's weight represents its relative importance to the outcome.
4. Income and well-being scores: The latest data available is gathered for each country. The raw values are standardised and multiplied by the weights. The weighted variable values are then summed to produce a country's well-being and income score in each sub-index. The income and wellbeing scores are then standardised so they can be compared.
5. Sub-index scores: The standardised income and wellbeing scores are added together to create the countries' sub-index scores.
6. Prosperity Index scores: It is determined by assigning equal weights to all eight sub-indices. The average of the eight sub-indices yields a country overall Prosperity score⁴.

We have selected the final score of the averages that the Legatum Institute has calculated following this process. The final score indicates the country situation according to the eight sectors analysed. This offers us an objective point of view of the situation of the countries analysed.

3.2 Subjective well-being

As before mentioned, one of the main problems of the GDP is that it does not consider people's feelings about their life's overall situation regardless of its economic status. To grasp those aspects of subjective well-being, we are going to use the Happy Planet Index (HPI), developed by the New Economics Foundation, an independent think-and-

⁴A deeper analysis on the technical notes on how the index is calculated can be founded here: http://media.prosperity.com/2013/pdf/publications/methodology_2013_finalweb.pdf

do tank that inspires and demonstrates real economic well-being. This institution promotes social, economic and environmental justice. Their mission is to start the move to a new economy through big ideas and fresh thinking. Once again, we have chosen this index according to the three conditions mentioned above.

This Index has the goal of encouraging good lives, not only in current time, but also in the future. With this purpose, it measures which countries deliver long, happy and sustainable lives for its citizens. The index examines global data on life expectancy, experienced well-being and ecological footprint to calculate the final score. It sets current and future well-being at the core of the measurement. It frames the development of each country in the context of real environmental limits. The classifications made by this institution reaffirm their claims, in which they argue that progress is not just about wealth. The HPI demonstrates that while the challenges faced by rich resource-intensive countries and those with high levels of poverty differ drastically, the end goal is the same: to produce happy, healthy lives now and in the future.

The methodology to calculate the index proceeds as follows:

$$\text{Happy Planet Index} = \frac{\text{Experienced well-being} \times \text{Life expectancy}}{\text{Ecological footprint}} \quad (1)$$

This simple headline indicator gives a clue of whether a society is heading in the right direction. It provides a crucial tool to ensure fundamental issues, which are accounted for in policy decisions. At the bottom, the HPI ⁵is a measure of efficiency. It calculates the number of happy year's life achieved per unit of resource use.

The index is composed by three different components:

Experienced well-being: HPI experienced well-being is assessed using a question called the 'Ladder of Life' from the Gallup World Poll. This asks respondents to imagine a ladder, where 0 represents the worst possible life and 10 the best possible life.

⁵ A fully description on how the HPI is calculated can be founded here:
http://media.prosperity.com/2013/pdf/publications/methodology_2013_finalweb.pdf

Life expectancy: HPI includes a universally important measure of health – life expectancy. In the 2012 report, life expectancy data is obtained from the 2011 UNDP Human Development Report.

Ecological Footprint: The HPI uses the Ecological Footprint promoted by the environmental charity WWF as a measure of resource consumption. It is a per capita measure of the amount of land required to sustain a country's consumption patterns, measured in terms of global hectares (g ha) which represent a hectare of land with average productive bio capacity.

The HPI is a clear and meaningful barometer of how well a nation is doing, but countries that do well on the HPI can still suffer many problems. From the New Economics Foundation they encourage to use other indicators, which will also be necessary to fully assess how societies are doing.

3.3 Human needs approach

Another concept GDP misses, refers to the basic human necessities of the population, and more concretely if these are or not fulfilled. Being aware that sustainable development is regarded as a human necessity and again following the three guiding principles, the Sustainable Society Index (SSI) is aimed to measure this notion of well-being.

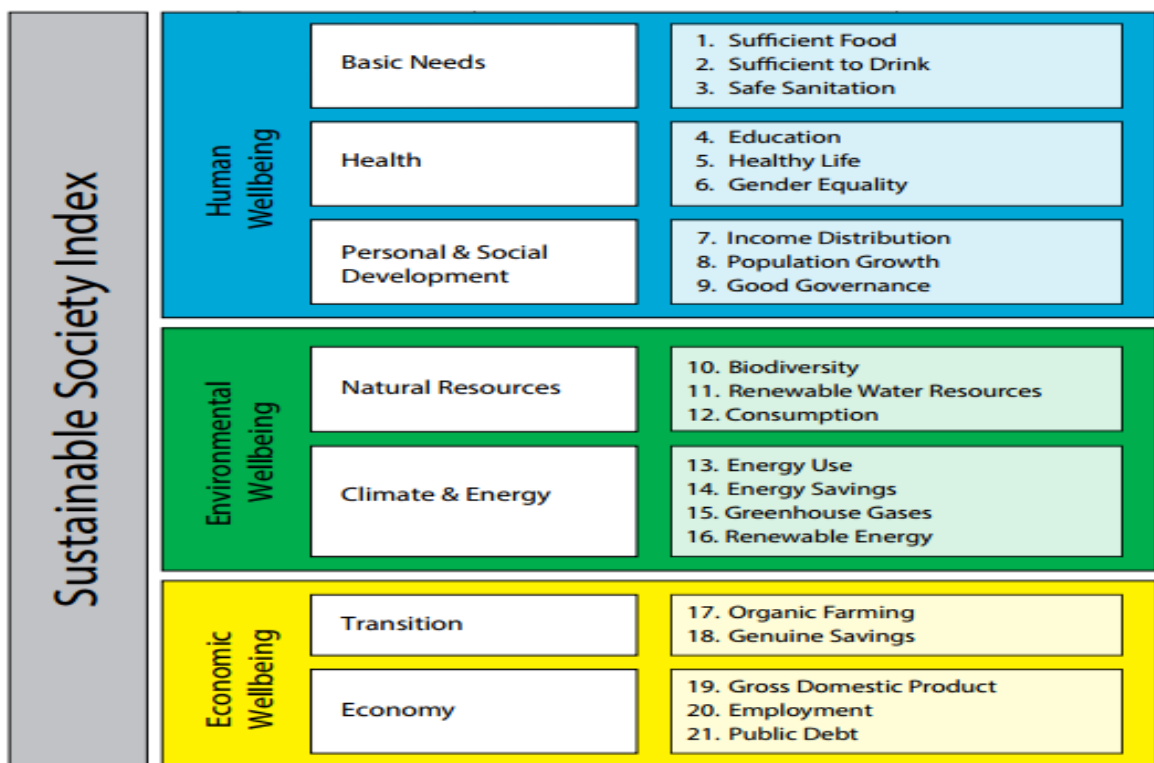
This index is developed by the Sustainable Society Foundation (SSF), a non-profit organization established in 2006, which focuses on stimulating and assisting countries in their development towards sustainability. The SSI is based on a solid definition of sustainability, which they split into 3 concepts. According to this institution, a sustainable society is a society:

- ✓ That meets the needs of the present generation
- ✓ That does not compromise the ability of future generations to meet their own needs
- ✓ In which each human being has the opportunity to develop itself in freedom, within a well-balanced society and in harmony with its surroundings

Thus, the SSI framework goes beyond a purely protectionist approach that would aim to maintain natural systems with minimal human impact. It describes societal progress along three dimensions: human, environmental and economic well-being, built on 21 indicators.

