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ALTERNATIVE MEASURES OF GDP

Bachelor's Thesis

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I declare that I have written this thesis on my own, with the help of the cited literature.

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Abstract

The findings of the research reveal that GDP has a number of important flaws and shortcomings, and thus fails to serve effectively for the purpose of measuring the economic growth of countries and welfare of their population as of today. Based on the evaluation of the advantages and drawbacks of macroeconomic measures alternative to GDP such as the United Nations Human Development Index, the Social Progress Index, the Environmental Performance Index, the Happy Planet Index, the Legatum Prosperity Index, the OECD Better Life Index, the World Happiness Index, etc., the author comes to a conclusion that despite the growing use of alternative measures, as of today, they are not able to replace GDP, but might complement it quite effectively.

JEL Classification

E00, E01, E2, D31

Key Words

GDP, economic growth, social welfare, alternative measures, digital technology.

Abstrakt

Závěry výzkumu ukazují, že HDP má řadu důležitých nedostatků, a proto neslouží jako účinný ukazatel k měření hospodářského růstu zemí a životních podmínek jejich obyvatelstva. Na základě zhodnocení výhod a nevýhod alternativních makroekonomických způsobů měření HDP, jako je index lidského rozvoje organizace spojených národů, index sociálního pokroku, index environmentální výkonnosti, Happy Planet Index, Legatum Prosperity Index, index lepšího života, index světového štěstí, apod., autor dospívá k závěru, že navzdory rostoucímu využívání alternativních způsobů měření nejsou tyto ukazatele schopny nahradit HDP, ale mohou tento ukazatel dokonce efektivně doplnit.

Klíčová slova

HDP, hospodářský růst, sociální blahobyt, alternativní ukazatele, digitální technologie.

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Introduction

The most widely used indicator for assessing countries' economic growth as of today is gross domestic product (GDP). It allows measuring the value of all products and services produced or rendered in a country within a particular time period. However, there are ongoing debates on whether it is sufficient to calculate GDP for assessing a country's development. For instance, Oviedo et al. (2009, p. 5) emphasize that GDP fails to take into account the actual structure of production means: for GDP, the same value created by innovative production and by obsolete production with great manpower resources are the same; Teti (2012, p. 23) points out that GDP does not consider the environmental damage brought to nature as a result of economic activities; Barro (2008, p. 20) notes that GDP does not take into consideration the economic output generated by the shadow and black market; Delang and Yu (2015, p. 9) note that GDP fails to recognize the effects of a range of important social indicators, including the fertility and mortality rates, level of access to medicine and education, and so on.

As a result of the aforementioned shortcomings of GDP, there is a need to pay greater attention to the possible alternative measures which could replace GDP effectively in international statistics. This is namely due to the fact that GDP does not take into account health, crime, poverty, household works, and so on, and therefore may be not really objective.

This thesis will deal with the topic of measures which might be used as alternatives to GDP in international statistics. The main aim of the thesis is to investigate the possible alternative measures to GDP, and to understand their actual applicability as a complement to GDP in international statistics.

The main alternatives to GDP which will be investigated in the thesis include Fordham Index of Social Health (FISH), Genuine Progress Indicator (GPI), United Nations Human Development Index (UNHDI), Gross Sustainable Development Product (GSDP), Gross Environmental Sustainable Development Index (GESDI), as well as other indicators.

Therefore, the thesis will evaluate those issues associated with GDP as a statistical measure, and will aim to investigate the best alternatives available.

The thesis will also evaluate thoroughly methodological issues related to the measurement of the outlined indicators, and will provide a critical overview of their feasibility to complement GDP.

The need for investigating the aforesaid indicators is due to the fact that some states have already adopted them in official statistics. For instance, the US States of Maryland and Vermont have already adopted GPI as the main indicator of well-being. UNHDI and GNI (Gross National Income) are gaining increasing popularity in developing states. The growing use of UNHDI and GNI can be explained by the fact that those indexes take into account life quality and different social indicators, which is one of GDP's weaknesses. In addition, the UN's Inclusive Wealth Index (IWI) developed in 2012 may be an effective alternative too, as it "*measures human capital and environmental capital as well as physical capital to determine the sustainability of growth*" (Daly and McElwee, 2014).

Moreover, according to a number of experts, in the modern digital world, the notion of price is changing. Time management is becoming more and more effective with the use of wi-fi technologies, and GDP already does not show the true effectiveness of economic output (Cohen 2017).

The main methodological tool to be used in the thesis is secondary research, i.e. the analysis of available data, and namely of statistical data. Comparison of statistical data will be used for the purpose of investigating different states' life quality levels as represented by GDP and alternative measures.

The conclusions drawn as a result of the analysis run should allow judging upon the current range of alternatives to GDP as a measure in international statistics, and on their actual applicability in the current international practices. The value added brought by the thesis will consist in an explicit explanation of the advantages and drawbacks of alternative measures which might complement GDP, and of the prospects which they have for greater use in international statistics in the near future.

1 Theoretical Part

1.1 Macroeconomic Indicators: Definition and Functions

Consistently with the well-known definition of macroeconomics, macroeconomic indicators are observable variables which are used as a measure for evaluating the development of national economies as a whole, i.e. in their entirety. Macroeconomic indicators do not represent the development of individual entities or business segments, but rather focus on the economy in its most general aspects. The investigation of macroeconomic indicators allows understanding the current level of the national economy's development, and investigating its dynamics, i.e. the vectors which it follows in its development. Macroeconomic indicators can be said to provide policy-relevant and forecast-relevant information. (Granger and Taylor, 2014). Macroeconomic indicators are used to measure the robustness of economic activities, degree of external imbalance, adequacy of foreign exchange reserves, and ease of monetary and credit condition (Melnick and Everitt, 2008).

Macroeconomic indicators are most often collected on a one-year or half-a-year interval, or even on monthly intervals. Monthly intervals are most often used for tracking and revealing major short-term changes in the national economy's performance, and to analyze the existence of seasonal nature across particular indicators. On the other hand, yearly data series are used for long-term policymaking and crisis management, as such sets of data allow understanding better the long-term trends in the economy and their potential consequences in the mid to long-term perspective (Vinod and Reagle, 2005).

Based on the information above, it is now possible to evaluate the main functions of macroeconomic indicators. They are the following (Salais and Villeneuve, 2009):

1. Monitoring and control. By measuring and analyzing macroeconomic indicators, the public authorities gain access to the most effective monitoring and control of the state's performance. Namely, the analysis of macroeconomic dynamics allows revealing in a timely manner where negative tendencies exist in the national economy, why they occurred, and where reserves can be found for mitigating their negative consequences. Also, macroeconomic indicators allow revealing the existing structural disproportions in

the national economy, and thus re-focusing the attention on the elimination of the most critical issues in particular economic sectors.

2. Forecasting. By analyzing time data series pertaining to macroeconomic indicators, it is possible to forecast the subsequent development of the national economy and its particular sectors, and to show how the current tendencies could affect the economy in the future.

3. Formation of national policies. Taking into account the two previous functions, macroeconomic indicators are used by states in order to form their national policies: allocate the required resources to particular economic sectors, focus on the implementation of particular programs for the achievement of particular benefits, focus on the implementation of particular social initiatives, and so on.

4. Risk prevention and management. This function is interconnected tightly with the previous one. Namely, by analyzing their macroeconomic indicators, states may ensure the best risk prevention and management procedures, revealing the key obstacles and threats to effective national economic performance and eliminating them.

5. Comparative and analytical function. Macroeconomic indicators are also important as a statistical tool for comparison and analysis. By comparing different countries' macroeconomic indicators, conclusions can be drawn on how a state performs as related to another one, how they are similar in their economic development, and where differences exist, which competitive advantages either of them might have, etc. (Sergienko et al., 2014).

Macroeconomic indicators may be often country-specific. This means that when building up its national economic policies, a country chooses its own set of the main macroeconomic indicators. For some countries, it may be relevant to investigate the development of national railways as a key indicator of economic development, while for some, this may have no reason, as railways do not bring any major benefits to its economic development (Kenett and Salini 2013).

However, despite the fact outlined above, there are macroeconomic indicators which are of key importance for any state, and therefore are used widely in national statistics around the globe such as gross domestic product (GDP) (this macroeconomic indicator will be analyzed in detail in the next chapter of the thesis); gross national income (GNI); exports and imports of goods and services; consumer price index (CPI);

unemployment rate; foreign direct investment (FDI) flows; foreign reserves; central government debt; unemployment; inflation; budget expenditures for education and healthcare; composition of national income, and so on.

In order to investigate Gross Domestic Product (GDP) more thoroughly, several definitions are available. These definitions should be already familiar to the reader, but we will briefly outline it for the sake of clarity. A brief definition of GDP is as follows: it is "*the total market value of final goods and services produced within a country in a given period of time.*" (Teti, 2012, p. 23). Another definition of GDP assumes that it is "*the sum of all prices of final goods and services times all quantities of final goods and services produced within the border of a nation.*" (Sherman et al., 2013, p. 289). Finally, another definition of GDP can be "*the gross national product excluding the value of net income earned abroad*," where gross national product stands for "*the total value of the goods and services produced by the residents of a nation during a specified period.*" (Merriam-Webster's collegiate dictionary, 2003, p. 31).

When analyzing GDP, it should be borne in mind that there are different types of Gross Domestic Product depending on the classification criterion used or depending on the performance metrics applied.

Thus, GDP can be nominal or real based on the time of prices taken into consideration. Thus, nominal GDP is calculated in terms of the prices which existed in the national economy as of the time of production. However, the value of money may change with the course of time, and therefore using obsolete price indicators may provide inaccurate GDP dynamics. For this purpose, real GDP is used. It stands for the GDP calculated with the adjustment of prices. I.e., in contrast to nominal GDP, real GDP is calculated in the prices which exist as of the date of measurement, and not as of the date of production. It allows assessing GDP dynamics effectively and getting reliable data for the effective time series analysis (Tucker, 2009).

Next, GDP can be calculated either in absolute or in per capita terms. Absolute GDP is calculated as the absolute final value of all products and services produced within a national economy during a particular time period. It may be effective for tracking the dynamics of a country's economic performance in general. However, this indicator may be often unsuitable for comparative analysis, as states differ in their geographic dimensions and size of the population: smaller states often cannot achieve the same GDP figures as

large states, even if they are more developed. Here, GDP per capita may be suitable: it allows analyzing a country's economic performance not in absolute terms, but in terms of per capita of the country's population. Therefore, the use of GDP per capita in economic measurements allows comparing different states' GDP regardless of the size of their population (Teti, 2012).

Based on the exchange rate indicators used, GDP can be measured either based on the official exchange rate (OER) or based on purchasing power parity (PPP). The OER approach to GDP measurement assumes that the value of GDP is calculated as the amount of products and services produced in a national economy as valued in its official exchange rate established against the US dollar. This approach to the calculation of GDP may often alter the reliability of comparative analysis with other states, as the establishment of the official exchange rate may not often reveal the true correlation between a country's national currency's value and the US dollar. For mitigating those negative aspects, GDP by purchasing power parity can be used. It evaluates GDP based on international weighs of the US dollar value. As a result, it allows achieving the maximum reliability in the representation of a country's GDP value in the US dollar as the major international currency (Race, 2007).

In addition to the classifications outlined above, it is also worth noting that there are well-known approaches to the actual measurement of the GDP value as follows:

1. Production approach, which is calculated as the sum of gross value added by institutional units that are resident in the economy (in different economic activities) plus taxes on products and import (VAT, excise tax and customs duties) less subsidies on products;

2. Expenditure approach, which focuses on the expenses which institutional units residents incur during a particular time period. The calculation scheme under this approach evaluates GDP as total expenditures of the national economy plus its exports of goods and services and less its imports of goods and services;

3. Income approach, which is based on summing the income of institutional units residents of the national economy which are involved directly in the process of production of goods and services as follows: Employment income in the form of wages and Social benefits (including Income tax) + Mixed income received from self-employment + Total

profit received by companies from economic activities + Taxes on production and import – Subsidies on production and import.

Historically, the importance of the investigation of macroeconomic indicators and their construction for the sake of identifying the level of a country's development and growth was for the first time emphasized by J.M. Keynes in his 1935 book "*General Theory of Employment, Interest and Money*". Keynes provided a detailed overview of different macroeconomic aggregates, highlighted their interconnection, and explained the need for their use in macroeconomic statistics. This book gave an impetus to the development of macroeconomic indicators and their wider use in international statistics, including as regards GDP (Whaples and Parker, 2013). Keynes made a re-evaluation of the classical economic theory, and showed the dependence of GDP on aggregate demand. Keynes emphasized the importance of macroeconomic analysis based on a set of macroeconomic indicators among which GDP was paid a particularly prominent role as an aggregated ratio of countries' economic growth. Keynes also contributed to the subsequent development of the macroeconomic theory dealing with national economic, monetary, fiscal and other policies, and the development of sub-sets of macroeconomic indicators to be used in the investigation of those particular fields of the national economy (Tucker, 2009).

The GDP indicator first emerged in the United States in the 1930's, during the time of the Great Depression. Since then, this macroeconomic indicator has become the major statistical index allowing measuring the economic performance of different countries around the globe. The main boost to the use of GDP in international statistics was provided by the 1944 Bretton Woods Conference, and by the subsequent establishment of the International Monetary Fund and the World Bank. Those international organizations contributed largely to the development of methodologies for evaluating effectively the value of GDP, and also introduced GDP largely to international statistical methodologies for measuring economic growth (Costanza, 2014).

In 1959, economist Moses Abramovitz became the first scientist to put under significant doubt the validity of using GDP for measuring social welfare. According to Abramovitz, economic output did not effectively reflect changes in the welfare of society. However, the growing use of GDP in international statistics persisted. In 1962, economist Arthur Okun derived an economic law that for every growth of GDP by 3%, the total unemployment rate in the state will fall by 1%. In 1978, Irving B. Kravis, Alan W. Heston,

and Robert Summers compiled the first estimates of GDP per capita figures for over 100 countries. This was set to eliminate the lack of opportunity to compare countries' economic output simply by absolute values, as countries with larger population had obvious advantages in those terms. In the 1990's-2000's, the concept of sustainable economic development became particularly popular, and this further affected the validity of GDP as a measure of society's welfare (Foreign Policy, 2011).

"*Today, GDP in particular, and economic growth in general, is regularly referred to by leading economists, politicians, top-level decision-makers, and the media as though it represents overall progress.*" (Costanza, 2014).

Therefore, as can be seen from the information outlined above, as of today, GDP plays an indispensable role in international statistics, and is one of the most widespread tools for evaluating a country's economic progress. Often, GDP is also used for measuring economic and social welfare (which is however measured solely by the income per capita which people gain and fails to take a number of other important parameters, as will be show later in this research), which is of core importance for international statistics. But the actual opportunity of GDP to represent adequately economic and social welfare is quite debated. In the current conditions of the global economy and rapid technological progress, it is simply not enough to calculate the value of products and services produced in a national economy during a particular time period for drawing conclusions on the country's welfare (Costanza, 2014).

Thus, it can be stated that despite the importance of GDP, there are issues with its use as a measurement tool in national and international practice. Those issues will be investigated more in detail in the next chapter of the thesis.

1.2 Current Problems and Issues with the Measurement of GDP

"*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.*" – John F.

Kennedy (Goodreads.com, n.d.) This quote from John F. Kennedy proves that GDP as a measure used in macroeconomic statistics has a number of important flaws and shortcomings. This chapter will aim to evaluate those issues and problems of GDP in detail.

For supporting the above quote from Kennedy, it is worth citing the example of Albania. According to Muça (2014), the country is characterized by lack of robust legislation and institutional infrastructure, high level of mistrust in the public authorities, high corruption, high use of illegal labor, and a number of other factors negative for its growth. This gives an impetus to the development of Albania's informal economy. According to estimates, it is measured to generated approximately 1/3 of Albania's total economic output. GDP fails to take into account those figures, and therefore reduces Albania's economic output by over 30%. An even more striking example is Bolivia. According to Schneider (2011), Bolivia's shadow economy makes up over 63% of the country's GDP, which makes GDP inappropriate as a statistical measure to compare Bolivia's economic growth with other countries around the globe.

