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The Rich, The Poor and The Satisfied

An Econometric Approach to assess Determinants of Individual Well-Being and Robustness of GDP as a measure of Aggregate Welfare

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Abstract

Following the extensive literature showing that GDP lacks in incorporating several aspects of human life that influence individual well-being and thus the aggregate country welfare, this research contributes specifically to enrich the studies based on a subjective approach. The analysis starts by presenting a latent regression model in which individuals are assumed to derive their well-being, represented by life satisfaction, from a set of personal and country variables. By means of the integrated WVS-EVS, a multi-temporal and worldwide dataset with more than 300,000 observations of subjective measure of well-being, this research sheds light on the relations between determinants of well-being and life satisfaction. These relations are estimated through an ordered probit model. There are two main findings of the research: first, consumption, wealth, health, environment, inequality, leisure time, country growth, education and unemployment contribute to shape the welfare differently according to macroareas; second, when predicted values of the ordered probit are compared with GDP, it is proven that GDP is not a robust measure to rank countries according to individuals' subjective well-being. This research ends with proposing an innovative method to rank countries according to the probability of their citizens being satisfied with their life.

Table of Contents

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Acronyms

AP	Asia and Pacific
CMEPSP	Commission for Measurement of Economic Performance and Social Progress
ECA	Eastern Europe and Central Asia
EU	Europe
EVS	European Value Survey
GDI	Gross Domestic Income
GDP	Gross Domestic Product
GNI	Gross National Income
GNP	Gross National Product
GPI	Genuine Progress Indicator
HDI	Human Development Index
ISEW	Indicator of Sustainability of Economic Welfare
LS	Life Satisfaction
LAC	Latin America and Caribbean
MEA	Middle East and Africa
MEW	Measure of Economic Welfare
MPI	Multidimensional Poverty Index
NAAN	North America, Australia and New Zealand
NDP	Net Domestic Product
NNDI	Net National Disposable Income
NNI	Net National Income
NPISH	Non-profit institutions serving households
OECD	Organization for Economic Co-operation and Development
SEEA	System of Environment Economic Accounting
SMEW	Sustainable Measure of Economic Welfare

SNA	System of National Accounts
UN	United Nations
UNDP	United Nations Development Programme
WVS	World Value Survey
WWF	World Wildlife Fund

List of figures

Introduction

For many years, using a monetary measure as the Gross Domestic Product (henceforth, GDP) per capita as a proxy for individuals' well-being found in a large consensus, in particular among developed countries GDP per capita in fact provided an accurate measure of a country's capacity to deal with the material needs of its residents.

However, parallel to its spread use as a proxy of country's living standard, GDP has received various criticisms. The creator himself, Simon Kuznets, from the very beginning, casted doubt on using GDP to assess overall national well-being: *"…the welfare of a nation can, therefore, scarcely be inferred from a measure of national income…"* (Kuznets, 1934). He also argued that this metric failed to distinguish *"between quantity and quality of growth, between costs and returns, and between the short and long run. Goals from more growth should specify more growth of what and for what."* (Kuznets, 1934). More recently, some scholars have debated, for instance, on the fact that once a certain level of material need has been met, further increments in GDP will not result on an equal improvement in citizens' well-being. At the same time, other researches have highlighted how economic growth neglects many important aspects of human life, for instance health, quality of institutions, amount of leisure time and environmental depletion, which are not included at all in GDP.

Several studies have been published over the last three decades on alternative measures of well-being, ranging from national accounts to corrected GDP measures, from dashboard of indicators to composite indexes. Unfortunately, none of these very diverse alternatives has proven to be compelling enough to provide a convincing "next best" and bypass the all-present GDP. In general alternative measures lack either comprehensiveness, i.e. they are unable to include all potentially relevant elements, or comprehensibility, i.e. they are simply not as easily understandable as GDP. Despite their very diverse nature, a common failure of GDP and its alternative measures is the lack of a simple feature: the consideration of true individuals' opinions on well-being.

One of the first economists to trust and to use individuals' opinions as a basis for economic research was Richard A. Easterlin. In his 1974 article, Easterlin studied in depth the relation between happiness of a country and its GDP. He concluded that, contrary to expectation,

happiness at a national level does not increase with wealth once basic needs are fulfilled. Easterlin contribution has commenced the flow of literature of subjective well-being, and above all, it has paved the way for people's opinions to be considered a useful and reliable source of analysis.

More recently, President Sarkozy has sponsored a Commission, the so-called Commission of Measurement of Economic Performance and Social Progress, with the aim to tackle the gap between people's perceptions of their own day-to-day economic well-being and what politicians and statisticians were telling them about the economy. According to this Commission, which could count on the participation of economists of the caliber of Stiglitz, Sen and Fitoussi, measures of subjective well-being represent a very promising approach for explaining well-being of people.

The present thesis aims at contributing to the subjective approach of measuring well-being. The underlying idea of this methodology is that relying on people's own judgments is a convenient shortcut, but also a logic and realistic method to provide a natural aggregation of various experiences in a way that reflects people's own preferences. One of the most attractive features of research on subjective well-being is the promise to deliver not just a good measure of the level of well-being, but also a better understanding of its determinants, as affected by a variety of objective characteristics (such as income, education) as well as by individuals' personal features (such as health status, environmental awareness).

Hence, the scope of the work is double: to study the single determinants of individual's life satisfaction and understand how much they might affect the aggregate welfare as well as to create an index derived from subjective measures of well-being which ranks countries according to their welfare and compare this measure to GDP.

In order to achieve this purpose a utility model that embraces both subjective and objective aspects of human life is developed. This model uses life satisfaction variable as a proxy for welfare and its ordinal comparability feature allows for applying an ordered probability model, i.e. ordered probit, to run regressions. The hypotheses tested refer to the relations between life satisfaction and determinants of well-being; specifically, positive relation between the dependent variable and consumption, education, health, leisure time, environment and country growth, and negative relation with inequality and unemployment. These relations are investigated by means

of multi-temporal and worldwide dataset, and analyzed not at world level but at macroarea level, where a macroarea is a set of countries which share similar conditions. Indeed another hypothesis is that the determinants of life satisfaction influence the well-being differently, depending on the macroarea considered. Finally, the last hypothesis is to investigate through a comparison between GDP and the index obtained from this research as to whether or not the classic metric may be a good proxy for welfare.