The SSI integrates human well-being and environmental well-being. Human and environmental well-being are the goals to be achieved. economic well-being is not a goal in itself. It is a precondition to achieve human and environmental well-being. It can be considered as a safeguard to the latter two. In table 4 below, we have a clear picture on the indicators that form the SSI

Figure 4: Composition of the SSI



Source: Sustainable Society Foundation (2014)

The authors of the report (2014) explain that despite the comprehensibility of the indicators that build the SSI, they make a warning according to the reliability of data. They remark that producing time series is confronted with irregularities and difficulties in the data.

For aggregation they used the geometric average. There is not a clear distinction between the different indicators so the Foundation decided to attribute the same weight

to every indicator. Afterwards they made the aggregation into dimensions. The total results are weighted for population size.⁶

The Joint Research Center of the European Commission (JRC) made an audit on this index⁷. This statistical analysis of the SSI and concludes that the setup meets the statistical requirements and is well suited to measure a country's level of sustainability. JRC strongly advises to aggregate no further than the existing dimension level. Following the recommendations of JRC they have not aggregated the dimension levels into one single figure for the overall index. Neither do us.

3.4 Capabilities-functioning's approach

To cover the last notion on well-being we are going to use the Human Development Index (HDI). This is a well-known indicator created in the 90s by the United Nations Development Programme.

According to the Human Development Report 2015 "Human development is about enlarging human choices—focusing on the richness of human lives rather than simply the richness of economies."

The importance of this index is well-known and is an adequate indicator for our study as many economists, such Amartya Sen, recognized: "HDI is people-centered ... GDP is commodity-centered" (in an interview regarding the 20th anniversary of the Human Development Index, 2010).

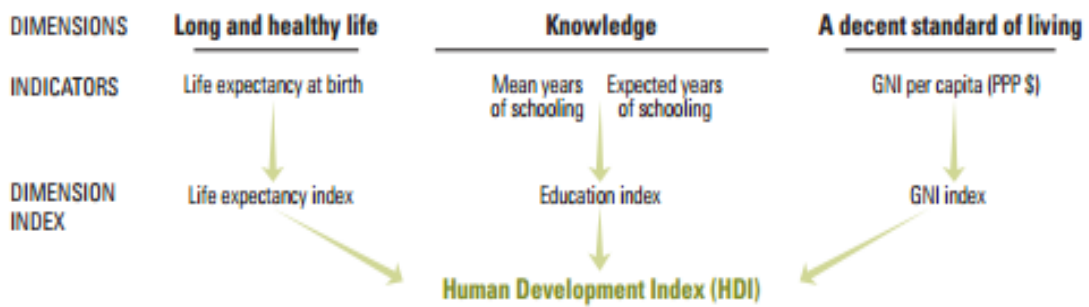
The HDI was built to encourage that people and their capabilities should be the final criteria for assessing the development of a country, not economic growth alone. The HDI is also used to question national policy choices, comparing countries with the same level of GNI per capita with its different human development outcomes. These contrasts can stimulate debate about government policy priorities.

⁶ A full explanation on how each indicator is calculated can be founded here:
http://www.ssfindex.com/ssi2014/wp-content/uploads/pdf/calculation_formulas-2014.pdf

⁷ http://www.ssfindex.com/ssi2014/wp-content/uploads/pdf/JRCauditSSI2006_2012.pdf

The Human Development Index is a summary measure of average achievement in vital dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the dimensions.

Figure 5: Composition of HDI



Source: UNDP, year 2015

The health dimension is delivered by life expectancy at birth, the education element is assessed by mean of years of schooling for adults aged 25 years and more and expected years of schooling for children of school beginning age. The standard of living dimension is measured by gross national income per capita. The HDI uses the logarithm of income, to reflect the diminishing importance of income with increasing GNI. The scores for the three HDI dimension indices are then aggregated into a composite index using geometric mean⁸.

The HDI simplifies and captures only part of what human development entails. It does not reflect on poverty, inequalities, empowerment, human security, etc.

⁸ For a detailed dissertation on how the HDI and its complementary indexes are calculated see: http://hdr.undp.org/sites/default/files/hdr2015_technical_notes.pdf

4. Data description and main statistics

In this section, we describe the data we use in this analysis. Two sample periods are covered. First, we focus on the year 2012 as we have data for all the indicators. Next we employ the available data for the years 2010, 2012 and 2014. We have data for these years for all indicators except the Happy Planet Index, which is only available for the years 2006, 2009 and 2012. We also consider these indexes for two subsamples considering developed and developing separately. In Table 1 you can see the definition and source of all variables.

Table 1: Variables definition and sources

Variable	Definition	Source
GDP per capita (gdppc)	GDP per capita of each country (USD)	World Development Indicators (World Bank database, 2014)
Legatum Prosperity Index (leproi)	Level of prosperity of each country, resulting from the average of the equal-weighted eight sub-indices forming the index	Legatum Institute (Legatum Prosperity Index 2015)
Human Well-being (huwb)	Sub index of the SSI that encompasses basic needs, social development and health	Sustainable Society Foundation (Sustainable Society Index, 2014)
Environmental Well-Being (envwb)	Sub index of the SSI that encompasses natural resources and climate energy	Sustainable Society Foundation (Sustainable Society Index, 2014)
Economic Well-being (ecwb)	Sub index of the SSI that encompasses transition and the economy	Sustainable Society Foundation (Sustainable Society Index, 2014)
Human Development Index (hdi)	HDI in each country	UNDP (2015)
Happy Planet Index (hapi)	Number of happy years life achieved per unit of resource use.	New Economics Foundation (Happy Planet Index 2012)

Source: own elaboration

As previously mentioned, in this paper we try to verify if there are differences between countries on their comparison between well-being indicators and GDP per capita. To do so, we first analyse the entire sample (2010-2014). We have chosen the 95 countries from which we found data of all the indicators these years. Secondly, we focus on 2012, given that it is the only year in which all the selected indicators have available data.