When investigating the problems and issues pertaining to the use of GDP as a key macroeconomic indicator in international statistics, the following can be noted.

First, as argued by Barro (2008), GDP does not take into account the economic activities in the underground economy, including both legal and illegal. For instance, when parents care for their child at home, GDP measurements do not embrace this as services for calculating the value of the national economy's aggregate gross domestic product; on the other hand, while a nurse is hired for caring over the child and is paid money, this is already counted for as part of services contributing to GDP. On the illegal side, GDP does not take into consideration any products or services produced within the shadow economy. In developing states, the shadow economy may account for a great share in the country's overall output, contributing to the level of social standards. The fact that GDP omits this value makes it alter the actual value of the country's overall economic output.

In this context, it is also worth noting that the so called "black economy", which is mostly not taken into account in GDP, is different from the shadow economy. Thus, Kolb (2008) states that while the shadow economy stands for activities which are not taxed due to evasion, the black economy stands for markets such as the market of drugs, illegal weapons, prostitution, and so on. The black market is not accounted for in GDP, as such

activities are considered illegal. However, in some states such as Nigeria or other African countries, the black market can account for over 70% of GDP, and therefore it is a major drawback of GDP as a measure not to take those effects into account.

For instance, Sakir (2010) cites the example of Italy whose GDP figure would grow by over 1.3%, if the black market economy was taken into account. In the UK, USD 16.7 billion would be added to the country's yearly budget, if drugs and brothels (street prostitution is already legal) were legalized. In Finland, Sweden, Austria and the Netherlands, the legalization of those activities could contribute to GDP's growth by at least 3 to 5%. This shows that GDP actually does not take into consideration an important turnover of illegal economic activities in states.

Further elaborating on the the black market economy and the differences in how it is accounted for in different countries, it is worth noting that the Netherlands and Thailand recognize the statistics related to prostitution officially, which leads to the growing GDP value. In France, Germany, and most other states, proceeds from prostitution are not taken into account within GDP. In Russia, where prostitution is not included in GDP, its value may achieve up to 4% of the country's GDP (Jerven, 2013).

Nevertheless, it is worth noting that the definition of black market differs across different countries. In those states where prostitution is legalized, it is taken into account in GDP. This also gives birth to inconsistencies in GDP measurements across different states (Raymond, 2013).

Second, a specific issue regarding GDP is the theory of imputation. This means that GDP includes the value of some goods and services which are not traded in the market. "*Imputations approximate the price and quantity that would be obtained for a good or service if it was traded in the market place. The largest imputation in the GDP accounts is that it is made to approximate the value of the services provided by owner-occupied housing.*" (US Department of Commerce Bureau of Economic Analysis, 2008). Thus, GDP fails to recognize any difference between a house which is owned by a person and one which is rented. The ownership of any kind of housing is construed as a productive activity within GDP. If the house is rented, the value of the service amounts to the rent paid by the tenant within GDP. However, if the house is occupied by the owner, this ownership is accounted for in GDP as the amount of rent which the house owner could obtain, if he let the house on rent. As a result, actual production activities and simple house ownership are

equal for GDP, and are believe to bring the same additional value for the economy (Jerven, 2013).

Another example of imputations in GDP can be financial services which are provided by financial institutions of any kind on a free basis or at reduced fees. "*For the depositor, this "imputed interest" is measured as the difference between the interest paid by the bank and the interest that the depositor could have earned by investing in "safe" government securities. For the borrower, it is measured as the difference between the interest charged by the bank and the interest the bank could have earned by investing in those government securities.*" (US Department of Commerce Bureau of Economic Analysis, 2008).

GDP would be incomplete without imputations, and would represent the actual degree of economic growth less effectively. On the other hand, imputations might distort the actual value of production generated by the economy, and they often cannot provide a sufficiently high degree of reliability (Jerven, 2013).

Third, GDP does not make any distinction between "good" and "bad" products. For instance, the manufacturing of drugs saving people's lives and of nuclear weapons which threaten global peace and the very existence of the international community is accounted in the same way within GDP measurements. In authoritarian militarist states, GDP values can be higher through the production of such "bad" products, while this would not actually contribute to any higher standards of the population's living. This also relates to products harmful for the environment, products which provoke addiction, products which might affect human psyche, and so on. The fact that they are counted in GDP in the same way as drugs against cancer, healthy foods, sports gear, innovative technologies, and so on, does not allow making any distinction between the paths of economic growth chosen by different states (Teti, 2012).

GDP fails to evaluate the actual environmental damage brought throughout the course of the economic activities within the state. It should be understood that industry, transport, energy and other sectors bring major harm to the environment in the course of their activities. Therefore, as a result of economic output, the environment suffers, and this makes the state invest significant funds in the elimination of the negative consequences of its economic growth and in the implementation of protective mechanisms for ensuring sustainable growth. The GDP indicator alters those effects. For instance, clear water

consumed by households within a state is not included in GDP, as it is deemed to be a gift of nature. However, if water is polluted, and the state invests funds in cleaning it, this is counted for as services, and therefore such costs make GDP increase, even though there is no sustainable and productive economic growth in this case (Chhokar, 2006, p. 265). Also, the construction of buildings always contributes positively to GDP's value, even though it may bring great harm to the environment. GDP fails to recognize environmental issues associated with economic growth, which is of key importance as of today, when sustainability is on the foreground of developed states' economic agenda (Teti, 2012).

As Wetherly and Otter (2014) point out, a major issue with GDP is that a growing GDP value can be associated with environmental degradation. "*Expenditures to reduce degradation are regarded in economic accounting terms as an increase in welfare because they increase GDP, rather than being a cost which actually reduces welfare.*" (Wetherly and Otter, 2014, p. 210). Therefore, this might significantly distort the perception of the actual level of a country's welfare.

Fourth, the failure to take into account the value of natural resources is another specific shortcoming of GDP as a measure of a state's welfare and economic growth. All natural resources which a state exploits in its economic activities are not anyhow reflected in GDP (as the water in the example above), as they are believed to be provided by nature on a free basis. The failure of GDP to take into account natural resources means that within this macroeconomic indicator, such resources tend to be considered as unlimited. However, natural resources are limited, and their excessive exploitation has major negative impact in terms of the state's economy, sustainability of the environment, and social consequences for the population (Teti, 2012).

Similarly to environment degradation, GDP fails to take into account the actual effects of resource depletion which might be very significant, particularly for developing countries. The costs associated with the renovation of depleted resources are accounted for as positive values contributing to growing GDP figures, while in fact they reduce the population's welfare. Also, the depletion of resources such as forests or water might bring major long-standing negative effects for human health (Harris and Roach, 2013).

Fifth, GDP does not take into account the structure of income distribution. For instance, in developed countries, the proportion of income distribution may be rather even, when 10% of the wealthiest population possess 25% of national wealth, and the other 90%

possess 75% of it. On the contrary, in emerging markets, where the level of corruption is high or authoritarianism is prevailing in the structure of political power, 5% of the wealthiest population may concentrate 90% of national wealth, while the other 95% of the population may account for only 10% of national wealth. Such disproportions mean that similar economic growth may contribute much to the population's welfare in the first group of countries, while not having virtually any benefits for the standards of living in the countries belonging to the second group. GDP neglects those differences, as it only evaluates the overall value of the goods and services produced within a country. This means that GDP has major flaws when used for assessing national economic and social welfare (Barro, 2008);

An example of this situation can be the United Arab Emirates. The country has its GDP per capita figures on the level of the world's developed states. However, this is achieved only thanks to the large export volumes of oil, and the greatest share of income belongs to a very limited percentage of families, while most of the population lives either close to or even below the poverty line. Thus, this proves that the failure to take into account the differences in income distribution is a major issues associated with GDP (Tucker, 2015).

Sixth, GDP ignores the issues related to human rights and freedoms. Thus, a product or service manufactured using illegal child labor or hard women's labor is not anyhow different from a product manufactured without the violation of human rights for GDP measurements. Moreover, GDP also fails to take into account the benefits associated with people's living in countries where human values are evaluated high and are respected both within economic activities and overall. This is a major drawback when evaluating economic and social welfare. "*Suppose that two countries have the same per capita GDP. One country commits severe human rights abuses and curtails political liberties, while the other country protects human rights and encourages political liberty. The two countries would rank the same on a per capita GDP scale. Nevertheless, living in the second country would be preferable to living in the first.*" (Kernohan, 2012, p. 313).

Also, it should be noted in this respect that the overall quality of social well-being is significantly higher in countries where there is great respect for human rights: this is measured not by economic indicators, but rather in terms of people's satisfaction with their living conditions, freedom of speech and confession, freedom of choice, etc. Therefore, by focusing purely on the level of income, GDP fails to take into account important social

component of life quality, and namely the level of protection of human rights (DeLaet, 2014).

Seventh, GDP assigns no value to leisure time. This means that when calculating the actual economic performance achieved by a state's national economy, the GDP indicator fails to take into account the time spent by the population on leisure, which can be seen as a factor of recreation for making the labor resources subsequently more productive in their work, and thus more productive for the national economy as a whole (Barro, 2008). Furthermore, during leisure, people can still produce goods and services contributing to the national economy's development and growth. However, such goods and services are not taken into consideration within GDP, as they are believed to be delivered in non-working time (Teti, 2012).

New houses, cars, shoes, necklace, etc. are counted in GDP, even though some of those goods may be actually purchased just for some moral pleasure, and not for actual needs. At the same time, expenditures for leisure are not taken into account, while they can be the same in nature. Also, it can be stated that the duration of workweek in the US fell in the early 2000's. This meant that people gained more time for leisure, and thus raised their spending on leisure. However, as GDP does not take this into account, the changes in workweek length did not affect the GDP figures (Arnold, 2010).

Eighth, GDP takes into account only marketable goods or services, i.e. those where monetary exchange takes place. At the same time, GDP fails to take into account any kind of volunteer work (i.e. when products or services are provided on a free-of-charge basis, with humanitarian or any other aims), donations, and so on. This might alter the actual value of the country's economic output, and most importantly of its national economic and social welfare. For example, if a person works as a gardener an gets a salary, this is accounted for in GDP. However, if the residents of a housing come to do garden works on Saturday for making their living area beautified, their work is not accounted for in GDP, as it is volunteer, even though the essence of the work is the same as in the paid gardener's case. (Teti, 2012).

Also, it should be noted that GDP does not take into account the value of used (or secondhand) goods. GDP takes into account the value of goods only when they are produced. Thus, "*a used car sale, for example, does not enter in the current-year statistics, because the car was counted when it was originally produced.*" (Arnold, 2008, p. 134).

Ninth, GDP does not take into account any quality improvements in the provision of services or production of goods. For instance, if customers receive utilities services within a year for a particular value, and on the next year the quality of those services gets significantly improved without changing anyhow in price, the GDP indicator will not reflect this anyhow in its value. This means that it will not reflect important changes in the overall conditions of living in the country (Cohen 2017). The same relates to new technologies. For instance. if the consumption of energy decreases due to the use of new energy-efficient technologies, GDP might lower as a result of the decreasing monetary value of expenses for energy, while in fact the population's welfare will grow (Otter, 2014).

Tenth, GDP ignores actual technological progress and innovations. Thus, if the value of goods produced using obsolete methods and equipment is equal to the value of goods produced using innovative methodologies and tools, GDP will not show any differences between the two. In the current conditions, when digital technologies and the Internet play a steadily growing role in economy and trade around the globe, not taking into account the structure of production is a major flaw in the measurement of economic growth. Countries relying upon innovative technologies have significantly better prospects for their subsequent development in the long-term perspective, and have much better stability in overall terms. GDP does not recognize the actual contribution of innovations to economic growth, as soon as such contribution is not translated directly into greater value of products and services (Oviedo et al., 2009).

An example of this issue with GDP can be the production of TV sets. While in developed states, the TV sets currently sold are of modern 3D standards, with high definition and resolution ratios, in developing states, there are no such technologies, and therefore the TV sets sold are chiefly those which had been popular in developed economies at least several years ago. However, the prices can be largely the same. Therefore, the sales of the same number of different-quality TV sets will be equal for GDP figures, and thus GDP will not reflect the actual level of quality which people obtain in developed countries thanks to innovative technologies (McEachern, 2017).

Eleventh, GDP ignores many other indicators showing the actual quality of people's life. For instance, GDP fails to take into account birth and mortality rates, the length of living, quality of healthcare and education, and so on. As a result, while reflecting the value of products and services manufactured in a national economy, GDP

does not reflect an entire range of important quality and structural indicators. This means that while GDP tends to measure the economic output generated within the national economy, it fails to consider the social welfare of the population within this national economy, while it may be crucial for assessing the actual level of a state's development (Delang and Yu, 2015).

Twelfth, GDP fails to take into consideration the social costs associated with unemployment, intensity of criminal activities, family breakdowns, divorce, and so on. All those factors affect significantly the quality of human living and the social standards of life (Delang and Yu, 2015). At the same time, it should be noted that GDP often tends to treat crime, divorces and other negative elements of social life as positive factors for economic output: they generate additional costs within the national economy for remedying their negative effects, which is treated as growing economic output within the GDP measure. However, this means that GDP alters the meaning of sustainable life standards, as with the growing rates of the aforesaid events, social welfare tends to drop (Battersby, 2017).

Thirteenth, GDP ignores external debt. Foreign debt is not anyhow reflected within the value of GDP. However, "*foreign debt can have serious implications on a nation's ownership of its welfare-yielding assets.*" (Delang and Yu, 2015, p. 9). External debt may be a major obstacle to countries' economic stability in the long-term perspective, and this needs to be taken into account for assessing effectively a national economy's growth opportunities. High levels of external debt may force countries to spend a large part of their economic output generating on repaying those debts, instead of investing it in economic growth and the accumulation of social capital. Furthermore, high external debt levels tend to cause greater misuse of natural resources. All in all, this produces major negative effects for social welfare, which is not anyhow reflected in GDP (Delang and Yu, 2015).

Lastly, GDP evaluates the effects of economic output only within a particular accounting period. However, the actual economic and social effects of particular economic activities can only prove themselves in the subsequent years, i.e. in the long-term perspective (Delang and Yu, 2015). For instance, a country's growing GDP figures may imply growing future expenses, which might to loans raised from third parties, depletion of resources, and a range of other factors. Such expenses will definitely diminish GDP in the future periods, but they are not anyhow reflected in the current period, and therefore the actual value of the country's economic growth is distorted, as GDP does not reveal the quality structure of such economic growth (Jancovici, 2014)

Therefore, as the information above emphasizes, there are major obstacles and hindrances which might affect significantly the quality and sufficiency of GDP as a key macroeconomic indicator used in international statistics for measuring a country's economic growth and the overall welfare. Taking those facts into account, the next chapter will highlight the preconditions and difficulties in the search for measures alternative to GDP.

1.3 Preconditions and Difficulties in the Search for Alternative Measures

The preconditions for the search for alternative measures to evaluate a nation's welfare, growth and progress are contained in the very problems associated with GDP and its measurements. As shown in the previous chapter of the thesis, GDP as a key macroeconomic indicator in international statistics has many flaws and shortcomings which cannot be eliminated without introducing new measures. The criticism of GDP (notorious critics of GDP include Moses Abramovita, Michael Green, Lorenzo Fioramonti, and other) has been persistent in the United States and in other developed states for several decades right due to the fact that this measure fails to assess effectively the economic and social welfare of the population. Therefore, all this forms reasons which drive the need to search for alternative measures in the practice of states (Daly and McElwee, 2014).

Another precondition which should be noted here is the fact that the attempts to modify the GDP indicator to reflect better economic and social welfare have not yet yielded any positive results. The Organization for Economic Co-operation and Development has offered several revisions of GDP in order to meet the current challenges in international statistics (OECD, 2000).