The thesis is structured as follows. Chapter 1 covers GDP and its limits, the criticisms moved to GDP as a measure of welfare and extensively reviews the main alternative measures. Chapter 2 presents the theoretical model, the research questions and the methodology applied. Chapter 3 is dedicated to the presentation of data. Chapter 4 presents the econometric model and covers the key findings obtained from the analysis. Chapter 5 concludes and presents the limitations of the study.

Chapter 1: Existing approaches to measure socio-economic welfare

The purpose of this Chapter is to provide an overview of the main tools that have been proposed until now to measure socio-economic welfare.

The point of departure is GDP being the first and core indicator in judging the position of the economy of a country over time or relative to that of other countries. Section 1 illustrates first the history of GDP from when it was presented in a US Congress in 1934 by its creator, Simon Kuznets. Second, it presents the main historic critics moved by some of the most respected economists of the 20th century: Kuznets itself, Nordhaus and Tobin, and Easterlin. Third, the Section revisits GDP definition and describes more in-depth the main limits of its calculation. The Chapter continues examining the various approaches to the measurement of welfare that have been considered among scholars for the construction of alternatives to GDP. In particular, Section 2 explores alternative approaches, starting from the closest to standard official statistics, and moving progressively toward the most remote approaches. Specifically, Section 2 illustrates, first, indexes proposed by System of National Accounts (SNA) that are used as complements or alternatives to GDP for assessing economic welfare. Second, it discusses dashboards assembling various sets of elementary statistics or indicators that allow for a more comprehensive measurement of welfare, used to extend pure economic measures as GDP or SNA indicators also to social aspects. Third, the Section examines two ways of building the so-called synthetic indexes. One approach consists in producing indexes of "corrected" GDP through a release of elements that do not contribute to welfare and an addition of monetary evaluations of items such as health, life expectancy and leisure, which enhance the socio-economic welfare. The other approach consists instead in building composite indexes that combine sub-indexes in a more or less arbitrary fashion. Finally, the Section presents an approach of measuring welfare based on subjective measure of well-being. This literature focuses on interpreting the immediate information conveyed by measures that rely on people's judgment of their welfare. To conclude, the third and last Section summarizes the main findings from the literature review, highlighting in particular those which have not been deeply explored yet. In particular, the lack of studies on subjective measures of well-being provides legitimation to this research project.

1.1 GDP and its limits

1.1.1 The history of GDP and historic critics

The measure was developed by Nobel Prize-winning U.S. economist Simon Kuznets in the 1930s as Presidents Herbert Hoover and Franklin D. Roosevelt sought to design policies to combat the Great Depression. Until then, policymakers had relied on less exhaustive data such as stock indices, freight car loading, and industrial production indices to gauge overall national economic health. But the growing role of government in the economy prompted increased demand for a comprehensive set of data to account for national economic activity.

Since its creation, GDP has been credited by economists with improving the ability of policymakers, economists, and businesses to analyze the impact of various tax and spending policies and the impact of monetary policy on the economy. Use of GDP spread globally after the Bretton Woods Conference in 1944, which led to the creation of the World Bank and International Monetary Fund. Those institutions adopted GDP methodologies from the United States and Great Britain to guide policymaking on international monetary exchanges and determine which global development projects merited funding. Today, GDP is also used to compare economic progress between countries. Although it is not a direct indicator of a country's living standard, it is often used as such, since in theory a country's increased economic production is often assumed to benefit its citizens.

However, this story represents only the lighted side of the medal. There is another history about GDP that sometimes is neglected. The first time GDP was presented by its creator, Simon Kuznets, in front of the US Congress affirmed not to use GDP as a measure for welfare: *"…the welfare of a nation can, therefore, scarcely be inferred from a measure of national income…"* (Kuznets, 1934). Kuznets had already understood that a measure focused on income could not have captured human welfare and progress.

Years later, at the beginning of the Seventies, national accountants have nothing but repeated the warning about how this measure was a flawed indicator of economic welfare because factors that affect living standards are incorporated imperfectly. The two main historic critics on a GDP

approach as measure of well-being were contained in the seminal works of Nordhaus and Tobin in 1973 and Easterlin in 1974.

Nordhaus and Tobin (1973) started their paper "Is Growth Obsolete?" saying, *"Disillusioned critics indict both economic science and economic policy for blind obeisance to aggregate material 'progress', and for neglect of its costly side effects. Growth, it is charged, distorts national priorities, worsens the distribution of income, and irreparably damages the environment. Paul Erlich speaks for a multitude when he says, 'We must acquire a life style which has as its goal maximum freedom and happiness for the individual, not a maximum Gross National Product'"*. After statements as the above, they directed their attention to an important question, *"How good are measures of output currently used for evaluating the growth of economic welfare?"* The answer of this question was that Gross National Product (GNP) could not measure economic welfare for one main reason: "*An obvious shortcoming of GNP"*, they wrote, *"is that it is an index of production, not consumption"*. Believing therefore that the goal of economic activity, after all, was consumption, they constructed their "Measure of Economic Welfare", in which they attempted to allow for the discrepancies between GNP and economic welfare.

The other important economist that criticized GDP measure showing the discrepancy between continuous economic growth and stable subjective life satisfaction was Richard Easterlin. In his 1974 paper "Does Economic Growth Improve the Human Lot? Some Empirical Evidence" and in the 1995 update "Will Raising the Incomes of All Increase the Happiness of All?",[1] he showed that in the long run and at macro level, happiness and subjective well-being were not correlated with income or GDP. Indeed, examining the relationship between happiness and GDP both across countries and within individual countries through time, he found little significant evidence of a link between the level of economic development of a society and the overall happiness of its members. This finding is called "Easterlin paradox" and can be summarized resuming exactly what Easterlin wrote in his paper (1974, p. 4): *"In all societies, more money for the individual typically means more individual happiness. However, raising the incomes of all does not increase the happiness of all. The happiness-income relation provides a classic example of the logical fallacy of composition - what is true for the individual is not true for society as a whole.*

[1] Easterlin (1974); Easterlin (1995).