Table 2. Summary Statistics Year 2012

Variable	Obs	Mean	Std. Dev.	Min	Max
gdppc	95	17216.09	20732.25	469.6843	101563.7
leproi	95	0.2338947	1.614714	-3.27	3.43
huwb	95	6.608105	1.573403	3.21	9.07
envwb	95	4.68	1.686599	1.71	8.25
ecwb	95	4.590316	1.435383	1.72	8.24
hdi	95	0.7334105	0.147891	0.373	0.944
hapi	95	43.95895	8.810928	25.3	64

Source: own elaboration

In Table 2, we present the main statistics of the different indicators in 2012. As we observe, there are huge differences between the minimums and maximums in all the indicators, particularly in GDP per capita from 101563.7USD for the richest to 469.6843 for the poorest nation). Therefore, we can say that there exists enormous differences in the characteristics of the countries selected. That is why, in a second stage, we decide to split our sample into two categories: developed and developing countries. We made this division following the UNCTAD (2015)⁹ classification. See further information in Table 1 of the appendix A. Thus, our sample is now divided into 32 developed countries and 62 developing countries. With this division, we want to check if the verifiable differences on GDP per capita between developed and developing countries are translated (or not) into differences in the different indicators of well-being.

⁹

http://unctadstat.unctad.org/EN/Classifications/DimCountries_DevelopmentStatus_Hierarchy.pdf

Table 3. Separated Summary Statistics Year 2012

Variable	Obs	Mean	Std. Dev.	Min	Max
Developed	32				
gdppc	32	38798.07	21484.73	8577.289	101563.7
leproi	32	1.99125	1.084325	-0.08	3.43
hapi	32	42.8875	5.277386	34.6	55.2
huwb	32	8.268125	0.4855222	7.03	9.07
envwb	32	3.49375	0.8784986	2.16	5.35
ecwb	32	5.656563	1.594787	2.46	8.24
hdi	32	0.8833125	0.0382483	0.793	0.944
Developing	63				
gdppc	63	6253.813	7639.49	469.6843	50903.91
leproi	63	-0.6587302	0.98058	-3.27	1.22
hapi	63	44.50317	10.14307	25.3	64
huwb	63	5.764921	1.220963	3.21	7.95
envwb	63	5.28254	1.682773	1.71	8.25
ecwb	63	4.04873	0.9834739	1.72	6.35
hdi	63	0.6572698	0.1222305	0.373	0.831

Source: own elaboration

In table 3, we present the main statistics of variable for the separate sample. From these figures, we can verify that still there are remarkable differences between developed and developing countries in all the indicators. The differences between the maximums and minimums in each group remain also notable, but are not as huge as in the entire sample. We are especially interested in if this divergences in the GDP per capita leads to such important differences in the other indicators.

Moving now to the indicators of well-being, we observe that there are also big divergences within and between them once the sample is divided. The differences in the Legatum Prosperity Index and the Human Well-being remain notable. The Legatum Prosperity Index scores 1.99125 on average for the developed countries while it has a negative score for the developing countries, -0.6587302¹⁰. Concerning the Human Well-Being, the mean score for developed countries (8.268125) is notably higher than in developing countries (5.764921).

¹⁰ It's important to remember that the index is an average of eight pillars of the economy, this give us a clue of the importance of this difference between countries.

Regarding to the HDI and the economic well-being, the mean score is slightly bigger for the developed countries, the difference between countries in those indexes is not as important as in the previous ones.

What draws the attention in this table are the Happy Planet index and the environmental well-being. The score in the mean of Environmental Well-Being is greater for the developing countries (5.28254); this means that their environmental performance is better than for the developed countries (3.49375). This may induce a negative relationship between the GDP per capita and its impact in the environment because the richest countries have worst consequences on the environmental system. This corresponds to the critics on the externalities on GDP seen in the literature.

The results are interesting in the Happy Planet Index due to the mean score is lightly higher for the developing countries (44.5037) than for the developed countries (42.8875) on average. This needs particular attention due to the HPI is composed by self-experienced well-being and life expectancy years apart from the ecological footprint, a concept that we have seen the impact is lower in the developing countries. What this score tell us is that for the year 2012 the citizens of the developing countries had a longer sustainable and happy life its corresponding's of the developed countries, on average. This fact could reflect the lack of adequacy of the GDP as a measure of well-being as we have explained above and needs a special attention.

In table 4 below, we show the correlation between our variables for 2012. As you can appreciate, our explanatory variables are strongly correlated each other. Hence, we cannot carry out a multiple regression analysis due to the potential multicollineality problem.

Table 4 matrix correlation year 2012 obs 95

	gdppc	leproi	huwb	envwb	ecwb	hdi	hapi
gdppc	1						
leproi	0.8634	1					
huwb	0.6298	0.7585	1				
envwb	-0.521	-0.6295	-0.7737	1			
ecwb	0.4933	0.5932	0.6086	-0.4685	1		
hdi	0.7444	0.9028	0.845	-0.7028	0.5681	1	
hapi	0.0075	0.1227	0.0659	0.0159	0.163	0.1753	1

Source: own elaboration

Table 5. Summary Statistics Years 2010 2012 2014

Variable	Obs	Mean	Std. Dev.	Min	Max
gdppc	285	16882.09	20200.22	341.8589	101563.7
leproi	285	0.1938041	1.635362	-4.07	3.517942
huwb	285	6.613193	1.54993	3.17	9.07
envwb	285	4.665421	1.672669	1.68	8.26
ecwb	285	4.619263	1.519189	1.53	8.41
hdi	285	0.7310912	0.1469236	0.35	0.944

Source: own elaboration

Tables 6, 7 and 8 show that similar results are obtained when we consider the years 2010, 2012 and 2014 together. The considerable differences remain in the GDP per capita, the Legatum Prosperity Index and the Human Well-Being, and all these averages are much higher for the developed countries.

The same happens for the HDI and the economic well-being. The mean scores are slightly higher for the developed countries.

And again the environmental well-being has a better score for the developing countries than for the developed as it happens in the year 2012.