Focusing more in detail on attempts to change the methodological approach to the calculation of GDP for improving this measure, it is worth noting the examples of China and India. Thus, in 2015, the National Bureau of Statistics of China adopted changes to the methodology of GDP evaluation: instead of year-on-year calculations, China now adopted quarterly GDP evaluation and their combination into yearly indexes. According to the National Bureau of Statistics of China, the new GDP approach will be "*more accurate in measuring the seasonal economic activity and more sensitive in capturing information on*

short-term fluctuations" (Reuters, 2015). As for India, in 2015, the country made two important changes to its GDP calculation methodology. Thus, first, it changed the reference year for the evaluation of GDP from 2005 to 2012. Second, and most importantly, India started using market prices and not real prices for the purpose of evaluating the actual amount of economic output in the state. The new methodology showed significantly boosted figures of India's GDP, making it outpace China's economic growth (Worstall, 2015).

Still, it should be understood that despite methodological adjustments, GDP still remains very limited in terms of the construction of social and economic welfare, as it still deals only with the value of products and services manufactured within a national economy, without addressing duly a number of other important indicators outlined earlier in this paper (OECD, 2000).

However, despite the existing preconditions for the development of measures alternative to GDP, there are also major issues which hinder their use. Namely, the most prominent of those issues are the following:

- GDP is widely used in international statistics. As stated by Frumkin (2004), GDP is the main macroeconomic indicator used for the comparative analysis of states' economic growth and well-being not only within the methodologies adopted by national statistics offices, but also within organizations such as the World Bank, the International Monetary Fund, and so on. Refusing to use GDP as the main indicator of macroeconomic statistics would require the simultaneous shift in the statistical standards of a number of states and international organizations. Otherwise, there could be significant disparities in the existing approaches to the measurement of economic growth and well-being in different countries, which could bring major difficulties to compare macroeconomic statistics internationally.
- There is currently no agreement upon the best measure alternative to GDP. Despite the existing proposal and suggestions, the scientific practice and the practice of international statistical measurements has not yet adopted a single best alternative which would allow replacing GDP with the best effects. Namely, as Frumkin (2004) claims, it should be understood that in order to eliminate the drawbacks of GDP as a macroeconomic indicator, the new measure should be a compound ratio including a wide range of different economic and social indicators. As of today, the

use of particular indicators within those ratios implies controversies, and common agreement is yet to be reached. The main alternative measures to GDP and their inherent shortcomings and advantages will be investigated in the practical part of this thesis;

- Due to the complexity of new compound measures of national economic growth and welfare, there can exist important problems with the practical application of such indicators and with the ease of the basic calculations. Namely, as argued by Cohn (2015), for ensuring the effective opportunities of comparison in international statistics, those indicators should allow using comparable time frames, currency values, and so on, which might often be complicated by the different nature of the ratios making up the compound indicator and the need to bring them to a common whole;
- There might be important problems with the lack of statistical data for calculating alternative macroeconomic measures. Thus, as explained by Cohn (2015), data on GDP are published by all states and are collected and processed by major international organizations such as the World Bank. Therefore, they are always available, and thus are simple to evaluate. On the contrary, in composite indexes covering a wide range of different ratios, including those pertaining to human rights, human satisfaction with life, happiness and other ratios which characterize welfare and well-being rather than economic growth, there could be major problems with collecting such data from developing countries, especially the so-called Third World, i.e. the poorest states, where no such statistics might exist. The use of approximate and estimate statistics in this case might only further deepen the existing deviations and provide an unreliable picture of the situation, thus bringing confusion to the comparative analysis of states' welfare and economic growth.

Therefore, as can be seen from the information outlined above, there are important issues associated with the development and introduction of macroeconomic measures alternative to GDP. Nevertheless, due to the important preconditions for their introduction, such measures are used more and more widely in international practice. In the next chapter of the thesis, a brief overview of the history of alternative measures will be provided.

1.4 History of Alternative Measures

Criticisms of GDP have existed since the introduction of GDP as a macroeconomic indicator to be predominant in international statistics for measuring national economies' growth and welfare. However, major critique of the index emerged in the 1960's-19670's, and was first of all due to the intensifying technological progress of humanity, which proved that GDP was unable to take into consideration effectively all the different components of national well-being (Oviedo et al., 2009).

In 1979, the Kingdom of Bhutan introduce the Gross Happiness Index (GHI) as a macroeconomic indicator to replace GDP, claiming that this indicator was more important: it allowed measuring the actual well-being of people, instead of the economic output which could often bring no benefits to the population's actual welfare. GHI offered by Bhutan included several ratios within it, and namely offered to measure economic self-reliance, sustainable development and environment preservation, promotion of national culture, and satisfaction with the governance of the public authorities. This index has provoked major interest on the part of international community, but also raised controversies. Criticisms of GHI included claims that it was an attempt of the Bhutanese authorities to divert attention from ethnical cleansings in the state (The Conversation, 2014).

In the 1980's, the Index of Sustainable Economic Welfare (ISEW) was introduced by the United States as an index destined to replace directly GDP in international measurements. In contrast to GDP, this index took into account costs associated with environment protection and sustainable growth, and focused on the expenditures of households rather than on the economic output of the state (Simms and Boyle, 2009, p. 177).

ISEW was subsequently replaced by the more sophisticated Genuine Progress Indicator (GPI) which aimed to take into consideration a wider range of indicators covering sustainable development, including pollution, resource depletion, ability to withstand long-term negative environmental effects, etc. (Simms and Boyle, 2009, p. 177).

In 1990, the Human Development Index (HDI) was introduced by the United Nations as a new indicator to measure the level of countries' economic and social development. HDI was set to include three key components, namely the life expectancy index, the education index, and the income index, thus measuring key aspects of individuals' life such as economic income, health and education. This index was adopted

by the UN, and is widely used in the measurement of nations' well-being as of today (Arak, 2013, p. 45).

In addition to the alternative measures outlined above, there have been other important attempts to complement GDP with more effective macroeconomic measures on the international scale, which will be investigated more in detail in the practical part of the thesis, as well as methodological issues related to the measurement of the outlined and other indicators. In addition, there have also been attempts on the part of individual states to introduce their own metrics for tracking economic development and social welfare. Thus, in 2013, Australia made an attempt to create its own system of macroeconomic indicators to assess the well-being of the Australian population. Instead of seeking for a single compound indicator, the country's government developed a set of 26 ratios covering the issues related to Australia's economic growth, social standards, sustainable development, governance and so on (The Conversation, 2014).

Unlike most other measures of macroeconomic progress in international statistics, Australia's MAP (Measures of Australia's Progress) does not offer any single composite ratio. On the contrary, it offers a combination of individual indexes which are to be evaluated by the researchers. Thus, MAP includes indicators such as life expectancy at birth, unemployment rate, real income per capita, real national worth per capita, fine particle concentrations, divorce rates, crime rates, multifactor productivity, number of animal species under extinction, and so on. Thus, it covers a broad range of economic, social, environmental and other indicators, and is aimed to assess effectively Australia's sustainable economic growth. Also, the government holds discussion with the Australians in the online environment for adding new components to MAP in order to reflect the actual level of the population's welfare (Hurley, 2013).

Therefore, as can be seen from the information above, there have been major attempts to replace GDP with more comprehensive measures of economic and social well-being both on the international and on the national level. The practical part of this thesis will aim to investigate in detail the most prominent alternative measures to GDP which are used in international practice as of today.

2 Practical Part

2.1 Alternative Measures to GDP

In this chapter of the thesis, the most widely used macroeconomic measures alternative to GDP will be introduced and thoroughly analyzed, with the focus on their specifics, advantages and drawbacks. For the purpose of showing the correlation of those measures with GDP, data of OECD (Organization for Economic Co-operation and Development) member states will be compared in terms of GDP and alternative measures. Revealing such correlation is important in order to see how alternative measures differ from GDP in terms of the results obtained, and thus how they might complement GDP. The aggregate numerical data to be used for this kind of analysis are given in Annex 1 to this thesis. All data are taken for 2015 where possible, as the latest GDP figures provided by the World Bank are available for 2015 only.

2.1.1 United Nations Human Development Index (UNHDI)

The Human Development Index is a composite index developed by the United Nations for the purpose of evaluating nations' welfare. The methodology for calculating the index embraces three key components, namely the following:

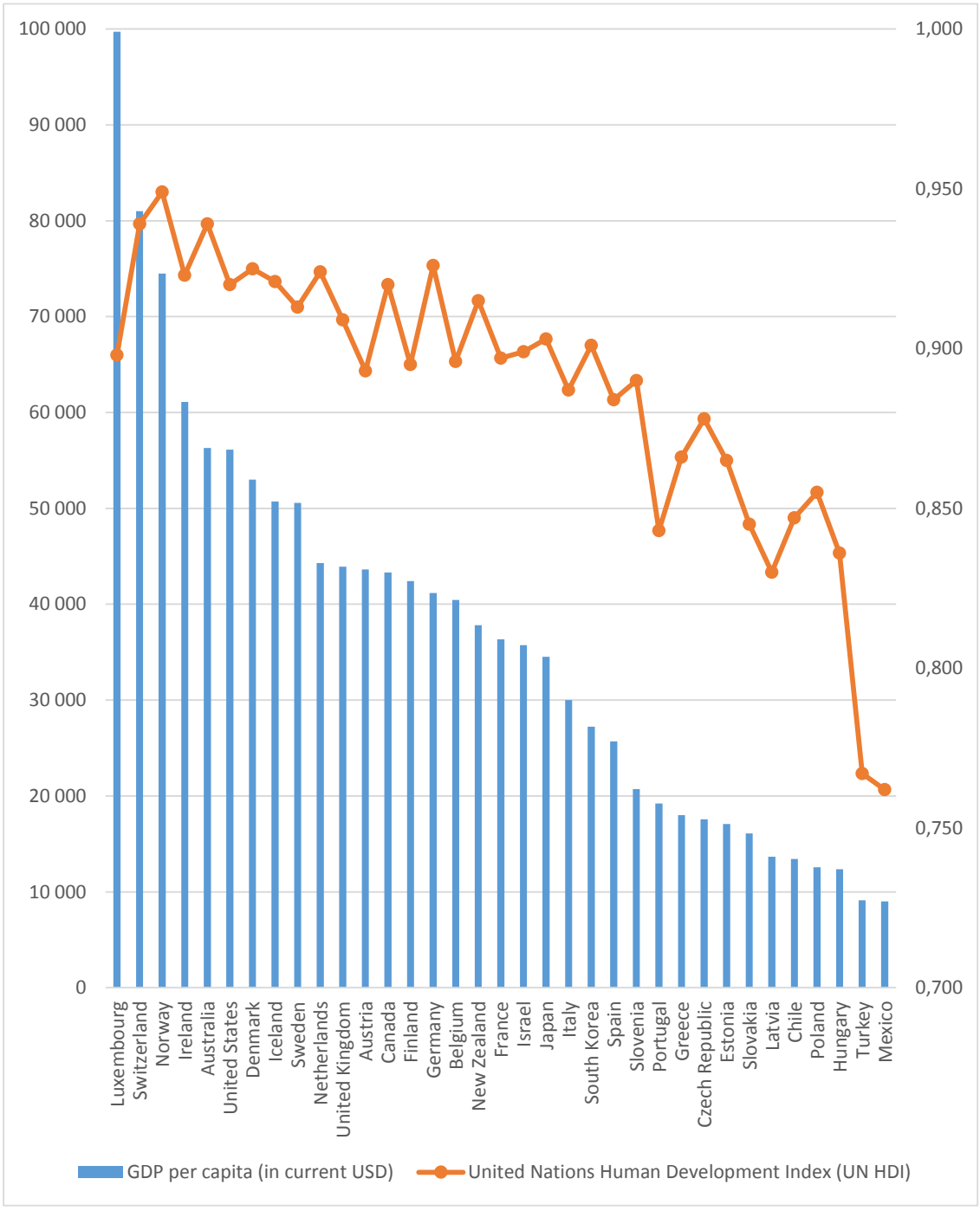
- life expectancy index: it is calculated as $\frac{LE-20}{85-20}$, where LE stands for life expectancy; the figure 85 is the desired goal of life expectancy, and 20 is the value of life expectancy below the average reproduction age, which is believed to be ruinous for society;
- education index: it contains two sub-components, namely the mean years of schooling index (average schooling duration in a particular state taken from the data of the UNESCO Institute for Statistics) and the expected years of schooling index (taken from the data of the UNESCO Institute for Statistics for each particular states, the estimates are based on enrolment by age at all levels of education, and population of official school age for all levels of education). The education index is calculated as the mean value of its two sub-components;

- income index: it reveals the index of actual earnings gained by the population and is calculated as $\frac{\ln(GNIpc) - \ln(100)}{\ln(75{,}000) - \ln(100)}$, where GNIpc stands for gross national income per capita in current USD; the figures 100 and 75,00 are used as minimum and maximum GNIpc reference values respectively, and natural logarithm is used to reflect the reduction in the importance of additional income in richer countries (United Nations, 2016).

Therefore, the welfare of the population under the UNHDI method is computed based on the population's economic income, education and life expectancy (i.e. healthcare). Based on the previous findings of this thesis, it can be stated that the major advantage of UNHDI against GDP is the fact that it embraces not only an economic parameter, but also allows evaluating the differences in countries' levels of education and healthcare. As a result, UNHDI is more complete and characterizes rather more deeply the actual welfare of nations.

However, UNHDI has its drawbacks. Thus, it does not evaluate the quality of education. High levels of primary, secondary or tertiary education in a country do not necessarily describe its population's welfare or happiness, and obviously, if a developed and a developing economy have the same rates of education, the quality of education in the former is higher, which distorts the validity of UNHDI scores. Also, UNHDI doubles many of GDP's shortcomings. Namely, it does not take into account the effects of the black market and shadow economy, it fails to evaluate any environmental impacts, it fails to reveal differences in countries' technological development, it does not differentiate 'bad' and 'good' products, it fails to take into account the maintenance of human rights and freedoms, and so on (Waugh, 2002).

Figure 1. OECD countries' GDP per capita (in current USD) and UNHDI scores, as of 2015

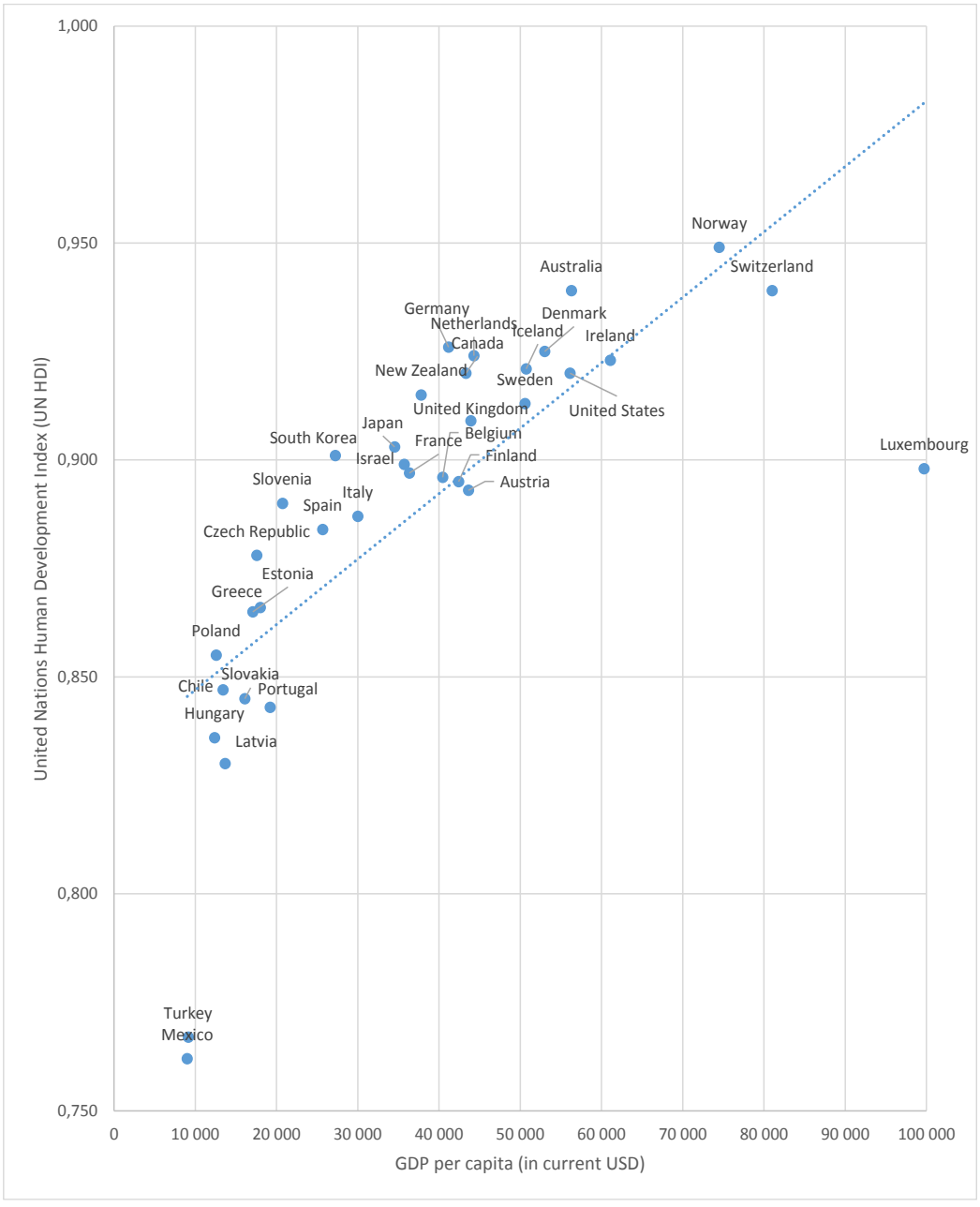


Source: Own compilations, World Bank (2017) and United Nations (2016)

Figure 1 above illustrates how OECD countries compare in terms of their GDP and UNHDI. As can be seen from the chart, while the overall trend is somehow similar, there are some fluctuations from country to country. Namely, as the chart illustrates, the top 6 OECD states in terms of GDP per capita also hold positions in the top 8 countries by UNHDI value. The other two states in the top 8 are Canada and Germany: this illustrates

that despite having lower GDP per capita, those countries perform better in the health and education parameters included in UNHDI. Turkey and Mexico show the worst results for both GDP per capita and UNHDI.