The resolution of this paradox lies in the relative nature of welfare judgments. Individuals assess their material well-being, not in terms of the absolute amount of goods they have, but relative to a social norm of what goods they ought to have". These findings invited a reassessment of the relationships between economic development and individuals' well-being, highlighting two main issues: a) happiness at a national level, contrary to expectation, does not increase with wealth once basic needs are fulfilled; b) the relevance of "relative income" interpretation. Indeed, individual well-being does not depend on the absolute level of individual income but on the ratio of income to that of other people, and the evolution of social well-being is driven not only by the rate of economic growth but also by the evolution of inequalities in income distribution and other factors not correlated with income.

1.1.2 Definition

In the attempt to explain better and more "technically" shortcomings of GDP, this section revisits GDP definition and the following illustrates the limits in its computation that make this measure a flawed proxy for welfare.

GDP is, by definition, an aggregate measure of production; indeed, it represents the market value of all final goods and services produced within a geographical entity over a given period of time. It is:

- "Gross" because the depreciation of the value of capital used in the production of goods and services has not been deducted from the total value of GDP;

- "Domestic" because it relates only to activities within a domestic economy regardless of ownership (alternatively, "national" if based on nationality);

- "Product" refers to what is being produced, i.e. the goods and services, otherwise known as the output of the economy. This product/output is the end result of the economic activities within an economy; and, the GDP is the value of this output.

Value is product of prices and quantity. An economy can increase the value of its GDP either by increasing the price that will be paid (e.g. by raising quality and innovating) for its goods and services, or by increasing the amount of goods or services that it produces (Goossens, Mäkipää,

Schepelmann, van de Sand, Kuhndtand , & Herrndorf, 2007). These two variables mirror the relative values that individuals puts on the commodities only when markets are competitive and in absence of externalities. Consequently, in principle, using prices to weight products should correspond to weight them with their value for each individual in the society. Moreover, economic theory[2] suggests that, in presence of competitive markets where economic well-being depends only on consumption of marketed goods, changes in Net Domestic Product (NDP), i.e. the GDP adjusted for depreciation, are a good indicator of changes in economic well-being. This argument holds because an individual's or country's wealth can be viewed as the present discounted value of consumption, and thus NDP can represent an interest payment on this wealth. Hence, although under restrictive conditions, a direct link between NDP and economic well-being can be established.

In reality, prices may not exist for some goods and services and, even where they exist, they may deviate from customers' underlying valuation. In particular, when there are externalities, GDP as a pure market-based measure will not track well-being. This aspect will be resumed later and deepened in section "Beyond GDP".

1.1.3 Measurement discrepancies

Gross Domestic Product can also be described as the crossing point of three sides of the economy: demand, production and income.

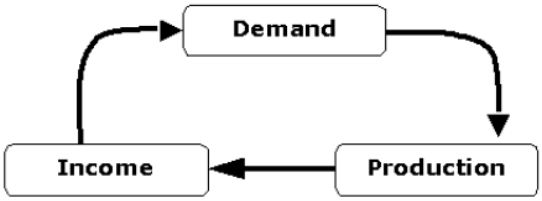


Figure 1 – Three approaches to measuring GDP

The three different crossing points in the economy also translate into three approaches to measuring GDP. Each should theoretically yield the same result, but as different data sources are used to estimate them they will in practice contain small differences, attributable to statistical measurement discrepancies.

[2] For example, Weitzman (1976).

Focusing particularly on the production approach, the notion of production considered by the System of National Accounts[3] (2008, p. 98) and taken into account for the calculation of GDP is very extensive. It includes (a) the production of all individual or collective goods or services that are supplied to units other than their producers, (b) the own-account production of all goods that are retained by producers for their own-final consumption or gross capital formation, (c) the own-account production of knowledge-capturing products that are retained by their producers for their own final consumption or gross capital formation but excluding (by convention) such products produced by households for their own use, (d) the own-account production of housing services by owner-occupiers, and (e) the production of domestic and personal services produced by employing paid domestic staff.

From a perspective of economic welfare, however, four main limits can be identified to this concept that will be detailed successively (CMEPSP, 2007):

A. Exclusion of many household activities which are productive in an economic sense;

B. Problems concerning the measurement of non-market output and its aggregation with market production;

C. The fact that GDP is an aggregate;

D. The fact that it is only a measure of flows.

A. Many household activities are excluded from GDP despite their contribution to economic welfare

The definition of production used by the SNA includes market activities as well as the goods and services provided for free or at subsidized prices by the government or NPISHs[4] and part of the household own-account production. Services activities that households undertake for themselves as cleaning, cooking, childcare, driving to work and so on, are not measured in the standard accounts, even if they are economically significant (System of National Accounts, 2008, p. 98).

[3] The System of National Accounts (SNA) was produced jointly by the OECD, the United Nations Statistical Division, the International Monetary Fund, the World Bank and the European Commission. The 2008 System of National Accounts is an update of the SNA 1993.
[4] NPISHs: Non-profit institutions serving households.

Past studies[5] have shown indeed that the consideration of the household services is likely to change the level, distribution and growth of expanded measures of household income, consumption and investment. Those can substitute goods and services purchased in the market and, even if they are not directly marketable, they can affect how individuals dispose of marketed income.

In order to have a clearer and quantified sense of how important home production is for individuals, it can be briefly illustrated how people use their time. Figure 2 provides a comparison of time spent per household and per day on various activities. Household production, i.e. unpaid work, appears sizeable in all countries and comparable in magnitude with paid work (Stiglitz, Sen, & Fitoussi, 2009a).

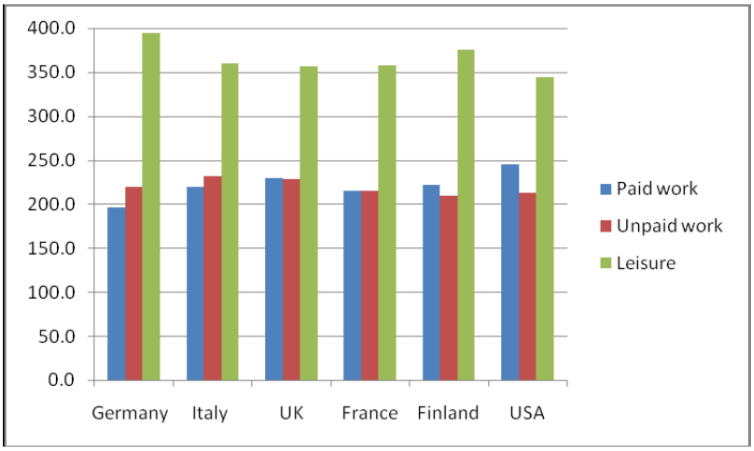


Figure 2 - Housework, paid work and leisure[6]

However, the reasons why many domestic and personal services are excluded from GDP, despite their consumption contributes to economic welfare, are summarized as follows by the SNA (2008, pp. 98-99):

- The own-account production of services within households is a self-contained activity with limited repercussions on the rest of the economy.