Table 6. Separated Summary statistics 2010 2012 2014

Variable	Obs	Mean	Std.Dev.	Min	Max
Developed	96				
gdppc	96	38520.22	20324.97	8297.483	101563.7
leproi	96	1.978008	1.059546	-0.08	3.517942
huwb	96	8.251667	0.447601	6.97	9.07
envwb	96	3.520574	0.8306242	2.16	5.38
ecwb	96	5.849271	1.611152	2.46	8.41
hdi	96	0.8795625	0.0385109	0.784	0.944
Developing	189				
gdppc	189	5891.293	6865.83	341.8589	50903.91
leproi	189	-0.7124581	1.010712	-4.07	1.301387
huwb	189	5.780952	1.208543	3.17	8.14
envwb	189	5.246931	1.693701	1.68	8.26
ecwb	189	3.994497	1.004878	1.53	6.41
hdi	189	0.6556772	0.1220087	0.35	0.837

Source: own elaboration

The results are similar to the obtained in 2012.

Table 7 matrix correlation years 2010 2012 2014 obs 285

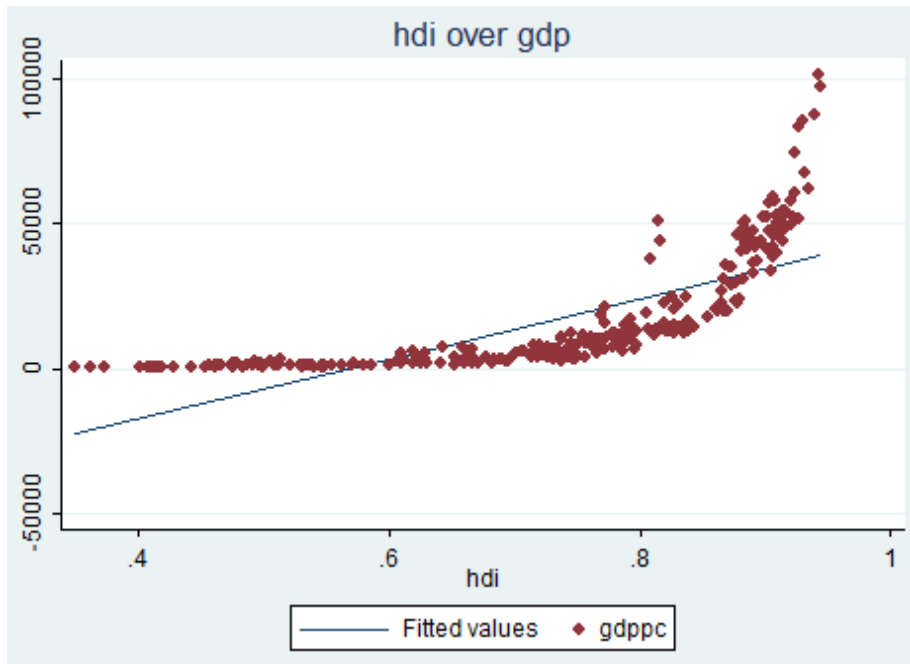
	gdppc	leproi	huwb	envwb	ecwb	hdi
gdppc	1					
leproi	0.8617	1				
huwb	0.636	0.7579	1			
envwb	-0.5041	-0.611	-0.757	1		
ecwb	0.5197	0.6327	0.6287	-0.4718	1	
hdi	0.7491	0.8937	0.832	-0.6923	0.591	1

Source: own elaboration

Next, we plot our indicators to see in an intuitive way the relationship with GDP per capita.

The following graphs are taken in the year 2012 for all 95 countries of our sample.

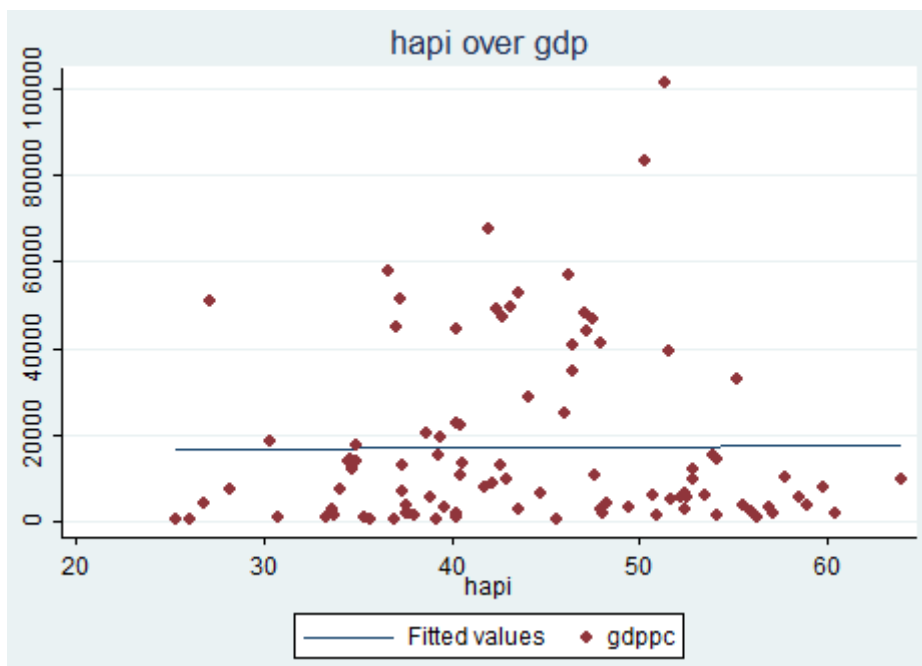
Graph 1: Human Development Index over GDP per capita