Figure 2. Cross-country relation between GDP per capita (in current USD) and UNHDI scores, as of 2015



Source: Own compilations, World Bank (2017) and United Nations (2016)

Figure 2 above further compares visually that there is a dispersion above the trend line. This means that there are slight discrepancies for OECD states' rankings in terms of GDP and UNHDI, but overall, the results are rather comparable for most states. As can be

seen from the slope of the trendline, there is quite a decent correlation between GDP and UNHID: countries which rank better in terms of their GDP per capita (i.e. economic output per capita) also tend to rank better in terms of UNHDI (i.e. economic output plus healthcare and education. Apparently, this can be linked with the fact that the growing economic output per capita allows investing greater funds in healthcare and education on the part of both the government and household.

2.1.2 Social Progress Index (SPI)

The Social Progress Index (SPI) is developed by Social Progress Imperative, an international non-profitable organization, and is based on the theoretical approaches offered by Amartya Sen, Douglass North, and Joseph Stiglitz (2010). SPI is based on two key preconditions: first, it excludes any measurement of economic indicators for evaluating social welfare; and second, it focuses on the investigation of outputs rather than of inputs. SPI embraces three key groups of indicators, namely basic human needs, foundations of wellbeing, and opportunity (Social Progress Index, 2016).

Table 1. Structure of SPI

Social Progress Index		
Basic human needs	**Foundations of wellbeing**	**Opportunity**
Nutrition and basic medical care Undernourishment Depth of food deficit Child mortality rate Deaths from infectious diseases *Water and sanitation* Access to piped water Rural access to improved water source Access to improved sanitation facilities *Shelter* Availability of affordable housing Access to electricity Quality of electricity supply Household air pollution attributable deaths *Personal safety* Homicide rate Level of violent crime Perceived criminality Political terror Traffic deaths	*Access to basic knowledge* Adult literacy rate Primary school enrollment Lower secondary school enrollment Upper secondary school enrollment Gender parity in secondary enrollment *Access to information and communications* Mobile telephone subscriptions Internet users Press Freedom Index *Health and wellness* Life expectancy at 60 Premature deaths from non-communicable diseases Obesity rate Suicide rate *Environmental quality* Outdoor air pollution attributable deaths Wastewater treatment Biodiversity and habitat Greenhouse gas emissions	*Personal rights* Political rights Freedom of speech Freedom of assembly/association Freedom of movement Private property rights *Personal freedom and choice* Freedom over life choices Freedom of religion Early marriage Satisfied demand for contraception Corruption *Tolerance and inclusion* Tolerance for immigrants Tolerance for homosexuals Discrimination and violence against minorities Religious tolerance Community safety net *Access to advanced education* Years of tertiary schooling Women's average years in school Inequality in the attainment of education Number of globally ranked universities Percent of tertiary students enrolled in globally ranked universities

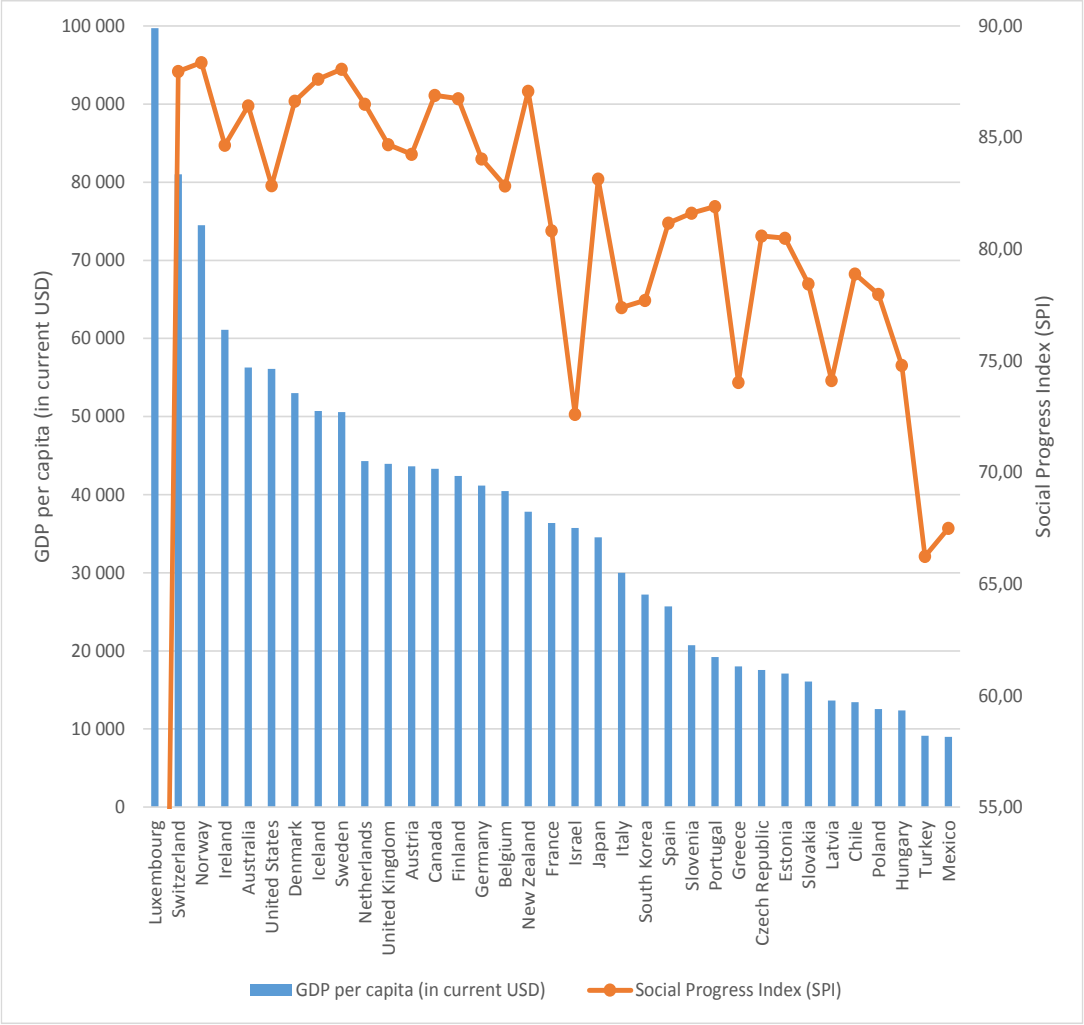
Source: Social Progress Index (2016)

As can be seen from Figure 3 above, SPI covers a wide range of indicator subsets, and includes indicators related to healthcare, reduction of poverty, personal freedoms, education, environment quality, and personal safety. For each of the three pillars, points are assigned from 0 to 100. SPI is calculated as the mean value of the three pillars' values. Thereafter, ranking is done fromtop to lowest SPI scores.

Based on the previous findings of this thesis, it can be stated that SPI is a considerably more multifaceted indicator compared to GDP. Its major advantage over GDP is that it takes into account human rights and freedoms, and a wide range of other socially

important indicators. Moreover, such indicators are combined into larger groups, and SPI thus embraces 53 different social welfare indicators overall. However, a major defect of SPI is the fact that it does not anyhow address economic issues, which are put into the core of GDP. Also, it can be seen from the information outlined above that SPI also does not take into account any technological factors, which makes it very limited in practical application.

Figure 3. OECD countries' GDP per capita (in current USD) and SPI[1] scores, as of 2015



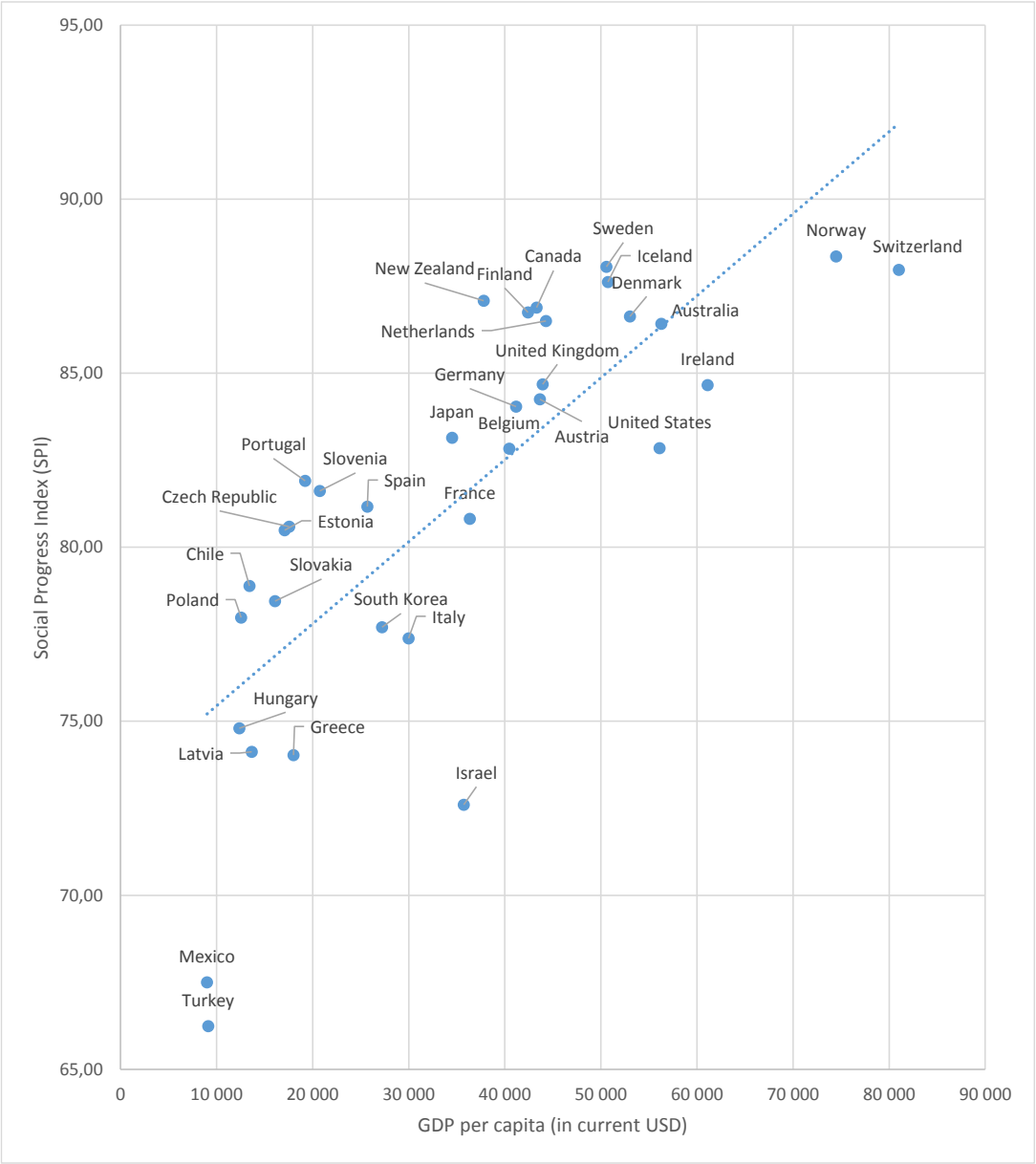
Source: Own compilations, World Bank (2017) and Social Progress Index (2016)

As can be seen from Figure 3 above, there are quite large discrepancies between OECD countries' figures achieved in terms of GDP per capita and SPI. For instance, New

[1] no data available for Luxembourg

Zealand which ranks only 17th in terms of its GDP per capita has the 5th SPI score. At the same time, Slovenia which has comparably low GDP per capita values has quite high SPI scores. Those differences are due to the different methodological approaches used for the calculation of the two ratios.

Figure 4. Cross-country relation between GDP per capita (in current USD) and SPI scores, as of 2015



Source: Own compilations, World Bank (2017) and Social Progress Index (2016)

Figure 4 further confirms the abovementioned discrepancies: the dispersion is rather high both above and beneath the trendline. Obviously, such deviations are caused by

the fact that GDP and SPI have no common indicators: while GDP calculates economic output, SPI does not take it into account at all. The correlation between GDP and SPI is rather weak, even though for a part of the sample, higher GDP value do correlate with higher SPI scores.

In the context of this thesis, this implies a suggestion that SPI could be used effectively together with GDP, adding its economic findings by important calculations related to social welfare.

2.1.3 Environmental Performance Index (EPI)

The environmental performance index is developed and calculated by the Yale University and Columbia University, together with the World Economic Forum and the Joint Research Centre of the European Commission (Yale University, 2017). In the period from 1999 to 2005, another index had been used in place of EPI, namely the Environmental Sustainability Index (ESI), which was thereafter improved and modified to its current format. ESI is designed to evaluate the success of nations on the way to the achievement of sustainable economic development.

Figure 5. Structure of EPI

Source: Yale University (2017)

As can be seen from Figure 5 above, EPI consists of two major groups of indicators, namely ecosystem vitality and environmental health. Ecosystem vitality embraces indicators related to the effective treatment of natural resources, including wastewater treatment, tree cover loss, marine protected areas, species protection, and so on. Environmental health embraces indicators related to the level of anthropogenic impact on biological resources, and namely calculates amounts of pollution, unsafe drinking water volumes, and other negative environmental factors.

As explained by the Yale University (2017), the EPI score is calculated as the mean of the scores for ecosystems vitality and environmental health. At the same time, for the factors and sub-factors, weighing coefficients are applied when calculating the scores for the two pillars. The weighing coefficients are provided in Table 2 below.