- As the vast majority of household domestic and personal services are not produced for the market, there are no suitable market prices that can be used to value such services. It is not

[5] For example, Landefeld and McCulla (2000), Landefeld , Fraumeni and Vojtech (2006), Ruger and Varjonen (2008).
[6] Source: OECD (2008).

only difficult to value the outputs of these services but also the associated incomes and expenditures which can be added to the values of real monetary transactions.

- Imputing values for the own-account production of services would yield values that would not be equivalent to monetary values. Indeed, if the incomes associated to own-account production were really available in cash, they would certainly modify household consumption.

B. The inclusion of non-market activities, i.e. imputations, in GDP are difficult to treat

There are productive activities and associated income flows, typically non-monetary, that take place outside the market sphere, and some of them have been incorporated into GDP. Imputations are individual and collective goods and services delivered in great measure by government, such as education, health and defensive expenditures. However, imputations not linked to government-provided services exist and an example is the consumption value for the services that home-owners derive from living in their own dwelling. There is no market transaction and no payment takes place, but the national accounts treat this situation as if home-owners paid a rent to themselves. Indeed, if two persons receive the same money income but one of them lives in his/her house while the other rents, most people would convey that they are not equally well-off. Hence, imputations help in better comparing income over time or across countries. This last concept can also apply to public services: their values, indeed, should not depend on the institutional arrangements in a country (invariance principle). For instance, if the same medical services are provided in one case by the public sector and in another by the private, overall measures of production should be unaffected by a switch between the two institutional settings (Stiglitz, Sen, & Fitoussi, 2009a).

Ascertained that imputations are important for the comprehensiveness and the invariance principle, their measurement is subject to criticisms. The first concerns the double counting of part of the production; the second concerns its valuation. Goods and services produced by government are included in final consumption and in GDP at a value equal to the sum of the related costs. A traditional criticism, going back at least to Nordhaus and Tobin (1973), is that part of government purchases should be regarded as intermediate rather than final consumption. Items like police or national defense should be treated as *"necessary overhead cost of a complex*

industrial nation-state" to avoid overestimating value added in national accounts. The second criticism about the calculation of non-market production concerns the valuation at current and at constant prices. National accounts have to face the difficulty that generally no market prices for this production exist. The general practice used by most statistical offices is simply to add up costs linked to their provision, implicitly assuming optimally allocated costs. However, as Atkinson and Stiglitz (1980) pointed out, this assumption breaks down *"...once we recognize that government spending is financed by distortionary taxes. This has led some people to conclude that public provision stops short and that therefore we should value the output at an amount greater than the value of the inputs. However, we cannot say categorically that the value should be greater"*. Furthermore, unlike market production where prices can be interpreted as reflecting both the marginal costs of production and the marginal utility for consumers, there is no reason to believe that valuation of non-market production by its cost also reflects a consumer perspective.

The absence of market prices comes along with the difficulties in measuring the volume of non-market production. National accountants have usually dealt with this problem in two ways: a) when a product with similar features is available on the market, using this price to measure the volume on the non-marketed product; b) when there is not any equivalent product in the market, using the so-called input method, i.e. summing up the price of each component (inputs) of the product, to compute the volume of production (CMEPSP, 2007). However, recently many European countries as well as Australia and New Zealand have developed output-based measures for government provided services. The output method consists in valuing the volume of the output by using relevant indicators of the outcome (e.g., the number of pupils for education services). Using this last approach, the risk to omit factors that drive the outcome but not affect the initial expenditure is minimized. For example, people's lifestyle will affect health outcomes, in the same way as the time the parents spend with their children will affect exam scores. Curley, Deaton and Lleras-Muney (2006) have examined causes for changes in mortality rates over time and they have identified a host of factors other than medical care that may have had as big an impact on mortality as heath care per se. Attributing changes in the health or education status only to hospitals and schools, and to the money spent on them, neglects all these factors (Stiglitz, Sen, & Fitoussi, 2009a).

Although these differences, in terms of concepts as well as of their results, between the abovementioned approaches are well-known, countries continue to evaluate their non-market production not using the same method. This therefore has led to a significant bias in comparing outcomes across countries. In his review on the measurement of government output, Atkinson (2005) noted that, between 1995 and 2003, *"the difference, for the United Kingdom, between the input method (used by the United States) and the output method used by the United Kingdom [accounted] for nearly half the difference between the two countries' published growth rates"* (2.75% per year for the UK; 3.25% per year for the US) (CMEPSP, 2007).

C. GDP is an aggregate measure that does not address the issue of distribution between individuals

The distribution of resources between individuals is a crucial determinant of welfare. Despite the fact that measures of disposable household income, for instance, are routinely compiled by a large of majority of OECD countries, and the System of National Accounts also foreseen measurement of adjusted household disposable income, there are gaps in its availability. Unfortunately, the most continue to publish only aggregate economic data. These aggregates are then simply divided by the number of individuals or households in an economy (e.g. GDP per capita), hence not taking into consideration distributional issues.

A way to better capture distribution aspects, e.g. in population income, would be to measure the median, i.e. the income such that half of all individuals are above that level and half below. Following the median approach, when inequality rises, e.g. due to an increase in societal income that accrues to the richest 10% in society, median income may remain unchanged, while average income increases. The median individual is indeed, in some sense, the "typical" individual that in the above situation will not actually benefit from that increase. However, although the median measure gives a more accurate picture of the societal well-being, is also more difficult to compute. Indeed, microeconomic information are needed and the problem of household-level data availability comes back.