Source: own elaboration

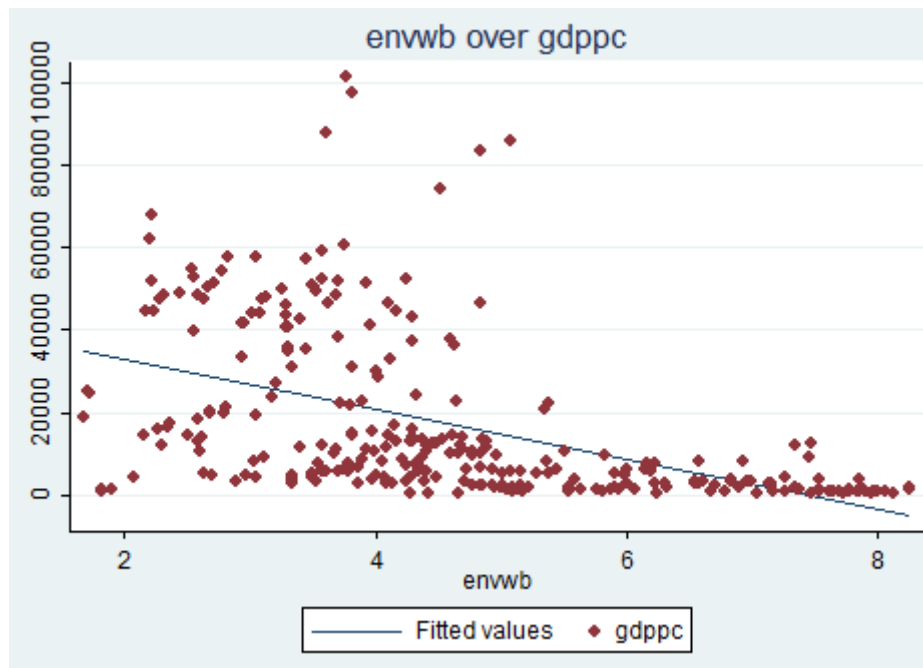
We observe that for some indicators there is a positive relation correlation with GDP per capita as the HDI shows. Meanwhile, we have a flat relationship for the HPI.

Graph 2: Happy Planet Index over GDP per capita



Source: own elaboration

Graph 3 : Environmental Well-Being over GDP per capita.



Source: own elaboration

Surprisingly, we find a negative relationship between the environmental well-being and GDP per capita. This suggest us to analyse more deeply this fact through an econometric analysis in order to determine which relations are significant or not.

5. Empirical analysis.

5.1 Methodology

Our main goal in this study is to analyse to what extent changes in GDP per capita are associated with variations in the different indicators that represent the alternative notions on well-being. To empirically verify this, we use two econometric methodologies: cross-section OLS estimation and fixed-effect panel data model.

In addition, we try to test if the results obtained differ between the richest and the poorest countries. By splitting the sample between developed and developing countries, we pretend to verify if higher economic wealth means an improved well-being regardless of the level of development.

Since we cannot carry out a multiple regression analysis due to the high correlation between the different indicators of well-being, we test the influence on GDP of each available indicator individually. The study is organised in two parts. The first part is a cross-section analysis containing all the indicators explained for the year 2012.

Afterwards we carry on a panel-data analysis that embraces the years 2010, 2012 and 2014 for all the indicators except the HPI, which is not available for this period.

We follow the same procedure for both the whole sample altogether as for developed and developing countries separately considered. In a first part of the empirical analysis, we use the OLS estimation and in the second part we regress a fixed effect model.

Thus, we try to have a more robust evidence in order to make our conclusions less sensitive to the limitations of our study.

5.2 Model specification and results

5.2.1 Cross-section analysis

In the first part of the empirical analysis, we estimate the following models:

$$gdppc_i = \beta_0 + \beta_1 leproi_i + u_i \quad (1)$$

$$gdppc_i = \beta_0 + \beta_1 huwb_i + u_i \quad (2)$$

$$gdppc_i = \beta_0 + \beta_1 envwb_i + u_i \quad (3)$$

$$gdppc_i = \beta_0 + \beta_1 ecwb_i + u_i \quad (4)$$

$$gdppc_i = \beta_0 + \beta_1 hdi_i + u_i \quad (5)$$

$$gdppc_i = \beta_0 + \beta_1 hapi_i + u_i \quad (6)$$

Where *gdppc* represents per capita gross domestic product for each country and *leproi*, *huwb*, *envwb*, *ecwb*, *hdi* and *hapi* represents the different indicators for well-being in these countries. Concretely the variables used represent the indicators as it follows:

1. *leproi* represents the Legatum Prosperity Index.
2. *huwb* represents the Human Well-Being sub-score of the Sustainable Society Index.
3. *envwb* represents the Environmental Well-Being sub-score of the Sustainable Society Index.
4. *ecwb* represents the Economic Well-Being sub-score of the Sustainable Society Index.
5. *hdi* represents the Human Development Index
6. *hapi* represents the Happy Planet Index

Through the estimation of these equations we seek to identify the individual relation between each indicator and GDP per capita. We wish to analyse the influence of an increase in these indicators to see if a higher GDP per capita means indeed a better score on the indicators that explain the different concepts of well-being.

According to the statistics shown in the descriptive section, we might predict a positive sign in all the coefficients β_1 except for Equations (3) and (6). More specifically, in Equations (1) and (5) we expect positive coefficients for the independent variables, as both indicators, *leproi* and *hdi* include the standards of living in its calculations. Hence, the richer countries are expected to have higher scores in those indicators and the relation expected with income will be positive. Similar result is expected for the economic well-being (Equation 4). Note that the value of this index for the developed economies is notably higher than for the developing ones. Nevertheless, this indicator includes transition (which measures genuine savings and organic farming). Thus, the β_1 coefficient might be unambiguous because it has two contrary components, transition and the total size of the economy.

For the human well-being indicator in Equation (2), we expect a positive coefficient of β_1 as this sub-index includes components that are supposed to be better with a higher GDP. For example it takes into account aspects such as sufficient food, safe sanitation or healthy life. This induces to a consistent difference between rich and transition countries.

As previously shown, the explanatory variable in Equation 3, *envwb* seems to have negative relation with the GDP per capita, and this was because the mean score was lower for the richest countries. Therefore, we expect a negative coefficient in this case. This may be explained, because indicator components, such as natural consumption or energy use are lower in the developing countries.

Regarding equation (6), the indicator *hapi* has an unambiguous effect on GDP per capita because the mean of this indicator for developed and developing countries is very similar, just a bit higher for the second ones, but this cannot give us a clear conclusion about the relation between the variable *hapi* and our dependent variable. This can be explained because the components of the indicator are not necessarily better for the richer economies.

In the following regressions, we test the null hypothesis that the coefficient on the different indicators is equal to zero ($H_0: \beta = 0$) and the alternative that the coefficient is different from zero ($H_1: \beta \neq 0$). The chosen levels of significance are 10 % (*), 5 % (**) and 1 % (**).