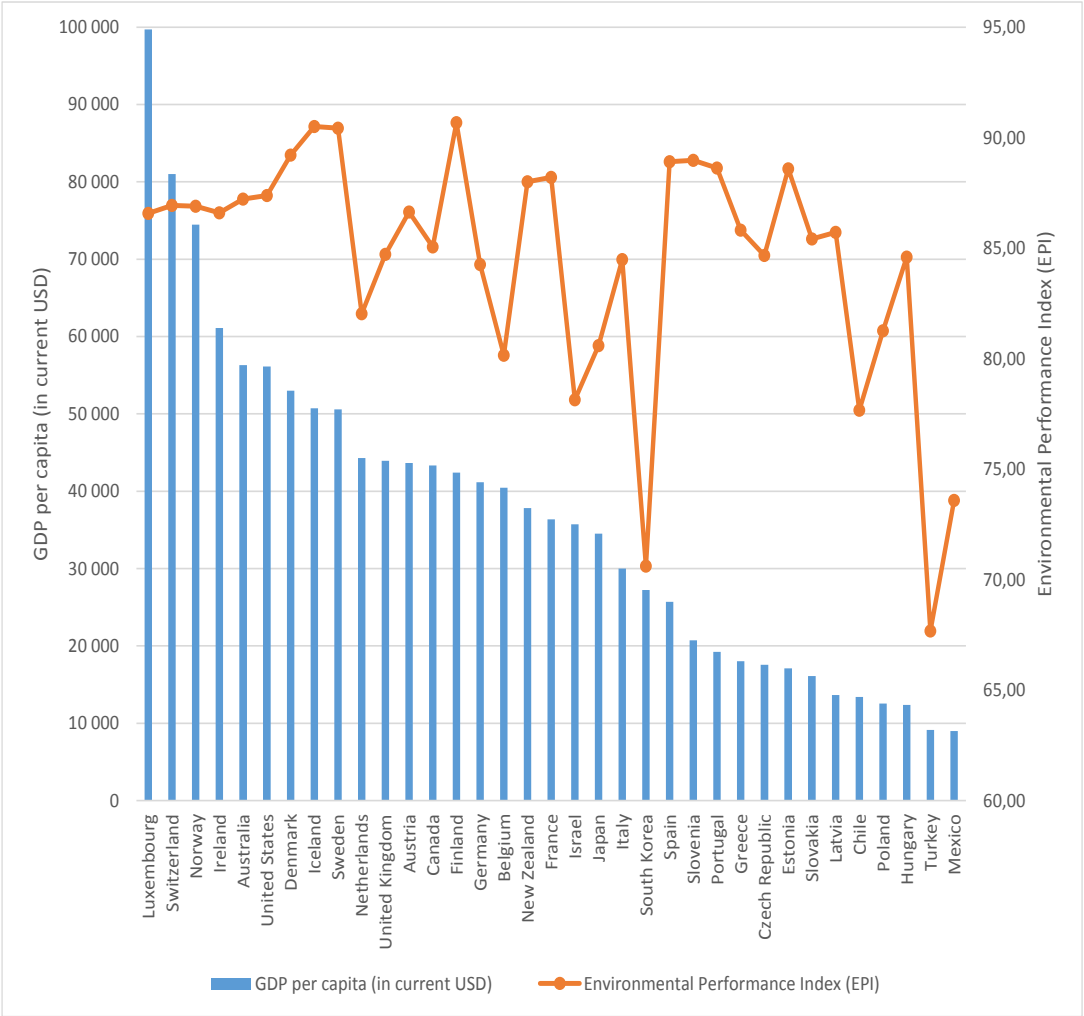
Table 2. EPI calculation structure

EPI	Objective	Issue Category	Indicator
Environmental Performance Index (EPI)	Environmental Health (50%)	Health Impacts (33%)	Environmental Risk Exposure (100%)
		Air Quality (33%)	Household Air Quality (30%)
			Air Pollution - Average Exposure to PM2.5 (30%)
			Air Pollution - PM2.5 Exceedance (30%)
			Air Pollution - Average Exposure to NO2 (10%)
		Water and Sanitation (33%)	Unsafe Sanitation (50%)
			Drinking Water Quality (50%)
	Ecosystem Vitality (50%)	Water Resources (25%)	Wastewater Treatment (100%)
		Agriculture (10%)	Nitrogen Use Efficiency (75%)
			Nitrogen Balance (25%)
		Forests (10%)	Change in Forest Cover (100%)
		Fisheries (5%)	Fish Stocks (100%)
		Biodiversity and Habitat (25%)	Terrestrial Protected Areas (National Biome Weights) (20%)
			Terrestrial Protected Areas (Global Biome Weights) (20%)
			Marine Protected Areas (20%)
			Species Protection (National) (20%)
			Species Protection (Global) (20%)
		Climate and Energy (25%)	Trend in Carbon Intensity (75%)
			Trend in CO2 Emissions per KWH (25%)

Source: Yale University (2017)

Therefore, in contrast to the previous indicators, EPI deals closely with the evaluation of sustainable development, and namely the preservation of the natural environment for the sake of future generations. In those terms, it covers an area which is not touched upon by GDP. However, EPI is very limited due to the fact that it only evaluates the quality of the interaction between the economy and the environment, and thus describes the overall conditions of human life in the environment. However, EPI does not investigate any economic output factors or any social welfare factors beyond sustainable development. Therefore, it may be used only in combination with other measures in international macroeconomic statistics.

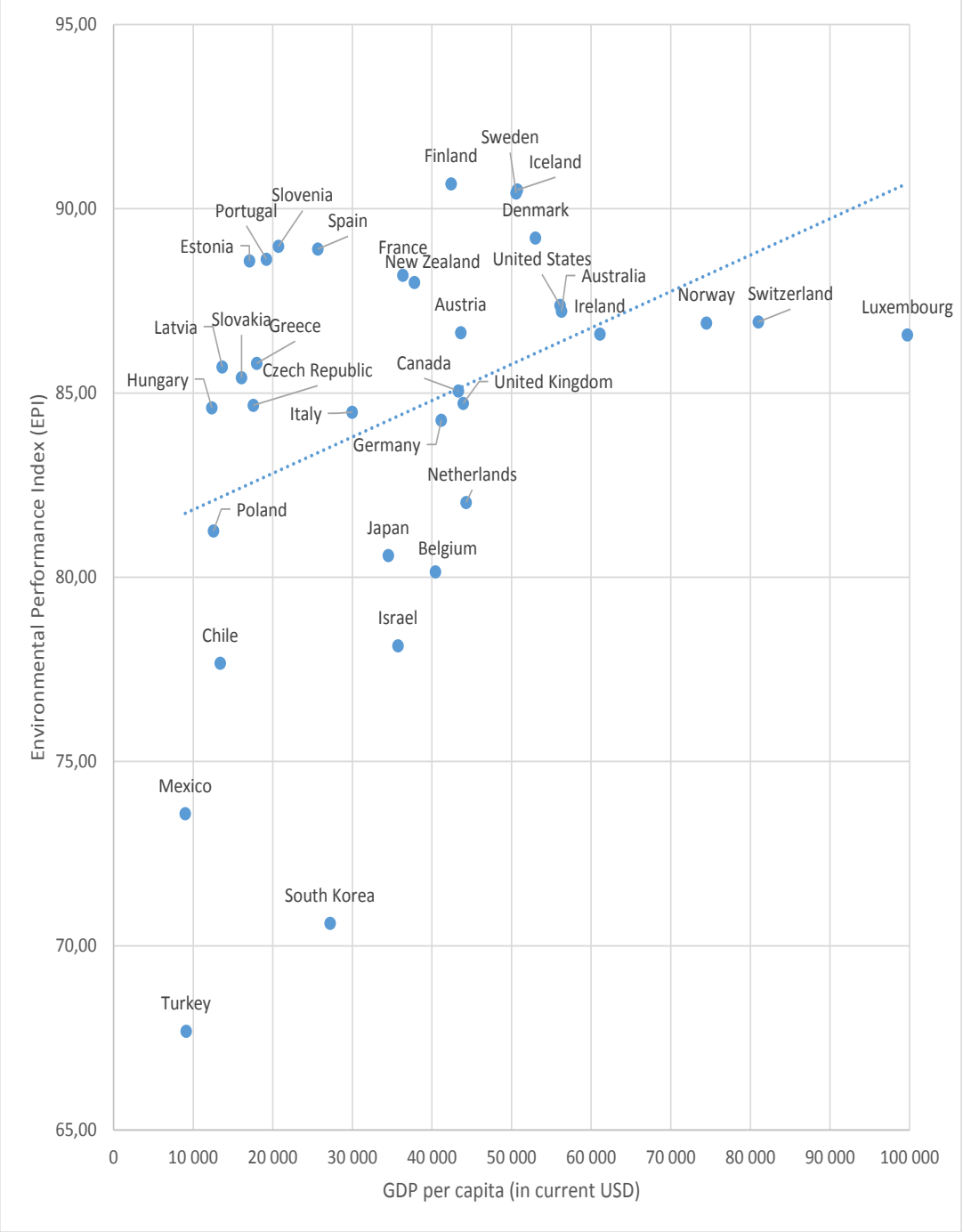
Figure 6. OECD countries' GDP per capita (in current USD) (as of 2015) and EPI scores (as of 2016)



Source: Own compilations, World Bank (2017) and Yale University (2017)

As can be seen from Figure 6 above, the discrepancies between OECD countries' results in terms of GDP per capita and EPI are significantly greater compared to the alternative measures investigated previously in this chapter. For instance, Estonia which is among the lowest ranked countries by GDP per capita is one of the best states in terms of EPI. At the same time Israel, with a medium GDP per capita value is ranked low in terms of EPI. The high discrepancies testify that countries with greater GDP values do not necessarily have a good situation with the environment. This illustrates the previous findings of this research which explained that GDP fails to take into account the exdisting environmental damage.

Figure 7. Cross-country relation between GDP per capita (in current USD) and EPI scores, as of 2015



Source: Own compilations, World Bank (2017) and Yale University (2017)

Figure 7 further confirms the findings described above. The dispersion of countries around the trendline is significantly greater compared to the cases of previous alternative measures. This testifies that the correlation between GDP and EPI is very weak: growing GDP does not necessarily imply growing EPI. These findings confirm the previous assumptions that economic output can bring environmental damage where no sufficient

attention is paid to sustainability, and GDP fails to take into account such effects. This might be an indication that EPI can be combined with GDP when evaluating countries' welfare.

2.1.4 Happy Planet Index (HPI)

HPI is an index of human well-being developed by the New Economics Foundation, a British non-governmental organization. HPI is calculated based on four sets of indicators, namely life expectancy, wellbeing, inequality of outcomes, and ecological footprint. The formula is:

$$HPI = \frac{\text{Life expectancy} \times \text{Wellbeing} \times \text{Inequality of outcomes}}{\text{Ecological footprint}}$$

Life expectancy is taken from the UN data on the average life expectancy of people and is measured in years.

Wellbeing is calculated as a composite index based on the findings of the Gallup World Poll which include the availability of income, jobs, access to food and shelter, and human rights and freedoms. This index is measured in scored from 0 to 10: the higher the score the better the wellbeing.

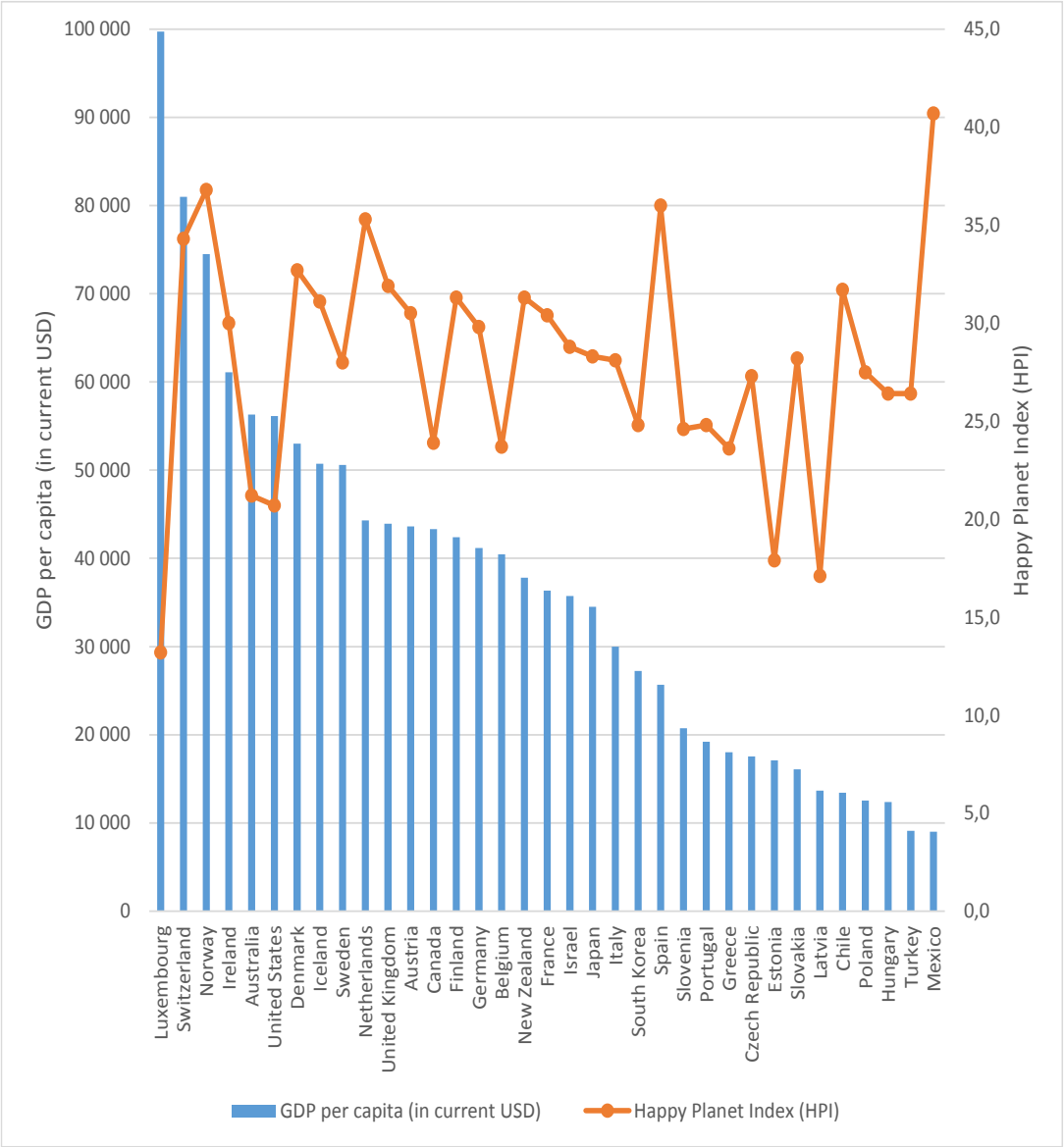
Inequality of outcomes reveals the differences in income distribution, and also people's happiness, i.e. satisfaction with life standards. It is calculated in percentage of inequality: the lower this score the better.

Finally, ecological footprint is based on data provided by the Global Footprint Network, and is calculated in global hectares per person. This index reveal the actual volume of nature's resources which is required for supporting a person's life in a country. The lower the value of this index the better, as this means lower burden borne by the environment (Happy Planet Index, 2017).

As can be seen from the information outlined above, HPI has some considerable advantages over GDP. Thus, it accounts for differences in the distribution of income, takes into account the indicator of human happiness, accounts for the maintenance of human rights and freedoms, and also pays attention to sustainable development and environmental factors.

However, HPI also has significant drawbacks. Thus, first of all, its coverage of sustainability indicators is very limited, and the ecological footprint indicator fails to reveal the interconnection between sustainable development and social welfare. Also, the calculation of happiness within HPI raises doubts on its effectiveness, as its justification is not provided, and the ratio itself is rather biased (MAC Prague consulting, 2014).