The same argument is valid for the consumption distribution. The average consumption gives no indication of how people effectively benefit from the available resources. However, empirical research has repeatedly shown that the distribution of consumption can be quite different from

the distribution of income, and it is actually more reflective of wealth than income patterns. Two are the reasons. First, consumption tends to be driven by permanent, long-term income more than by short-term changes in income. Consumption distribution is therefore less subject to transitory shifts in persons' income (that can decide to compensate short-term income fluctuations by increased savings or by borrowing). Second, differences between a household's position in the income and in the consumption distribution are often reflective of differences in the distribution of wealth. Only some wealth effects are picked up by income measures, e.g. receipts of rents as part of property income. Other wealth effect such as realized capital gains are not normally reflected in income measures but are likely to affect consumption.

The ideal solution to the distribution issue will be thus to consider income and consumption jointly with wealth. However, if income data at individual level are poor, consumption data are even less available (Stiglitz, Sen, & Fitoussi, 2009a).

D. GDP is a measure of flows that does not measure the stock of wealth in an economy

"By the curious standard of the GDP, the nation's economic hero is a terminal cancer patient that is going through a costly divorce. The happiest event is an earthquake or a hurricane. The most desirable habitat is a multibillion-dollar Superfund site. All these add to GDP, because they cause money to change hands. It is as if a business kept a balance sheet by merely adding up all 'transactions", without distinguishing between income and expenses, or between assets and liabilities." (Cobb, Halstead, & Rowe , 1995)

The above quote, while ironical in tone, elegantly makes the point on how GDP should not be confused with human wealth or welfare. The capacity to consume, now or later, is not only linked to the flow of income at each period. It also depends on the stock of wealth at the disposal of economic agents. Moreover, the flow of income is not the only factor that influences the evolution of the stock of wealth. Revaluations (due to variations of asset prices), consumption of fixed capital and other volume changes (changes in assets that are not due to economic transactions, such as destructions due to natural disasters or wars, discoveries of natural asset, etc.) also affect the stock of wealth.

1.2 Beyond GDP

Before going through all the proposals been made to overcome GDP measure, it could be insightful to bring back in a well-framed way some conceptual issues regarding individuals' well-being (Figure 3).

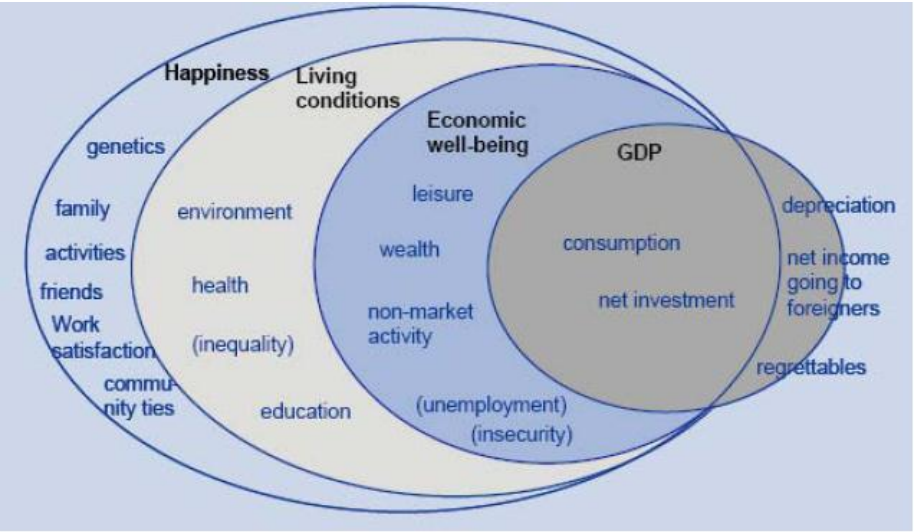


Figure 3 - Main elements of individuals' well-being[7]

From the above picture it seems clear how narrow the GDP set is and thus how many elements are not included in the calculation of well-being. The following approaches will therefore seek to fulfill this deficiency through the formulation of more extensive indicators. The bottom line is to encompass little by little new elements of individuals' well-being. Hence, this section will start describing measures that are based on the GDP but also capture only one more element, e.g. NDP that absorbs the depreciation aspect, and then move to indicators that embrace more aspects at the same time, e.g. the composite indices.

1.2.1 National account approaches

The point of departure for alternative indicators are other SNA concepts that better measure national standard of living or economic well-being; specifically, net domestic product (NDP) which takes into account depreciation, national incomes (NI and NDI) which adjust for the

[7] Goossens et al. (2007).

relation with the rest of the world and for the consumption of fixed capital, specific indicators for the household sector (disposable income, final consumption expenditure, actual final consumption), and government balance sheets which allow to value the stock of wealth in an economy.

Net Domestic Product (NDP)

As explained in the previous sections GDP is a measure of the amount of final good and services produced in a year and, as a gross output measure, it takes no account of depreciation of capital goods. Thus, if there is a rise in the need to set aside a large amount of output in order to renew machines or other capital goods, the society will consume less than if only a small amount of set-aside were needed. Consequently, with a view to computing the Net Domestic Product this depreciation is taken into account and the standards of living are better tracked. However, the reason why economists do not rely on NDP is in part because the depreciation is hard to estimate, above all when the structure of the production changes over time. An additional concern on NDP is that it misses to account the degradation in quality of the natural environment. Although environmental resources are qualified as "assets", they are still not economically quantifiable.

National Income (NNI) and National Disposable Income (NNDI)

As a measure of the value added produced by resident institutional units, GDP is an imperfect proxy of the income at their disposal. However, this income determines how much economic agents can consume immediately or invest for future consumption. Formally, Gross National Income (GNI) is the GDP free of net taxes on production and imports, compensation of employees and property income payable to the rest of the world, and enriched by the corresponding items receivable from the rest of the world. Furthermore, if other current transfers to and from the rest of the world, as payments of taxes on income and property, social contributions, and social benefits, are taken in consideration it will turn into the Gross Disposable Income (GDI).

The difference between GNI and GDI thus reflects an element of income distribution between sectors. This is best explained by applying the concept to a household. A household's (primary) income consists of wages and property income such as dividends received. However, households have to pay taxes and social contributions and they may receive social benefits and transfer payments. Accounting for these transactions leads to measures of disposable income. At the level of the whole economy, taxes, social security payments and so on that take place inside the country cancel out; but current transfers from and to other countries do not, and the difference between them mark the difference between GNI and GDI. Thus, GDI better measures how well off citizens are (Stiglitz, Sen, & Fitoussi, 2009a).