5.2.2 All Countries

Table 8. OLS Robust Year 2012 All Countries

VARIABLES	(1) gdppc	(2) gdppc	(3) gdppc	(4) gdppc	(5) gdppc	(6) gdppc
leproi	11,086*** (981.9)					
huwb		8,299*** (1,022)				
envwb			-6,404*** (885.3)			
ecwb				7,126*** (1,551)		
hdi					104,355*** (11,934)	
hapi						17.56 (206.1)
Constant	14,623*** (1,008)	-37,624*** (5,726)	47,187*** (5,548)	-15,492** (6,883)	-59,319*** (8,170)	16,444* (8,978)
Observations	95	95	95	95	95	95
R-squared	0.745	0.397	0.271	0.243	0.554	0.000

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration

Table 8 shows the results for the first six regressions. A previous analyses concerning to the presence of heteroscedasticity with the Breusch-Pagan test revealed heteroscedasticity in all of our models. To overcome this we calculate the robust standard errors. Hence, the probability of rejecting the null hypothesis when it should not be rejected is lower now. We have done this for all our regressions and in all of them we needed to calculate the robust standard errors, regardless of the sample analysed or the model carried out.

The results obtained are as expected in all of our variables. There is a statically strong evidence at the 1% level of significance for all the variables except for *hapi*. The relation of *leproi* and *hdi* is positive as it was clearly supposed to be. Concerning to *huwb* and *ecwb*, the expected results were not as clear as for the previous variables, but it fits to our expectations. Both have a positive and statistically relation. However, with *envwb*, the results for the estimations are opposite to the expected. It has a negative relation with *gdppc* at a 1% level of significance. This means that if *gdppc* increases, the score on environmental well-being is lower as income goes up.

We do not find any evidence for the Happy planet Index, when we consider, all the countries of our sample. That is, a higher GDP per capita does not necessarily mean a longer happy and sustainable life, which is what the HPI tries to measure.

5.2.3 Developed countries

In this section, we estimate the above equations (from 1 to 6) for the developed countries. A priori, the expected values of each coefficients are the same regardless of the level of development. But now, we want to test two facts: on the one hand if considering a group of countries with a smaller difference in incomes variates the results change and, on the other hand, how a higher income affects to our results.

Table 9. OLS Robust Year 2012 Developed Countries

VARIABLES	(1) gdppc	(2) gdppc	(3) gdppc	(4) gdppc	(5) gdppc	(6) gdppc
leproi	16,593*** (2,211)					
huwb		-719.5 (5,634)				
envwb			-4,335 (4,618)			
ecwb				2,673 (2,210)		
hdi					490,594*** (64,072)	
hapi						1,992** (813.5)
Constant	5,758 (3,776)	44,747 (47,030)	53,944*** (15,414)	23,678* (11,735)	-394,550*** (55,802)	-46,627 (34,016)
Observations	32	32	32	32	32	32
R-squared	0.701	0.000	0.031	0.039	0.763	0.239
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Source: own elaboration

As can be appreciate in Table 9, when we consider only the developed countries, our results differ.

The *hdi* and *leproi* hold a positive and strongly significant influence on GDP per capita. This means that there are notable differences on these indicators when we consider just developed countries. The score on the HDI and the Legatum Prosperity Index depends on the GDP per capita of the countries. But, no empirical evidence is found for *huwb*, *ecwb*, *envwb*. We cannot reject the null hypothesis that the coefficient is different from zero for none of these variables. This could mean that, after achieving a certain level of income, a higher GDP per capita does not necessarily mean a better score in those sub-indexes for developed countries.

An important fact is that, in this case, we do find statistically significant evidence for the variable *hapi*. We have a positive coefficient at a confidence of 95%. This means that, for this group of countries, there is a relation between a higher GDP per capita and a better happy, long and sustainable life according to what HPI takes into account.

5.2.4 Developing countries

The equations estimated here are similar to the previous ones but now we focus on developing countries. Doing this, we try to know how the values obtained might change when a group of lower income on average shows lower differences in terms of GDP per capita is considered. We determine if the relationship between GDP per capita and the different indicators of well-being is different between developing and developed countries.

Table 10. OLS Robust Year 2012 Developing Countries

VARIABLES	(1) gdppc	(2) gdppc	(3) gdppc	(4) gdppc	(5) gdppc
leproi	4,731*** (1,143)				
huwb		2,247*** (634.0)			
envwb			-2,126*** (602.0)		
ecwb				981.4 (1,156)	
hdi					39,069*** (7,755)
Constant	9,370*** (1,423)	-6,701** (3,012)	17,485*** (3,901)	2,280 (5,347)	-19,425*** (4,509)
Observations	63	63	63	63	63
R-squared	0.369	0.129	0.219	0.016	0.391
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					

Source: own elaboration

For the HDI and the Prosperity Index, we find again evidence at a confidence level of 99%. The fact that the *gdppc* is taken into account on the indicators provides strong evidence for all our case study groups for the variables *hdi* and *leproi*. For human well-being there exists also statistically strong evidence. This means that a greater level of human well-being is associated with a higher income.

The variable *envwb* has as for the entire sample, a negative effect with statistically strong evidence. The relation between GDP and the environmental performance is now negative for the developing countries. This diverges with developed countries where we cannot find evidence for a negative coefficient for *envwb*. We do not find a clear explanation for this results, so we try to clarify this in the second part of the analysis.

As it happens with developed countries, there is not enough statistical evidence for a significant relationship between GDP per capita and the economic well-being. This variable has not a proven effect when we divide our sample, but it does have when we analyse the countries altogether.

Respect to the variable *hapi* we do not find any statistical evidence for this variable at any level of significance. According to this result, we cannot ensure that there exists a

relation between GDP and the HPI for the developing countries. We have estimated our models for the year 2012, in which we have available all of our selected indicators. There are appreciable differences between and within countries.

The only two indicators in which there are no divergences are the HDI and the Prosperity Index. They both are strong statistically significant at a level of confidence of 99% in all of our regressions for all of our case study groups. This has its explanation in the fact that both consider the GDP into the sub-components of their calculations.

In *huwb* there exist correlation for the all countries sample where there are huge differences in income between the observations. Nevertheless, when we analyse the poorer countries the effect becomes positive and strongly significant again. The interesting result is that there does not exist a demonstrable effect when countries achieve certain levels of wealth, which is the case of developed countries. A feasible explanation for this fact is that when the GDP per capita is very low, an increase on the human well-being implies an improvement in GDP. Although, when a certain level of GDP per capita is achieved, a better human well-being does not necessarily mean a higher GDP per capita

Moving to the environmental well-being, there is a negative relation between this indicator and the GDP per capita for all sample and developing countries. However, we do not find any evidence to the contrary case in the developed countries outcomes. These results reveal us that there is a negative relation between the environmental situation of a country and its wealth. This facts support the solid upcoming critics to the externalities of what an increase on the GDP involves.