Figure 8. OECD countries' GDP per capita (in current USD) and HPI scores, as of 2015

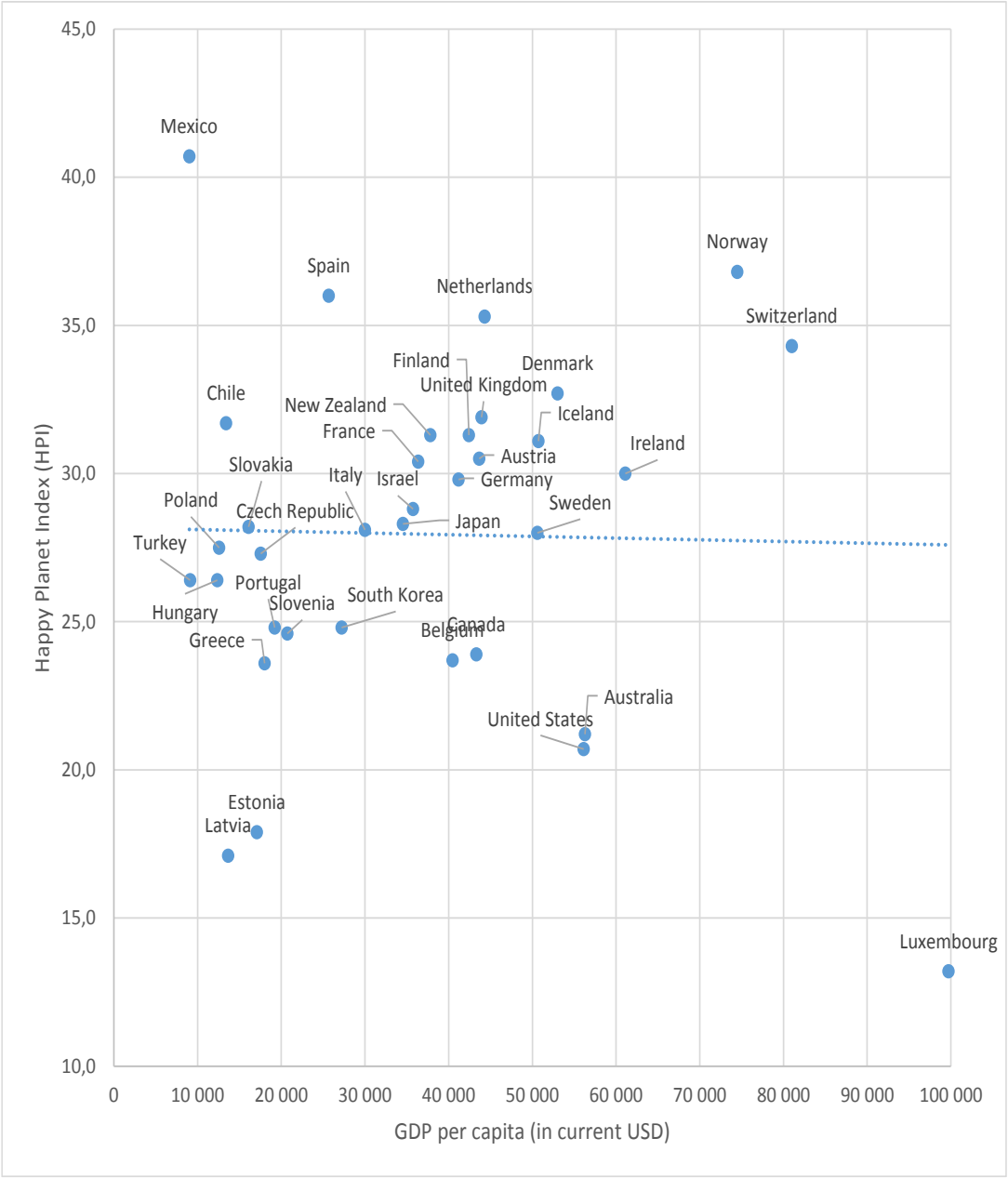


Source: Own compilations, World Bank (2017) and Happy Planet Index (2017)

As can be seen from Figure 8 above, there are major discrepancies in HPI and GDP results for OECD states. Luxembourg which has the highest GDP value is ranked

lowest in HPI, while Mexico which has the lowest GDP per capita is the top country in terms of HPI.

Figure 9. Cross-country relation between GDP per capita (in current USD) and HPI scores, as of 2015



Source: Own compilations, World Bank (2017) and Happy Planet Index (2017)

Figure 9 further confirms the information outlined above. The trendline is almost plain, and the dispersion around the trendline is very large. We cannot find any linkage between higher or lower GDP values and higher or lower HPI. This means that there is

almost no correlation between the two measures. Overall, it can be stated that HPI can be used an additional measure to GDP which complements it mainly in terms of environmental issues and also issues related to human rights. However, HPI cannot replace GDP, as it fails to evaluate effectively economic output.

2.1.5 Legatum Prosperity Index (LPI)

LPI is developed and evaluated by private investment company Legatum (Legatum Prosperity Index, 2017).

Figure 10. Composition of LPI

Source: Legatum Prosperity Index (2017)

As can be seen from Figure 10 above, LPI is based on three pillars, namely economic, social and institutional factors. Each of those groups has its subsets of data. Within those data subsets, particular indicators are measured. In aggregate, LPI calculates 104 different variables within the composite index. Below, selected variables are outlined for all subsets within the broader pillars of LPI (Legatum Prosperity Index, 2017):

Economic quality: absolute poverty; female labour force participation; prevalence of trade barriers; unemployment; etc.

Business environment: affordability of financial services; logistics performance index; perception of working hard getting one ahead; intellectual property protection; etc.

Governance: government effectiveness; democracy level; confidence in national government; rule of law; transparency of government policymaking; etc.

Personal freedom: ethnic minorities tolerance; LGBT rights; social religious restrictions; press freedom; etc.

Health: life expectancy at birth; mortality rates; improved sanitation facilities; health problems; etc.

Safety and security: availability of adequate food; availability of adequate shelter; terrorist attack casualties in last five years; etc.

Social capital: donations; volunteering; voter turnout; etc.

Education: primary completion rate; secondary education per worker; youth literacy rate; etc.

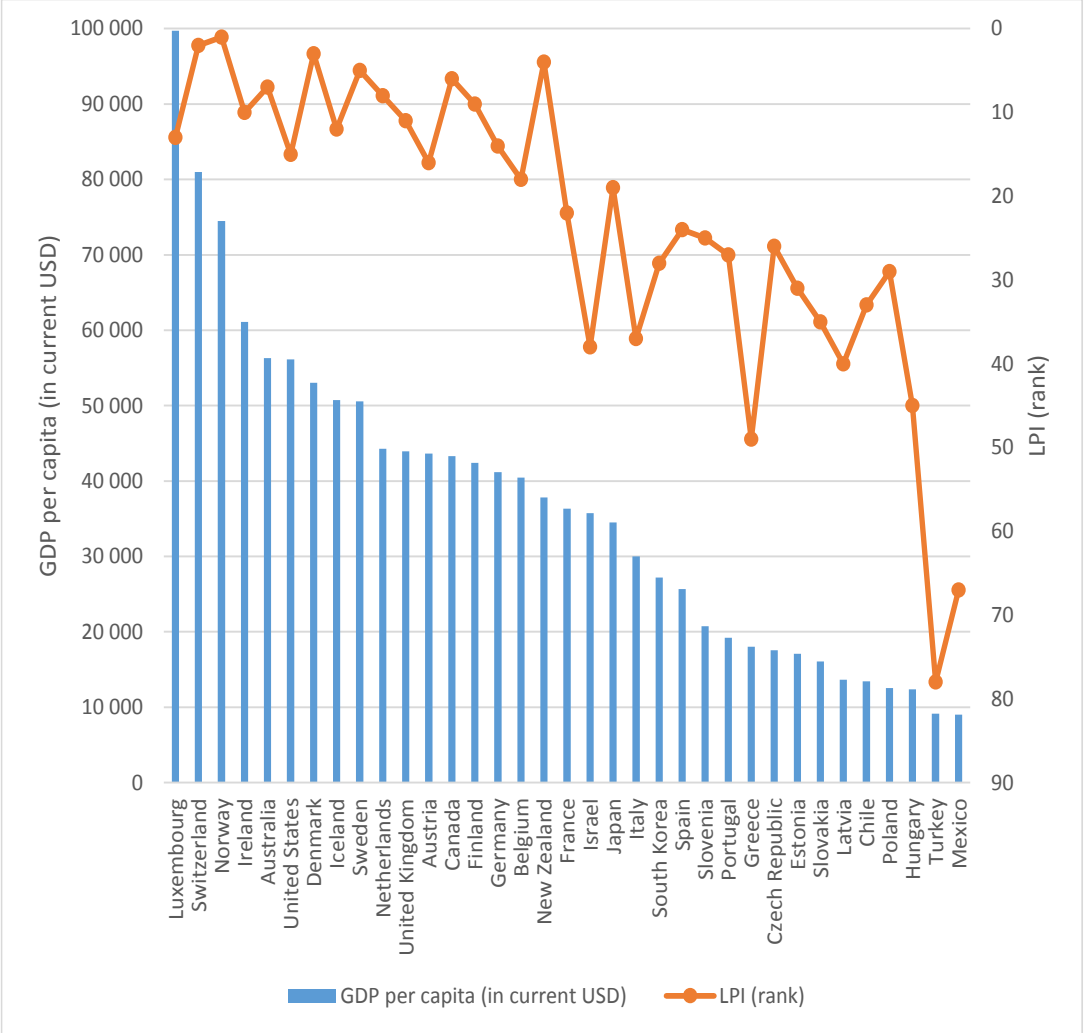
Environment: air pollution; freshwater withdrawal; pesticide regulation; wastewater treatment; etc.

LPI does not use any weighing coefficients. A country's overall position in the ranking is calculated as the mean value of its ranks across all variables compared against other states (Legatum Prosperity Index, 2017).

Therefore, based on the information presented above, it can be stated that LPI is a sophisticated composite ratio which combines a great number of indicators. It takes into account most factors which belong to the major issues of GDP as a measure of international statistics.

A major criticism of LPI however is the fact that the index is quite hard to calculate, and often, biased data can be taken into account. Also, while elaborating on more sophisticated economic indicators, LPI fails to take into account effectively basic ratios related to economic and technological growth (Greve, 2011).

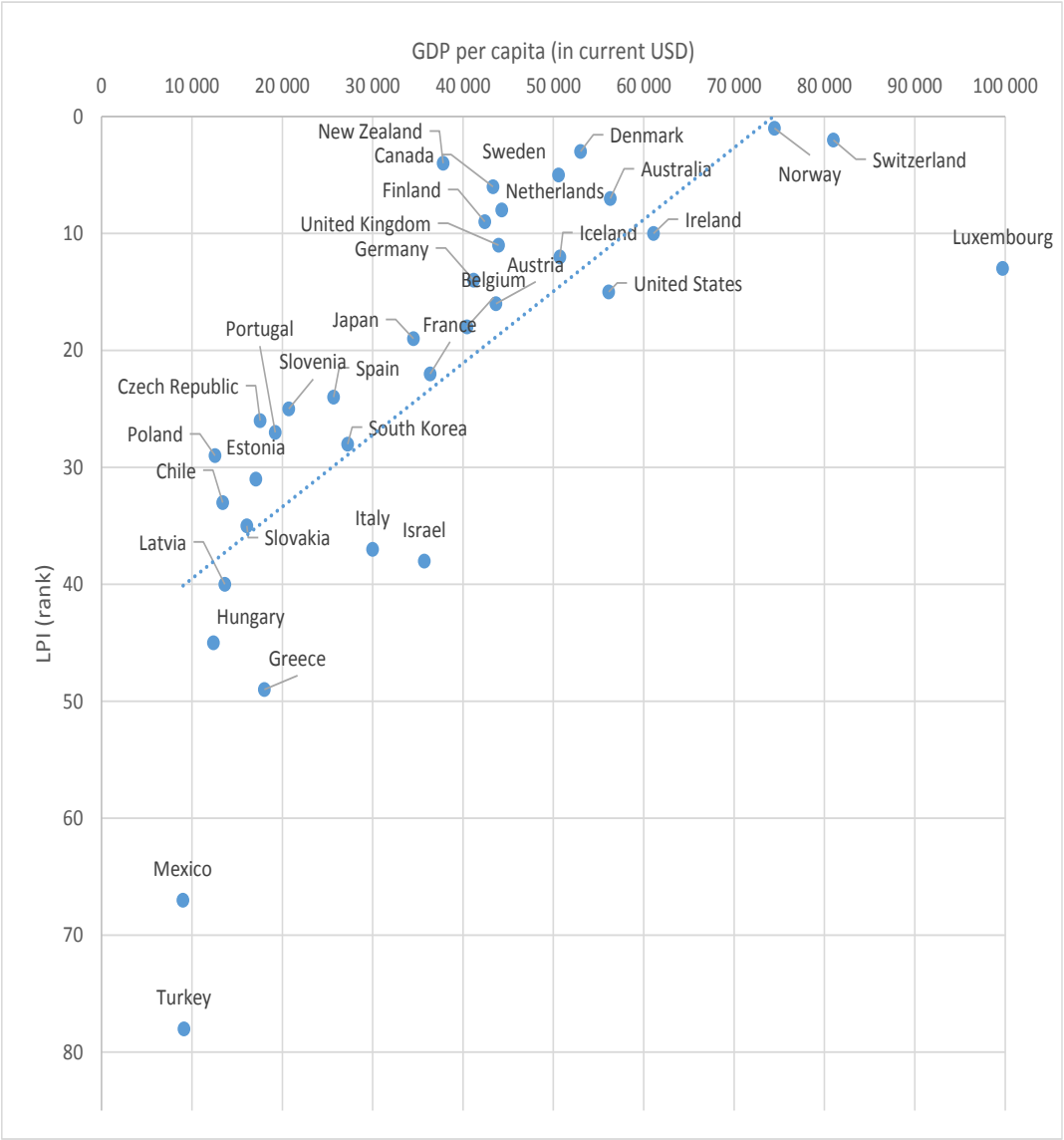
Figure 11. OECD countries' GDP per capita (in current USD) and LPI rank, as of 2015



Source: Own compilations, World Bank (2017) and Legatum Prosperity Index (2017)

As can be seen from Figure 11 above, there are fluctuations between GDP and LPI levels of OECD member states. For instance, Canada ranks 5th in terms of LPI while its GDP rank is only 13th. Also, Israel's LPI rank is significantly lower compared to its GDP value. This proves that there are disparities in the figures of GDP and LPI.

Figure 12. Cross-country relation between GDP per capita (in current USD) and LPI rank, as of 2015



Source: Own compilations, World Bank (2017), and Legatum Prosperity Index (2017)

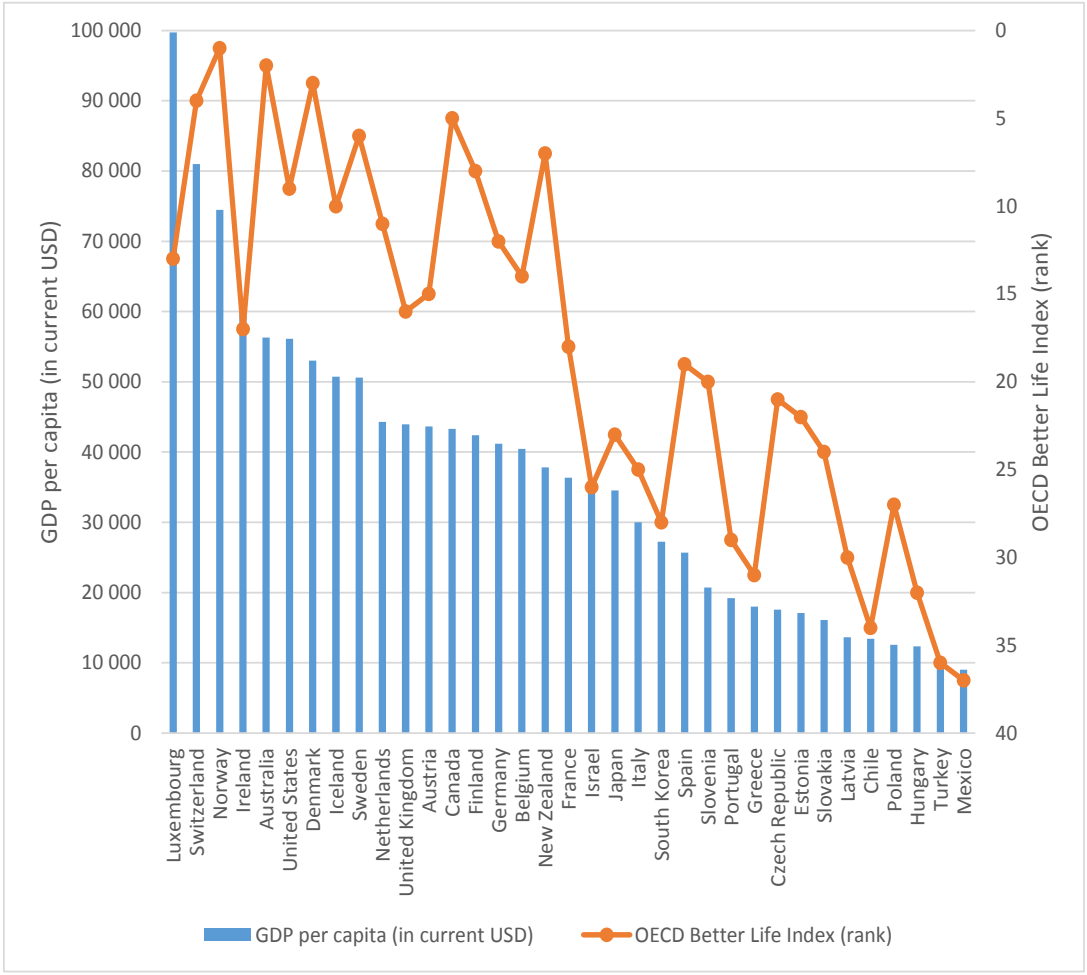
As Figure 12 reveals, the dispersion is lower compared to the previous alternative measures, but still does exists, which allows stating that the results for countries based on the analysis of GDP and LPI do have deviations. The eather weak correlation between the two measures proves that growing GDP values do not necessarily mean growing LPI, and vice versa.