As before, in order to get better measures of the economic resources available to individuals for present and future consumption, it can be computed the net values of these measures. These adjustments leads thus to Net National Income (NNI) and Net National Disposable Income (NNDI) that are respectively the differences between GNI and GDI and the consumption of fixed capital.

Specific indicators for the household sector: disposable income, final consumption expenditure and actual final consumption

As highlighted in the previous sections, the well-being of individuals is typically better linked to their current and future consumption of economic resources rather than to economy-wide measures of production and income. According to Boarini *et al.* (2006), there is large variation in the gap between the different household measures (disposable income or consumption per capita) and GDP per capita among OECD countries. Although there is a strong cross-correlation between the two measures, the difference becomes bigger when looking at the respectively growth rates.

Households' disposable income is a good approximation of their receipts available for consumption. It includes all income (compensation of employees, plus social transfers and net property income) less current transfers paid. Such transfers include employers' social insurance contributions, employees' social insurance contributions, taxes on income, regular taxes on wealth, regular inter-household cash transfers and regular cash transfers to charities. When an

adjustment is made for the value of the goods and services provided by government to households in return of the taxes they paid, one obtains a measure of adjusted disposable income.

National Accounts instead distinguish two notions of consumption for households (System of National Accounts, 2008, pp. 186-189):

- Final consumption expenditure, which consists in expenditures, including imputed expenditures, incurred by resident households on individual consumption goods and services.

- Actual final consumption, which is the value of the goods and services consumed by households, whether by purchase or by transfer from government units or NPISHs (e.g. education and health services). It is derived from their final consumption expenditure by adding the value of social transfers in kind receivable. Such a notion is particularly useful for international comparisons due to institutional differences between countries.

Adjusted household disposable income and actual final consumption are considered better measures because they go some way towards accommodating the invariance principle,[8] at least where "social transfers in kind" by government are concerned (Stiglitz, Sen, & Fitoussi, 2009a).

National balance sheets

Additional indicators relevant to the assessment of living conditions can be acquired by national balance sheets. These indeed disaggregate national wealth in many types of assets: non-financial assets, such as fixed assets, stocks, land, subsoil assets; financial assets, such as currency, securities, loans, share, etc. Variations of national wealth are also distinguished between flows, revaluations, consumption of fixed capital and other volume changes. National balance sheets are sometimes available for various institutional sectors (e.g., households, non-financial enterprises). These elements therefore provide measure of welfare that complement those based of flow accounts.

In order to develop and spread right frameworks to account national aggregates, the United Nations, the European Commission, the International Monetary Fund and the Organization for Economic Co-operation and Development finalized in 2003 a Handbook on Integrated

[8] The invariance principle implies that a movement of an activity from the public to the private sector, or *vice versa*, should not change people measure of economic performance, unless the switch between public and private provision affects quality of the services or access to it.

Environmental and Economic Accounting. This handbook proposes a number of accounting frameworks showing methodologies for correcting national accounts aggregates for environmental degradation and resource depletion.

1.2.2 Dashboards of indicators

Even if national accounts can provide different indicators compared to GDP, those cannot summarize properly all aspects of living conditions. The most direct way of describing more extensively living conditions is instead through dashboards of indicators. This set of indicators are obtained by gathering and ordering series of indicators that bear direct or indirect relationship to socio-economic progress and its durability.

A distinction between a first and a second generation of these sets of indicators can be made using as discriminant the 1992 Rio Summit. Indeed, before that date dashboards essentially focused on the measurement of social progress;[9] while, with the adoption of Agenda 21,[10] the interest has been moved to sustainability and environmental issues (Stiglitz, Sen, & Fitoussi, 2009a).

Indicators differ in a variety of ways. The initiatives to develop these indicators stem either from citizen and research groups or official statistical systems and they are oriented mostly to individual countries, even if international initiatives have been growing in the last years. Examples of the last ones are the dashboards developed by different international organizations such as: the Millennium Development Goals fostered by UN, Society at a Glance, Key Environmental Indicators, Factbook, Better Life Index developed by OECD and the EU Sustainable Development Strategy by Eurostat.[11]

These dashboards of indicators are useful in at least two respects. First, they are an initial step in any analysis of socio, economic and environmental conditions and their sustainability since they capture the highly complex nature of these issues. Second, this comprehensiveness of indicators sets helps to highlight a large degree of overlap as to the dimensions that are regarded in assessing social progress and quality of life. Indirectly, indeed, these sets improve the quality

[9] For example, at national level, the reports of the US President's Research Committee on Social Trends (1993) represented one of the most comprehensive efforts to assess social trends (CMEPSP, 2007).
[10] Document adopted at the end of the Rio Summit in 1992.
[11] See Annex I in CMEPSP (2007).

(e.g., in terms of timeliness, consistency and comparability) of those indicators that are more critical for social conditions' assessment.

The comprehensiveness however comes at a price, i.e. low comprehensibility. Indeed, dashboards suffer because of their heterogeneity and most of them lack in explicating causal links, their relation to sustainability, and/or hierarchies among the indicators used. Moreover, as communications instruments, they are less powerful than GDP in the role of allowing simple comparisons of socio-economic performance over time or across countries. Finally, an obvious limit is that the selection of the indicators and of their weight within the dashboards is inevitably *ad hoc* and subjected to arbitrariness.

1.2.3 Corrected GDP and extended national accounts

Although dashboards of indicators provide rich information about countries at different time, it still remains a strong demand for summary statistics gathering all these information in a single number that allows to analyze rapidly variations in well-being across countries and over time. Part of the literature has therefore attempted to develop new measures that start from standard GDP or other associated SNA indicators and include additional aspects. This approach can be labeled "corrected GDP" or "extended national accounts". A common characteristic of these indicators is the monetary evaluation of welfare.

A first example of this approach is the Nordhaus and Tobin "Sustainable measure of economic welfare" presented in 1973. The starting point of their welfare measure is not GDP but household consumption. This indicator is corrected in two steps. The first step derives a Measure of Economic Welfare (MEW) by subtracting from total private consumption a number of components that do not contribute positively to welfare (such as commuting or legal services) and by adding monetary estimates of activities that contribute positively to welfare (such as leisure or work at home). The second step converts the MEW in a "sustainable measure of economic welfare" (SMEW) that takes into account changes in total wealth.