Respect to the economic well-being we have statistical evidence for the entire sample, in which we have a statistically strong positive effect on the GDP per capita. Nevertheless, when we separate our sample into more similar countries this statistical evidence disappears. An explanation for this fact is that the enormous differences between GDPs considering all countries induces to a positive relation between the variable *gdppc* and the economic well-being.

Lastly, regarding to the HPI we have different results for developing and developed countries. There is no effect when considering developing economies and a positive correlation between the HPI and the GDP per capita if we take into account developed countries only. This induce us that there is an ambiguous relation between the HPI and the GDP per capita

Next, we estimate the previous equations with fixed-effect panel data methodology. The period covers the years 2010, 2012 and 2014. This broader analysis can help us to clarify our previous results.

5.2.5 Panel data analysis:

With this analysis, we want to check if the results obtained before hold when more periods are considered.

$$gdppc_{it} = \alpha_i + \beta_1 leproi_{it} + u_{it} \quad (7)$$

$$gdppc_{it} = \alpha_i + \beta_1 huwb_{it} + u_{it} \quad (8)$$

$$gdppc_{it} = \alpha_i + \beta_1 envwb_{it} + u_{it} \quad (9)$$

$$gdppc_{it} = \alpha_i + \beta_1 envwb_{it} + u_{it} \quad (10)$$

$$gdppc_{it} = \alpha_i + \beta_1 hdi_{it} + u_{it} \quad (11)$$

Our purpose is the same as in the previous section: that is, we try to analyse the individual relation between each indicator and the GDP per capita in order to see if a higher GDP per capita is associated to a higher score on the indicators that explain the different aspects of well-being.

The expected coefficients of the variables are the same as for the year 2012. In fact, if we observe the summary statistics of both samples we do not find notable differences, neither for the entire or divided sample.

Table 11 shows the five regressions that we have ran. As previously, we have tested the presence of heteroscedasticity with the Breusch-Pagan test for each model. We reject the null hypothesis of no heteroscedasticity in all cases. So, regardless of the sample analysed, we need to calculate the robust standard errors.

Once again, in our regressions, we have raised the null hypothesis that the coefficient is equal to zero ($H_0: \beta = 0$) and the alternative that the coefficient is different from zero ($H_1: \beta \neq 0$). The chosen levels of the test are 10 % (*), 5 % (**) and 1 % (***). We also need to remark that we have carried out the Hausman Test and we obtained not enough statistical evidence for a difference in the results between FE and RE all of our

regressions in all of our samples. That is why we use the fixed effects model instead of random effects.

5.2.6 All Countries

Table 11. FE Robust Years 2010 2012 2014 All Countries

VARIABLES	(7) gdppc	(8) gdppc	(9) gdppc	(10) gdppc	(11) gdppc
leproi	1,462*** (507.9)				
huwb		2,089** (961.7)			
envwb			915.4 (558.1)		
ecwb				-521.3 (389.6)	
hdi					85,946*** (14,841)
Constant	16,599*** (98.43)	3,064 (6,360)	12,611*** (2,604)	19,290*** (1,799)	-45,952*** (10,850)
Observations	285	285	285	285	285
R-squared	0.048	0.039	0.020	0.009	0.105
Number of Country	95	95	95	95	95
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					
Source: Own elaboration					

In table 11 we have the five regressions summed up for the years 2010, 2012 and 2014 for all countries. Both variables *hdi* and *leproi* have statistically strong significance and a positive relation with wealth. That is, the richer are the better the score on the HDI and the Prosperity Index.

For the Human well-being, we find statistically evidence at a level of confidence of 95%, implying, that the countries with better conditions regarding to the human well-being have also a higher wealth.

Regarding to the variables *ecwb* and *envwb*, we do not obtain enough statistically evidence of a significant influence on GDP per capita. This means that there is no relation between the GDP per capita and the score in those sub-indexes when the whole sample is considered.

5.2.7 Developed countries

VARIABLES	(7) gdppc	(8) gdppc	(9) gdppc	(10) gdppc	(11) gdppc
<i>leproi</i>	10,672*** (2,697)				
<i>huwb</i>		802.8 (2,768)			
<i>envwb</i>			4,051*** (1,103)		
<i>ecwb</i>				-1,131* (568.2)	
<i>hdi</i>					325,894* (69,660)
Constant	17,411*** (5,334)	31,896 (22,844)	24,259*** (3,884)	45,138*** (3,324)	-248,124* (61,271)
Observations	96	96	96	96	96
R-squared	0.198	0.002	0.139	0.036	0.221
Number of Pais	32	32	32	32	32

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own elaboration

In Table 12 above, we show the regression results for developed countries. Again, *leproi* and *hdi* are statistically different from zero at 1% of significance. This pattern holds in all the samples analysed.

Concerning to the variable *envwb* we have a positive relation at a level of confidence of 99%. Thus, a higher GDP is related with a lower impact on the environment.

In relation to the human well-being, it does not exist statistical evidence for a relationship between variables. This could mean that achieved a certain level of income, a higher human well-being does not imply a higher wealth as it happens in the sample analysed for the year 2012.

A remarkable result is the negative coefficient on the variable *ecwb*. Although this is only statistically different from zero at the 10 % significance level, so there is little empirical evidence against the null hypothesis.

5.2.8 Developing countries

	(7)	(8)	(9)	(10)	(11)
VARIABLES	gdppc	gdppc	gdppc	gdppc	gdppc
leproi	865.9*** (301.3)				
huwb		2,574*** (900.3)			
envwb			-257.5 (464.2)		
ecwb				553.3** (243.7)	
hdi					54,743*** (11,343)
Constant	6,508*** (214.7)	-8,986* (5,205)	7,242*** (2,435)	3,681*** (973.6)	-30,002*** (7,437)
Observations	189	189	189	189	189
R-squared	0.073	0.201	0.005	0.018	0.174
Number of Country	63	63	63	63	63
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					

Source: own elaboration

For developing countries, results from Table 13 show once again that *hdi* and *leproi* are statistically different from zero at the 1% significance level, as we obtained in all our previous regressions for these variables. However, *huwb* has a statistically strong positive relation for developing countries. This could mean that when the countries are poor, better levels of well-being will imply higher levels of wealth.

In this group of countries, we also find a positive influence, at a 90% of confidence, of the *ecwb*, which means that there is a positive relation between *ecwb* and GDP per capita. For the developing countries, the results show that the better the economic well-being, the greater the economic activity. However, for the environmental well-being indicator there is not enough statistical evidence at any level of significance. This result shows that it does not exist a relation between *gdppc* and *envwb*.