2.1.6 OECD Better Life Index

The OECD Better Life Index is developed by OECD. It is based on the calculation of 11 ratios, namely the following: housing (includes availability of residential housing, roofs, housing expenditures, etc.); income (includes net household income and household financial wealth); jobs (includes employment, job earnings, job security, etc.); community (quality of support network); education (educational attainment, students' skills, etc.); environment (water quality and air pollution); civic engagement (voter turnout, etc.); health (self-reported health and life expectancy); life satisfaction; safety (homicide rate and safety of walking alone at night); and work-life balance (time devoted to leisure and personal care, etc.) The single composite index is not calculated, and countries are ranked by their positions across all indicator subsets (OECD Better Life Index, 2017).

The major advantage of the OECD Better Life Index compared to GDP is its greater complexity, and the fact that it takes into account a number of important social and environmental factors. However, the OECD Better Life Index is very limited in the attention which it pays to sustainable development, and fails to take into account a wide range of factors associated with human rights and freedoms, inequalities in human condition, etc.

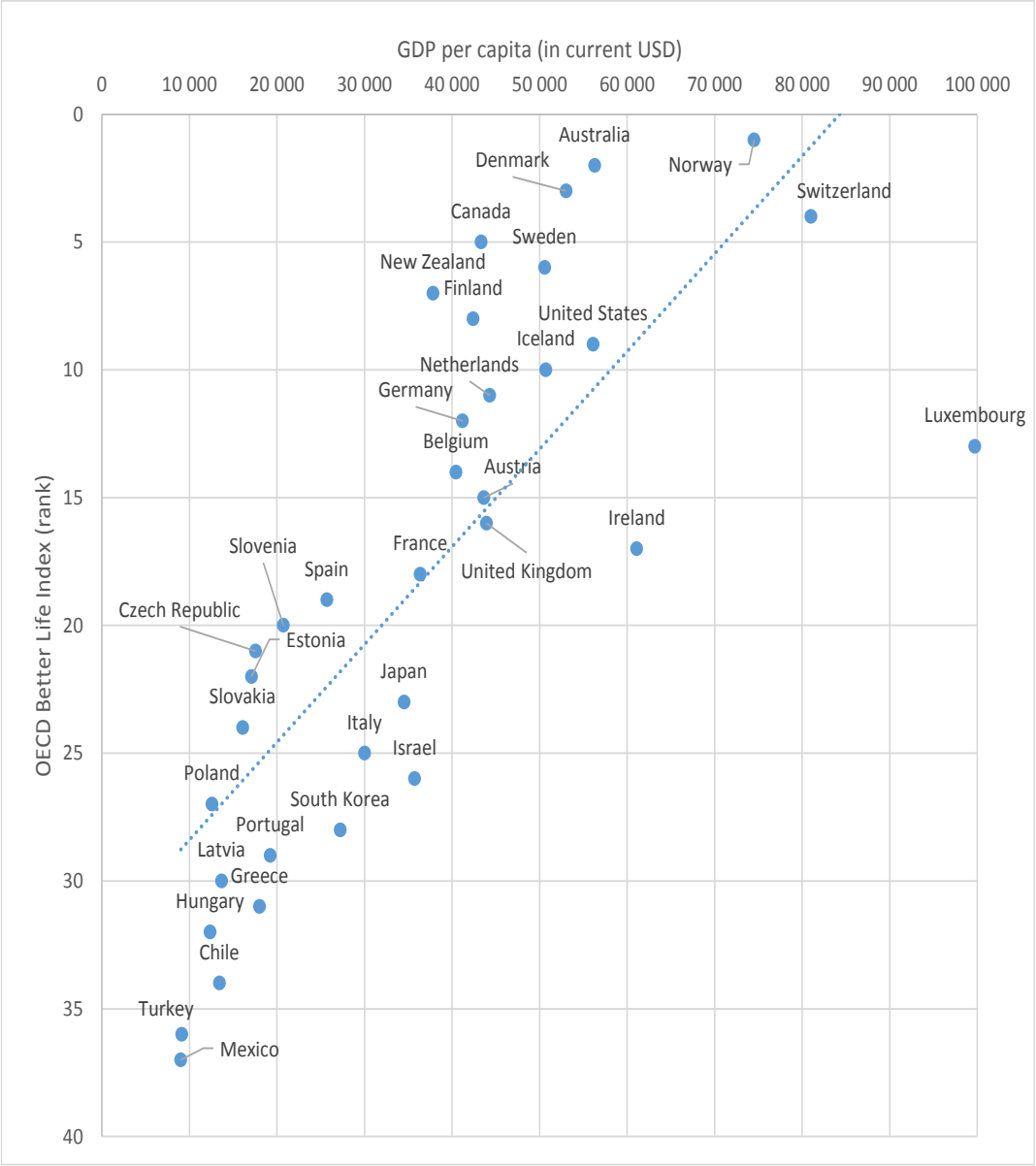
Figure 13. OECD countries' GDP per capita (in current USD) and OECD Better Life Index rank, as of 2015



Source: Own compilations, World Bank (2017) and OECD Better Life Index (2017)

As can be seen from Figure 13 above, the discrepancies between OECD states' GDP per capita and OECD Better Life Index are significant for OECD countries. Slovakia which is an outsider in terms of GDP per capita ranks in the middle in terms of the OECD Better Life Index. At the same time, Luxembourg which is the leader in terms of GDP per capita ranks only 13th in terms of the OECD Better Life Index.

Figure 14. Cross-country relation between GDP per capita (in current USD) and OECD Better Life Index rank, as of 2015



Source: Own compilations, World Bank (2017) and OECD Better Life Index (2017)

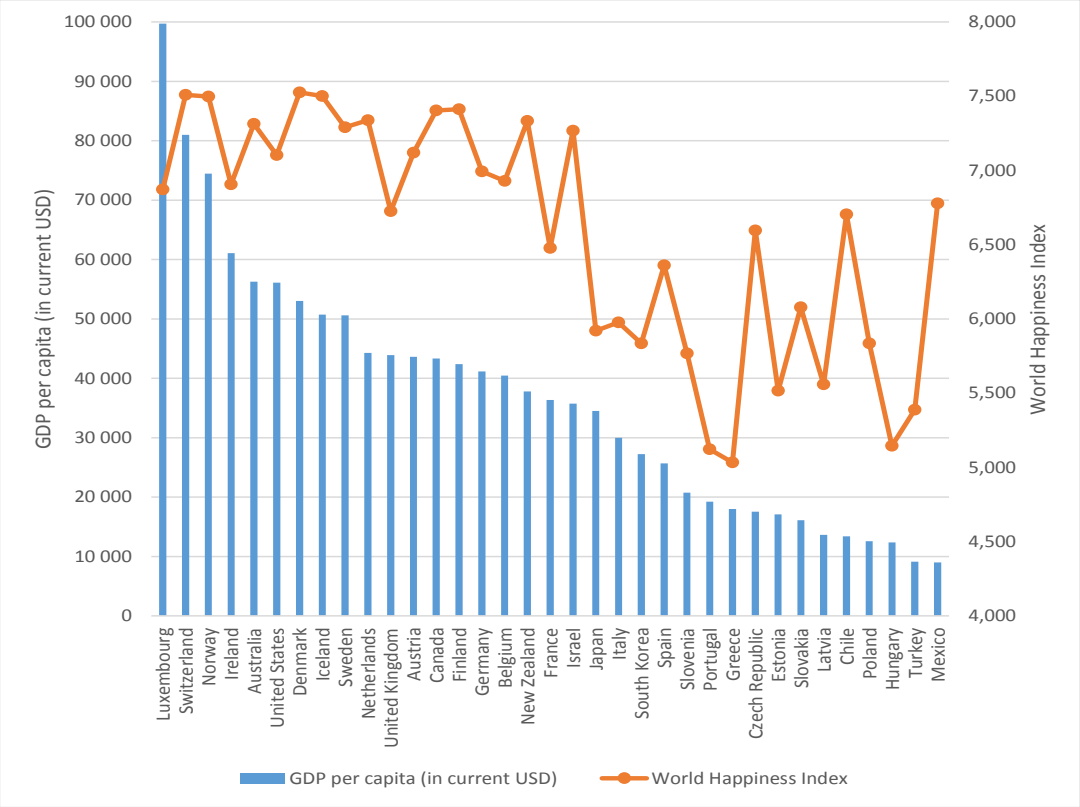
Figure 14 further confirms the findings described above: discrepancies are quite large, particularly for countries with higher GDP per capita values. This means that the correlation between GDP and the OECD Better Life Index is rather weak, and there is no direct interconnection between how countries perform in terms of the two ratios.

2.1.7 World Happiness Index

The World Happiness Index is used largely by the United Nations. This index is composite and includes GDP per capita, social support, healthy life expectancy, freedom to make life choices, generosity, trust, and residual effects. The index is calculated as the sum of the values of all factors it embraces. No weighing coefficients are used (World Happiness Index, 2017).

The main advantages of this index against GDP is the fact that it takes into account a number of social factors, while having GDP values at its core. However, similarly to GDP, the World Happiness Index fails to take into account structural differences in economic and technological development, protection of human rights, trade in good and bad products and services, effects of the black market and shadow economy, and so on.

Figure 15. OECD countries' GDP per capita (in current USD) and World Happiness Index scores, as of 2015

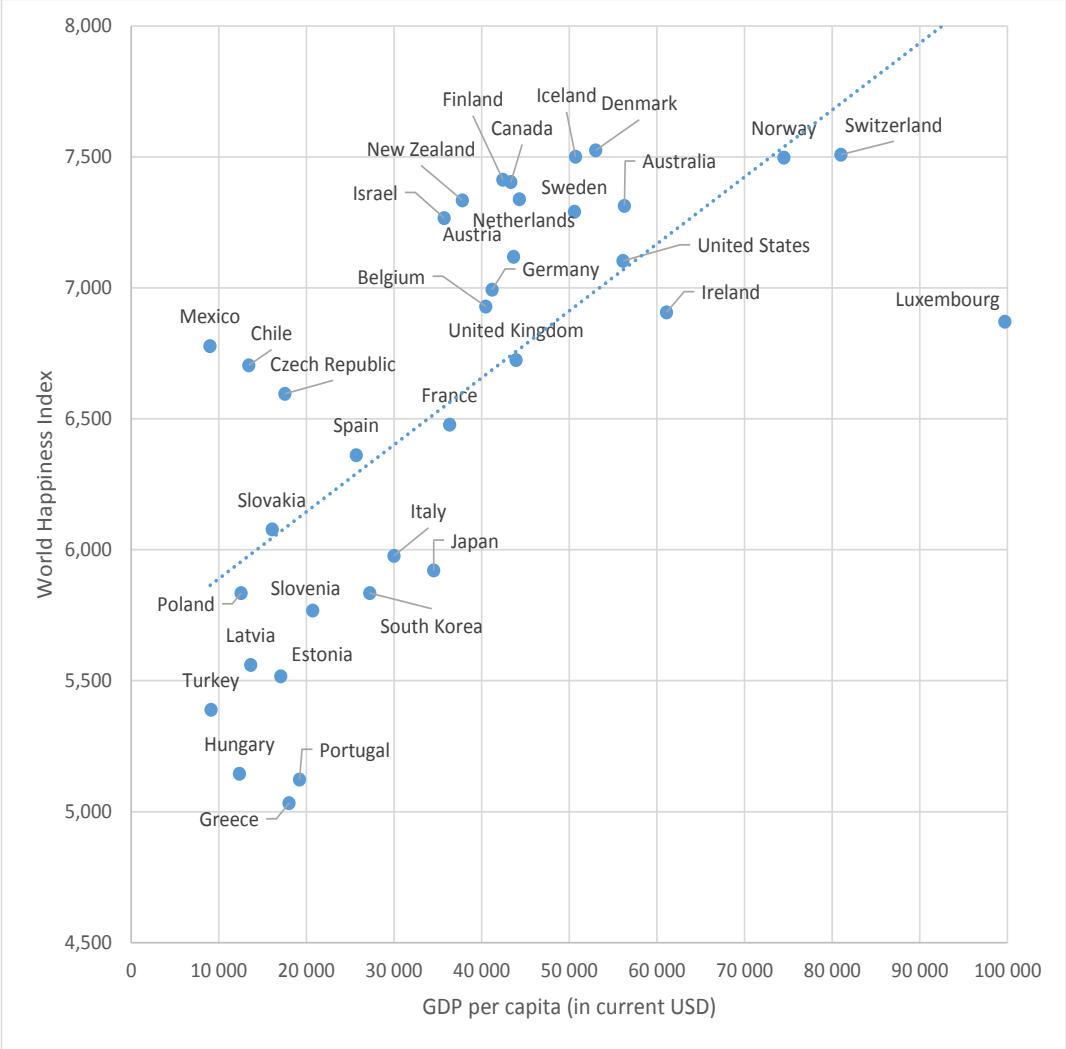


Source: Own compilations, World Bank (2017) and World Happiness Index (2017)

As can be seen from Figure 15 above, there are very high discrepancies between OECD states' GDP figures and their World Happiness Index results. Thus, Luxembourg,

the leader in GDP per capita, is only ranked 18th in the World Happiness Index ranking, while Mexico, the outsider in terms of GDP, is ranked right below Luxembourg in the World Happiness Index ranking.

Figure 16. Cross-country relation between GDP per capita (in current USD) and World Happiness Index scores, as of 2015



Source: Own compilations, World Bank (2017) and World Happiness Index (2017)

Figure 16 further confirms the findings described above. This means that the World Happiness Index differs significantly from GDP in terms of its methodological basis, which leads to differences in the practical results of computations obtained. There is no significant correlation between GDP and the World Happiness Index. This can be seen clearly on the examples of Luxembourg and Mexico which are located in the middle of the

World Happiness Index score, while being on the different extremes of GDP per capita values.

2.1.8 Other Alternative Indicators

In addition to the macroeconomic measures alternative to GDP outlined above, it is also worth noting several other important alternative measures which can be used to complement GDP in international statistics.

The Fordham Index of Social Health (FISH) developed by the Institute for Innovation in Social Policy embraces 16 indicators related to the social health of nations, namely infant mortality, child abuse, child poverty, teenage suicide, teenage drug abuse, high school dropouts, unemployment, average weekly wages, health insurance coverage, poverty among people aged 65+, out-of-pocket health costs of people aged 65+, homicides, alcohol-related traffic fatalities, food stamp coverage, access to affordable housing, and income inequality. For each individual indicator, a score is calculated, and the aggregate score is evaluated as the mean of the 16 sub-indicators' values. No weighing is applied (Fordham Institute for Innovation in Social Policy, 2003). This index is beneficial, as it evaluates a number of important social indicators not covered by GDP. However, it is also vulnerable to many shortcomings of GDP, including the lack of coverage of sustainability indicators, human freedoms, and so on. Also, some indicators such as homicides or alcohol-related traffic accidents seem to be rather very weak for describing effectively the social situation in a state.