In the late 80s, Daly and Cobb (1989) further developed the initial MEW into the new Indicator of Sustainability of Economic Welfare (ISEW), further refined by Cobb and Cobb (1994) in order to take into consideration depletion of natural resources. In 2006 a very similar indicator

has been proposed by the non-governmental organization "Redefining progress", the Genuine Progress Indicator (GPI) (Talberth, Cobb, & Slattery, 2006).

The upside of the SMEW and its successors is their power of addressing the issue of sustainability. Following the same track, Hamilton (1996) proposed several theoretical models, featuring depletion of renewable or non-renewable resources, pollution or environmental amenities and derived the way final consumption should be adjusted for to provide a sound measure of welfare and thus a level of sustainable consumption. Since the late 80's, many empirical investigations to compute environmentally-adjusted net domestic product (e.g. NDP) taking into account the consumption of natural capital, known as "Green GDP", have been proposed and the first System of Environmental Economic Accounting (SEEA) established in 1993 (see early empirical studies by Repetto et al. (1989), and SEEA Handbook Chapter 11 (2003) for additional references).

Even though these accounting adjustments are of great utility when considering sustainability, they still present some downsides: first of all, the methods of valuation of these adjustments are most of the time indirect and conditional on "what if" scenarios. Second, none of these measures characterize sustainability per se. Green GDP just charges GDP for depletion of or damage to environmental resources.

Attempts to solve these issues are provided by two indicators: Adjusted net savings and the Ecological Footprint. The first indicator is a broader concept of savings than in traditional national accounts including natural resources or capital and simple measures of human capital. Adjusted net savings (also called genuine savings) are defined as net savings (net gross savings minus consumption of fixed capital) plus education expenditures minus the consumption of natural resources (fossil energy, mineral resources and forest) and the monetary evaluations of damages resulting from CO_2 emissions.

The second index is the Ecological Footprint proposed by Wackernagel and Rees (1995) and sponsored by Redefining Progress (the association already mentioned in conjunction with the GPI and the WWF). This index is classified in this category of extended account approaches despite the fact that its results are not expressed in monetary terms. The reason for such a classification is that this indicator uses one common measurement unit for heterogeneous

elements: the common unit used by the Ecological Footprint is the surface of habitable land requested to support current standards of living of the various countries.

These indices focused on the measurement of sustainability raise the issue of how much it is possible to integrate information on well-being and sustainability in a single measure. As a matter of fact, it is arguable that a high level of current well-being can be achieved at the price of lower sustainability; while conversely higher sustainability today may imply lower current well-being. This consideration underscores the importance of separate measures for these two concepts.

Nevertheless, these two indicators present some shortcomings: a) technical progress and population dynamics are not taken into account, b) the extended wealth largely depends on the different forms of capital passed through to future generations and c) in a context of imperfect valuation by market, the price at which wealth is valued. In addition "*the calculations are not comprehensive in that they do not include some important sources of environmental degradation such as underground water depletion, unsustainable fisheries, and soil degradation*" (The World Bank, 2006, p. 154).

1.2.4 Composite index

While dashboards of indicators do not offer a unified comparable result, corrected GDP indicators manage to solve this issue but at the cost of a more demanding implementation in terms of pricing and valuation in monetary units. Composite index are an alternative procedure to the aforementioned families of indicators. The so-called "composite indicators approach" consists in aggregating several elementary indices that are assumed to reflect various dimensions of some unobserved concept (human development, environmental sustainability, well-being, etc.) into one single measure.

The most well-known composite indicator is the Human Development Index (HDI) developed by the United Nation Development Programme (UNDP) in 1990. Other examples of these indexes are the "Multidimensional Poverty Index" (MPI) proposed by Alkire and Santos (2010), the "Economic Freedom of the world index" by Gwartney and Lawson (2009) and the "Ease of doing business" produced by the World Bank Group. For instance the MPI is composed by 10

sub-indices: two for health (malnutrion and child mortality), two for education (years of schooling and school enrolment), and six which aim at capture "living standards". The three main dimensions (health, education and living standards) are weighted equally.

In 2010 Martin Ravaillon, a former World Bank researcher, published a very influential working paper on composite indices. According to Ravaillon (2010) two broad types of composite indices, or as he calls them "Mashup Indices", can be identified. The first group is made up by indices in which the choices of the component series and the aggregation function are informed and constrained by a body of theory and practice from the literature. GDP, for example, is a composite of the market values of all the goods and services produced by an economy in a certain period. In this case, the composite index is additive and linear in the underlying quantities, with prices as their weights. The second group collects a set of indicators that are assumed to reflect various dimensions of some unobserved (theoretical) concept. An aggregate index is then constructed at the country level, usually after re-scaling or ranking the component series. This second group of indicators can be divided into two subsets according to the method of choice of weights and the aggregation function. Weights and aggregation function can either be chosen freely by the analyst or could be instead based on a regression model calibrated to another survey data set. Weights and aggregation functions are key in understanding properties and robustness of the index.

The most critical aspect of mash-up indices is the determination of weights associated to the different dimensions which build the index itself. Thus, weights determine the underlying characteristics of the index. In particular weights are key to understanding the properties of the index in terms of tradeoffs. Tradeoffs can be seen as marginal rates of substitution between the different dimensions of the index.

In a mash-up index typically two levels of weights coexist. First, equal weights on the components indices (such as "education", "income" and "health" in the HDI). These components indices are the result of some primary variables. Usually weights associated to components indices are made explicit. However, this is almost never the case for the weights associated to the primary dimensions. Authors of mash-up indices tend not to consider the underlying tradeoffs existing at this second level and whether they are acceptable or not.

Robustness of the index depends on the way that weights and aggregation function are selected.

The most critical problem with mash-up indices is the possibility that even a very small difference in the underlying variables could lead to re-rankings. Thus, scholars suggest to test the robustness of the derived rakings (Ravaillon, 2010).[12]

In conclusion composite indices are useful allies for presenting information in an easy way. In principle an aggregate index could be more informative than any of its components. However, as depicted above, construction of these kind of indices do present some criticalities. As a further remark, some additional reasons for dissatisfaction with such indices are i) their lack of capacity to include information on sustainability (as with GDP) and ii) the typical arbitrary character of procedures that are used to weight the various components of the indicator.