From comparing the different study groups, we obtain important results. We observe a statistically strong and positive relation with GDP per capita and the independent variables *hdi* and *leproi* in all the three samples. The fact that wealth is measured in those indicators leads to a positive plausible relation in all the case study groups that we have analysed.

A surprising result is obtained for the *huwb* indicator. We find correlation for the all countries sample where there exists huge differences in income between the observations. When we analyse developing countries the effect is positive and strongly significant too. Although it does not exist a demonstrable effect when countries achieve certain levels of GDP, which is the case of developed countries. With these results, we observe that GDP does not grasps precisely the aspects that composes human well-being. According to the unclear relation between human well-being and GDP per capita.

Regarding the economic well-being, we have a different result for each sample. There is no correlation for this variable when we consider all the countries. Meanwhile, it appears a weakly negative relation for developed countries. This is unlikely to the developing economies case, in which there is again a weak relation, but, in this case the relation is positive. These results suggest that differences in income influence the relationship between these indicators and GDP per capita, as we obtain different results from rich and poor countries in these regressions. The less developed economies need better economic well-being to have more wealth.

Lastly, in reference to *envwb*, we do not find a relation when considering all and developing countries. In contrast, there is a positive relationship when we focus on developed countries. The only explanation possible to the results that we find is that the developed countries considered in the sample have a positive relation between income and environment.

6. Conclusions

In this paper, we have covered an incoming trendy issue such is the lack of adequacy of the GDP as a measure of overall progress. We have particularly focused on its deficiencies to grasp the different notions of well-being.

We have chosen this field expressly because is the one which GDP wavers the most. Additionally, well-being is a concept that has a direct impact on citizens life's so we claim for the necessity of the most accurate measurement possible. We are aware of its difficulties, they are presented in our literature review. Despite the existing complications, we encourage to overcome the existing barriers in its measurement in order to provide a better understanding and therefore, study the feasible solutions and implement the corresponding measures when possible.

In the literature review, we explain how the "Beyond GDP" movement has become trendy and popular with the involvement of laureates voices such the European Commission. We also plot the evolution in alternative measures and the increasing number of indicators and institutions. With these examples, we wanted to remark the incoming importance of the topic studied. We also have tried to expose the causes of the dominance of GDP in measuring economic growth and its shortcomings.

Our contribution is that we try to dissert the different concepts in the most comprehensive way according to the literature. According to our own criterion, well-being is divided into four interdependent notions; objective well-being, subjective well-being, human needs and capabilities and functioning's. Each concept is explained in detail.

From that starting point, we include an appropriate indicator for each concept. Thus, proceeding a deep research, we obtained four different indicators: Legatum Prosperity Index, Happy Planet Index, Sustainable Society Index and Human Index Development.

Our innovative approach is that we have used those indicators such as independent variables in order to find if there exist empirical evidence for a relation between GDP per capita and each indicator separately. In order to obtain clear and verifiable results we have organised our empirical analysis as it follows.

First, we describe our data in order to have a better known of which trends we can hope from the estimations between our variables. In our data description we make a determining distinction in our sample; we differ between developed and developing countries. With this separation we want to test if the inequalities in wealth are determinant in the plausible differences on the indicators explaining well-being and more concretely on their relationship with GDP per capita. We also want to know what happens when there is not a massive difference between wealth when we run out our regressions. We do the same distinction in our empirical analysis which is summed up hereafter.

We have developed two models embracing different periods. One OLS model for the year 2012 and one panel data analysis using a FE model for the years 2010, 2012 and 2014. We have chosen these models according to the available data of the indexes, pursuing the most accurate conclusions possible.

We have discrepant results to state the affirmation that a better overall well-being implies a higher GDP per capita. Our results show clearly better scores for the richer countries on average. This supports the traditional point of view of many economists and prominent institutions, which reinforce the importance of economic growth as a measure of well-being. According to our analysis and following the same path of the last 50 years of economic study, we can affirm that economic growth are positively related with a better well-being. Despite this, it is necessary to remark that exist some aspects that are not taken into account in the measurement of economic growth, which is mainly measured by changes in GDP. The concepts that are not measured are included in the indicators of human well-being and environmental well-being, both sub-indexes of the Sustainable Society Index. This Index does not have a clear relation with GDP.

The same happens with the Happy Planet index and the economic well-being. We have noticed of an unclear relation with GDP. Nevertheless, the mean score for developed countries is slightly higher than for developing countries. This is contrary to the upcoming arguments and critics that economic growth does not implies an improvement in these essential elements. The critical fact is that GDP does not measures clearly these crucial aspects that are involved in economic growth.

Thus, we can affirm that GDP is a good proxy for well-being. Although there is a crucial necessity to improve the measurements in those aspects on which we have showed that GDP fails the most. We have established the basis of a clear differentiation between the different aspects of well-being in order to provide an easier comprehension. Being aware of the limitations of our study, we encourage to other institutions and researchers to follow a similar framework. A clear explanation of each notion of well-being and a research of the most accurate indicators in grasping those missing aspects in GDP.

7. Appendix A

Table A1 shows the countries for which we have available data of all indicators in both periods. To divide our sample we follow the UNCTAD classification.

Table A1: Divided Sample

Developed Countries	Developing Countries	Developing Countries
Australia	Algeria	Mali
Austria	Argentina	Mexico
Belgium	Bangladesh	Moldova
Canada	Belarus	Mongolia
Croatia	Bolivia	Morocco
Czech Republic	Brazil	Mozambique
Denmark	Bulgaria	Namibia
Estonia	Cambodia	Nepal
Finland	Cameroon	Nicaragua
France	Central African Republic	Nigeria
Germany	Chile	Pakistan
Greece	China	Panama
Hungary	Colombia	Peru
Iceland	Costa Rica	Philippines
Ireland	Dominican Republic	Russia
Israel	Ecuador	Rwanda
Italy	Egypt	Saudi Arabia
Japan	El Salvador	Senegal
Latvia	Ethiopia	South Africa
Lithuania	Ghana	Sri Lanka
Netherlands	Guatemala	Sudan
New Zealand	Honduras	Tanzania
Norway	India	Thailand
Poland	Indonesia	Trinidad and Tobago
Portugal	Iran	Tunisia
Romania	Jamaica	Turkey
Slovenia	Jordan	Ukraine
Spain	Kazakhstan	Uruguay
Sweden	Kenya	Vietnam
Switzerland	Kuwait	Zambia
United Kingdom	Lebanon	Zimbabwe
United States	Malaysia	

Source: own elaboration

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