The Genuine Progress Indicator (GPI) is largely based on GDP. The formula for calculating GPI is the following: $GPI = A + B - D - F + I$, where A stands for income-weighted private consumption, B amounts to the value of non-market services generating welfare, C stands for private defensive cost of natural deterioration, D is the cost of deterioration of nature and natural resources, and I is the increase in capital stock and balance of international trade. Thus, in contrast to GDP, GPI takes into account factors associated with the negative effects of economic growth, namely depletion of natural resources, deterioration in the condition of the natural environment, and so on. However, beyond this, the issues of GPI are largely the same as the ones of GDP: GPI does not pay any attention to human rights, it fails to distinguish bad and good products, it does not

address differences in income distribution and unequal technological structure of production, etc. (Lawn and Clarke, 2006).

The Gross Sustainable Development Product (GSDP) is based on GDP, but covers a wide range of environmental factors, including the impact of economic development on environment and the costs associated with environment protection. GSDP is calculated as the total amount of economic output in a state within a particular time period evaluated at market prices less expenses associated with the elimination of the negative impact on the environment and healthcare associated with environmental deterioration. This index fails to take into account effectively a wide range of social factors, human rights and freedoms, income inequalities, and so on, and is thus similar to GDP in terms of drawbacks, except for taking into consideration environmental damage (McGregor Consulting Group, n.d.)

The Gross Environmental Sustainable Development Index (GESDI) is another variation of indices based on GDP. It covers as much as over 200 indicators grouped into 4 sets of data: people, available resources, environment, and economic development. In contrast to GSDP, this indicator takes into account a wide range of social factors. However, it is quite sophisticated and hard to calculate, due to which its use in international statistics is rather limited. Moreover, it fails to recognize the existence of bad and good products, does not distinguish the impact of the shadow economy and the black market, fails to evaluate the technological structure of production, and so on (McGregor Consulting Group, n.d.)

The Living Planet Index focuses on the investigation of the preservation of the environment, different animal species, and so on, which is seen as a key precondition for the effective development of the economy (Living Planet Index, 2017). The Living Planet Index differs from the Happy Planet Index due to the fact that it addresses the existence of animal species in the environment, and not the anthropogenic impact on the environment. The Living Planet Index also fails to take into account any economic or social factors.

Taking into consideration the findings presented above, in the next chapter of the thesis, the current use of alternative measures in different states will be investigated.

2.2 Current Use of Alternative Measures in Different States

If we consider UNHDI, SPI, EPI, HPI, LPI, the OECD better life index, all those measures are used by international organizations and/or nongovernmental organizations, and are used widely by states' public authorities for the sake of control and monitoring. The findings for those indices are collected by the aforementioned organizations, and therefore they are not used in the official statistics of states. However, other alternative indicators are used in different countries.

For instance, the FISH index has been used in the United States, and serves to evaluate the differences in the condition of social health of different states. The index is used not as a measure to replace GDP, but as a complement revealing social indicators which might be associated with economic growth (Fordham Institute for Innovation in Social Policy, 2003). However, the latest version of the index available on the web is dated 2008. The website has not been updated, even though the method is still listed as a unique methodology developed by the Fordham Institute.

GPI has been officially adopted as the main statistical measure in two US states, namely Maryland and Vermont. In terms of GPI, the two states are performing better compared to GDP dynamics, and this illustrates that they are able to achieve success beyond mere economic output, which is definitely positive. Also, Oregon and Washington are currently considering the opportunity to start using GPI instead of GDP in their statistics. It could potentially be used in the future by Colorado, Hawaii, Massachusetts, Michigan, Ohio, Oregon, and Utah (Daly and McElwee, 2014). GPI has also long been used in the official statistics of Finland, and still remains one of the major macroeconomic indicators for the Finnish government (Kainuu 2011).

The Gross Happiness Index (GHI) is used in the Kingdom of Bhutan as a composite macroeconomic indicator for measuring economic growth and social welfare. This indicator has long been the most important index in Bhutan's statistics. In Bhutan, the main problem associated with the index is that it is rather biased, and tends to evaluate happiness for the sake of improving national statistics. The index has not gained any spreading beyond Bhutan (The Conversation, 2014). Also, the case of Australia using its own system of macroeconomic indicators to complement GDP has already been emphasized earlier in this thesis. In Australia, the government has long been using its own MAP indicator for measuring economic growth, and, as highlighted before in this thesis, it

is the key measure of Australia's growth in the country's statistics (The Conversation, 2014).

Therefore, it can be stated that the use of measures alternative to GDP tends to become more and more popular as of today in the official statistics of state, which can be explained by GDP's inherent drawbacks and shortcomings.

In the next chapter of the thesis, the use of GDP and alternative measures will be explained in the context of the modern world of digital technologies.

2.3 Use of GDP and Alternative Measures in the Modern World of Digital Technologies

When evaluating the benefits and shortcomings of the use of GDP or alternative measures in macroeconomic statistics, it should be borne in mind that the modern stage of economic development is characterized by a rapid surge in the development and use of up-to-date computerized and digital technologies, and also is dominated by online and wireless technologies. This needs to be taken into account by states when adopting either measure for calculating their economic growth and social welfare.

Thus, as stated by Cohen (2017), GDP looks at the prices, while prices can often be negligible in the modern economy, or at least do not provide the full range of the required data. For example, when downloading a free software update which protects the computer from viruses, we pay no funds, but gain major advantages instead. Similarly, thanks to streaming services, it is possible to watch TV online without any payment fees. Instead of spending time and funds for visiting a library, research work can be done more effectively using online databases, and so on.

In this context, it should also be borne in mind that people' activities only tend to keep further migrating online: start-ups become the most effective businesses, people work remotely more effectively, communication is held via online social networks, and so on.

The nature of economic and social relations is steadily changing under the impact of the growing penetration of up-to-date online and other technologies. Therefore, in order to keep up with that pace at least in terms of effective measurements, new statistical

indicators are yet to be developed, which could allow providing an effective linkage between economic growth, social welfare and online technologies.

2.4 Discussion: Advantages and Shortcomings of Alternatives

The findings obtained in the course of this research prove that as of today, GDP is very limited as an indicator of economic growth in international statistics, and it has a considerable number of substantial flaws and drawbacks which reduce the effectiveness of this indicator's use in international statistics. There are a wide range of alternative indicators which can be used to complement GDP in international macroeconomic statistics, however none of them has yet been able to acquire such a widespread usage as GDP, and it is worth analyzing what advantages and shortcomings of those indices might affect their opportunities for the subsequent use as GDP alternatives.

As for UNHDI, it can be stated that this index is rather illustrative for general purposes of scientific or statistical research. However, it fails to eliminate most shortcomings of GDP. It has substantial flaws, and rather seems outdate as of today. This is due to the fact that UNHDI does not anyhow address issue related to sustainable economic growth, which is one of the major global trends as of today, particularly in developed states. Despotis (2005) points out that one of UNHDI's considerable shortcomings is that it does not assign any weight to either of its three components. Despotis argues that this distorts the perception of the results, as the economic component should be assigned greater weight against education and healthcare (the two latter factors are largely dependent on the economic component). Kamdar and Basak (2005) also argue that UNHDI does not anyhow address the issues associated with human rights and inequalities, which is its major drawback.

Social progress index has another major flaw: it does not take into account any economic indicators at all. However, its extensive focus on a wide range of social indicators makes it possible to use SPI together with GDP, as an index devoted solely to social welfare. This might allow complementing GDP with social data, thus addressing at least a part of GDP's inherent issues and problems. Chakraborty (2002) praises SPI for covering an extensive range of social indicators, but claims that its inability to anyhow

assess economic output and differences in income make this index weak in terms of the overall assessment of people's welfare.

The problem of EPI is similar to SPI, the only difference being the fact that EPI focuses on environmental indicators. Based on the findings of this thesis, it is doubtful that EPI could effectively illustrate social welfare alone. However, when combined with other indicators such as GDP and SPI, it could provide valuable information on nations' actual social welfare, namely focusing on the appropriate environmental issues. Zanella et al. (2013) point out the fact that EPI is an index which is rather limited to assess the condition of the environment and its fit for healthy human life, but cannot effectively evaluate welfare for not taking into account economic factors.

As for HPI, despite the fact that this index takes into account a wide range of social and economic factors not covered by GDP, some of its sub-ratios can be either hard for computations or leaving great room for biased evaluations. As a result, the use of HPI in international statistics as of today seems rather doubtful. Pink et al. (2013) point out that the Happy Planet Index is rather limited by focusing on the environmental side of sustainable development, but this measure can be used effectively as complementary together with economic measures.

As regards LPI, it can be stated that this alternative measure is the most sophisticated one among all analyzed within the framework of this thesis. It covers a very broad range of issues, and provides a detailed overview of the most important factors. Probably, LPI could become a major competitor to GDP in the future, particularly if it is able to become more flexible in the construction of the effects associated with up-to-date digital and online technologies. Helliwell and Barrington-Leigh (2010) praise LPI for its ability to cover the widest range of factors and call it an effective alternative to GDP.

The OECD Better Life Index is very similar to LPI, but it covers a much narrower range of indicators. For instance, while the OECD Better Life Index describes the quality of healthcare only by measuring life expectancy, LPI also measures health problems, access to improved sanitation facilities, mortality rates, and a range of other indicators. Also, while the OECD Better Life Index measures the environmental impact of economic production only by air and water pollution, LPI also includes pesticide regulation, wastewater treatment, and so on. Therefore, LPI seems to be more efficient to act as a complement to GDP. Pink et al. (2013) also note that the OECD Better Life Index focuses

chiefly on individual wellbeing and satisfaction with life, and therefore is rather inefficient in investigating social welfare.

Finally, the World Happiness Index is limited in its evaluation of social welfare, and may be often biased too when assessing the actual sufficiency of life standards in a state. This drawback is emphasized in particular by Knight (2012).

Therefore, taking into account the inherent advantages and drawbacks of measures alternative to GDP which have been investigated earlier in this thesis, it can be stated that as of today, none of them can totally replace GDP. However, when combined with GDP, those measures could form a much more effective approach to the investigation of macroeconomic indicators in international statistics.

Conclusion

As of today, GDP is the most widely used indicators in international statistics for measuring the economic output of states. GDP is applied widely in descriptive statistics, and serves for the goals of comparison of countries by their economic output. GDP is often believed to be the most widely used indicator of economic welfare of nations.

However, GDP as a macroeconomic measure in international statistics has a great number of inherent flaws and shortcomings. Thus, when dealing with the economic component of GDP, it should be borne in mind that GDP fails to take into account the economic output of the black market and shadow economy, it does not take into consideration expenses to be incurred in future periods, fails to evaluate the effects of resource depletion, does not pay any attention to sustainable growth indicators and environment protection, fails to take into account the structural differences in economic and technological development, does not consider the maintenance of human rights, fails to distinguish 'good' and 'bad' products, and so on. At the same time, on the social side, GDP fails to take into consideration a great number of important social indicators, including even basic ratios related to education and healthcare.

Furthermore, in the current conditions, when digital technologies play an ever-growing role in economic growth, GDP becomes more and more outdated, as it fails to take into account any effects associated with the growing virtualization of economic and social processes.

Therefore, there is a need to search for alternative macroeconomic measures which could effectively complement GDP in international statistics.

Within this thesis, major measures alternative to GDP have been investigated such as the United Nations Human Development Index, the Social Progress Index, the Environmental Performance Index, the Happy Planet Index, the Legatum Prosperity Index, the OECD Better Life Index, the World Happiness Index, and also some other measures which tend to gain greater popularity on the international scale.

As this thesis has revealed, each of the alternative measures has its advantages and drawbacks compared to GDP. For instance, UNHDI is criticized by ecnomist Despotis (2005): it covers important social issues, but still does not address most problems pertaining to the use of GDP; SPI criticized by Chakraborty (2002) totally rejects the

evaluation of any economic factors; EPI criticized by Zanella et al. (2013) focuses solely on environmental issues, without addressing economic and social ones; HPI criticized by Pink et al. (2013) covers a broad range of important social indicators, but might often provide biased data; LPI criticized by Helliwell and Barrington-Leigh (2010) embraces a very wide range of relevant indicators, but might often be hard for computations; the OECD Better Life Index criticized by Pink et al. (2013) is similar to LPI but narrower in terms of the indicators used; and the World Happiness Index criticized by Knight (2013) is limited in the interpretation of economic growth.

Also, there are alternative measures used by individual states such as Bhutan's GNH or Australia's MAP. However, they have not yet found any international spreading.

As the findings of this thesis suggest, none of the alternative measure described above can effectively replace GDP as of today. However, those measures can be used effectively together with GDP, and might complement it effectively, providing more extensive data on economic and social welfare, as well as on issues pertaining to sustainable development.

In the future, the search for better macroeconomic measures should be expected to continue. A major issues in all measures currently available in international statistics is their relative rigidity and the lack of ability to take into consideration effectively the effects associated with the development of digital and online technologies, which should become the focus of research in the years to come.

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Annexes

Annex 1. OECD Member States' GDP and Alternative Measures Data, as of 2015

	GDP per capita (in current USD)	United Nations Human Development Index (UNHDI)	Social Progress Index (SPI)	Environmental Performance Index (EPI)	Happy Planet Index (HPI)	LPI (rank)	OECD Better Life Index (rank)	World Happiness Index
Luxembourg	99,718	0.898	0.00	86.58	13.2	13	13	6.871
Switzerland	80,999	0.939	87.97	86.93	34.3	2	4	7.509
Norway	74,482	0.949	88.36	86.90	36.8	1	1	7.498
Ireland	61,094	0.923	84.66	86.60	30.0	10	17	6.907
Australia	56,291	0.939	86.42	87.22	21.2	7	2	7.313
United States	56,116	0.920	82.85	87.38	20.7	15	9	7.104
Denmark	53,015	0.925	86.63	89.21	32.7	3	3	7.526
Iceland	50,722	0.921	87.62	90.51	31.1	12	10	7.501
Sweden	50,585	0.913	88.06	90.43	28.0	5	6	7.291
Netherlands	44,291	0.924	86.50	82.03	35.3	8	11	7.339
United Kingdom	43,930	0.909	84.68	84.72	31.9	11	16	6.725
Austria	43,637	0.893	84.25	86.64	30.5	16	15	7.119
Canada	43,316	0.920	86.89	85.06	23.9	6	5	7.404
Finland	42,403	0.895	86.75	90.68	31.3	9	8	7.413
Germany	41,178	0.926	84.04	84.26	29.8	14	12	6.994
Belgium	40,454	0.896	82.83	80.15	23.7	18	14	6.929
New Zealand	37,808	0.915	87.08	88.00	31.3	4	7	7.334
France	36,352	0.897	80.82	88.20	30.4	22	18	6.478
Israel	35,729	0.899	72.60	78.14	28.8	38	26	7.267
Japan	34,524	0.903	83.15	80.59	28.3	19	23	5.921
Italy	29,993	0.887	77.38	84.48	28.1	37	25	5.977
South Korea	27,222	0.901	77.70	70.61	24.8	28	28	5.835
Spain	25,685	0.884	81.17	88.91	36.0	24	19	6.361
Slovenia	20,729	0.890	81.62	88.98	24.6	25	20	5.768
Portugal	19,223	0.843	81.91	88.63	24.8	27	29	5.123
Greece	18,007	0.866	74.03	85.81	23.6	49	31	5.033
Czech Republic	17,557	0.878	80.59	84.67	27.3	26	21	6.596
Estonia	17,085	0.865	80.49	88.59	17.9	31	22	5.517
Slovakia	16,089	0.845	78.45	85.42	28.2	35	24	6.078
Latvia	13,655	0.830	74.12	85.71	17.1	40	30	5.560
Chile	13,416	0.847	78.89	77.67	31.7	33	34	6.705
Poland	12,559	0.855	77.98	81.26	27.5	29	27	5.835
Hungary	12,366	0.836	74.80	84.60	26.4	45	32	5.145
Turkey	9,126	0.767	66.24	67.68	26.4	78	36	5.389
Mexico	9,005	0.762	67.50	73.59	40.7	67	37	6.778

Source: Own compilations, World Bank (2017); World Happiness Index, 2017; OECD Better Life Index, 2017; Legatum Prosperity Index, 2017; Happy Planet Index, 2017; Yale University, 2017; Social Progress Index, 2016