1.2.5 Subjective approach

The subjective approach to measure well-being is the latest contribution of the literature on alternatives to GDP. The idea underlying this approach is the following: being individuals the most interested in their own well-being, they should be the best judges of their own welfare. Thus, *"it is a straightforward strategy to ask them about their well-being"* (Frey & Stutzer, 2002). In the field of economics, this approach is closely linked to the utilitarian tradition, which argues that well-being is an intimate, subjective characteristic of each individual. This approach recognize the central theme common to both ancient and modern culture worldwide: being "happy" and "satisfied" with their lives is a universal goal of human existence.

The greatest strength of this approach is its simplicity: relying on people's own judgments is a convenient shortcut and potentially provides a natural way to aggregate various experiences in a way that reflects people's own preferences. Moreover, this approach makes it possible to reflect the diversity of people's views about what really counts in their lives. One of the most attractive features of research on subjective well-being is to deliver not just a good measure of the level of welfare, but also a better understanding of its determinants, as affected by a variety of objective features (such as consumption, health status, education, etc.).

[12] According to (Ravaillon, 2010): "*The most utilized method for testing robustness in the literature is to calculate the Pearson rank correlation coefficients between alternative versions of the mash-up index, such as obtained by changing the weights*."

A self-evident great source of weakness of this approach could be found in measurability issues. However, today, several methods have made subjective well-being amenable to systematic quantification (Kahneman, Objective happiness, 1999).

Both psychologists and economists use the same type of questions to evaluate subjective well-being. These questions most commonly ask people: "All things considered, how satisfied are you with your life in general?". Individual respond on an ordinal scale, ranging from 1 to *n*, where 1 means "totally unhappy" and *n* means "totally happy". However, one can raise the question: "How well does happiness score measure utility?" The subjective well-being approach is valid under three conditions that ensure a possible comparison between the answers (CMEPSP, 2007). First, the respondents are able to evaluate their life on a numerical scale and have no difficulty in answering. For this purpose, the use of a visual (ladder-of-life) scale, with explicit reference points, has proved more effective in measuring life satisfaction and avoiding in-country comparability problems rather than the use of qualitative responses, such as feeling "quite" or "fairly" happy with one's life (Stiglitz, Sen, & Fitoussi, 2009a). Second, the respondents understand the question in a similar way. Indeed, some studies (Van Praag, 1991) suggest that people sharing the same language understand questions in the same way. On the opposite, differences in culture and language probably affect the way people answer, and this may question the validity of subjective well-being indicators in cross-national comparison. This problem of heterogeneous standards across countries could however be partly alleviated by comparing only similar countries. Third, the respondents use the same scale. It is thus important to involve a survey fielded in as many as possible countries.

A weakness of subjective well-being approach that however persists, is the possibility that external events may disturb life evaluations and their measures. Answers may indeed be polluted by current moods (finding a coin a few minutes before the interview, or the state of the weather) or by the order in which questions are posed (asking about dating before posing questions on life-evaluation). However, there is a variety of evidence which points to a robust correlation between answers to subjective well-being questions and more objective measures of personal well-being. For example, answers to subjective well-being questions have been shown to be correlated with physical evidence of affect such as smiling, laughing, heart rate measures, sociability, and electrical activity in the brain (Diener, 1984).

All in all, however, most studies conclude that measure of subjective well-being contain a great deal of validity despite the persistence of some unresolved issues (Diener, 1994; Diener E. , Suh, Lucas, & Smith, 1999; Layard, 2005; Kahneman & Krueger, Developments in the measurement of subjective well-being, 2006).

1.3 Final remarks

All the measures of socio-economic welfare presented by scholars so far lack of some important elements that are different the one from the others depending on the approach used. Some, for instance, award the comprehensiveness in spite of the comprehensibility, and *vice versa*. Most of them do not consider the intimate characteristics of individuals or their social and cultural status, but on the contrary base their analysis on authors' values and thus inevitable preconceptions. Moreover, people's own perceptions of objective conditions of their lives are generally not taken into consideration.

The only approach that provides a natural way to aggregate theoretically all the elements in a way that mirrors people characteristics, preferences and perceptions, and at the same time encloses these elements in a single and understandable measure, is the subjective approach. However, the researches in this field need to progress, on one hand, in order to collect reliable and meaningful data on subjective well-being, on the other, to develop theories and models that use these measures. The subjective approach is indeed relatively recent and less explored by scholars compared to other approaches, even if these subjective measures contain important information that are not reflected in other common indicators and highlight patterns across people living in each country that differ sharply from those based on income measures. Moreover, qualitative measures of objective aspects hold the promise of delivering not just a good measure of welfare *per se*, but also a better understanding of its determinants, reaching beyond people's income and material conditions (Stiglitz, Sen, & Fitoussi, 2009a).

This suggests that subjective measures can play a useful role in measuring people's well-being and therefore it may be worth to better investigate the possibility in terms of socio-economic applications they may give. The present thesis aims at enriching the current literature and exploring these possibilities through a theory and a model that follows a subjective approach and is addressed to study welfare and its determinants.

Chapter 2: Thesis project, Research question and Methodology

The present Chapter lays the foundation for the research project by providing, throughout four sections, the key elements to develop a comprehensive and sound understanding of the study.

The first Section, "Problem Background", highlighting the need for a new approach to measure well-being other than GDP or the alternatives presented by a large stream of literature, shows the motivation to underlying this research project. The approach chosen to develop the project refers mainly to the subjective category due to the utilization of data on subjective well-being.

The second Section introduces and presents the theoretical model and the general framework for the study. In order to better approximate the real complexity of well-being of agents, the specification of the utility function includes both variables which are characteristics of the country, as well as characteristics of the agents as individuals. With the aim to recognize the intimate features of well-being, the individual characteristics of agents are studied through objective as well as subjective variables.

The third Section shapes the grounding for the analysis, defining and explaining the research questions that guided the whole project. In particular, the scope of the project is framed into four hypotheses which condense the main topics of interest the research project deals with, i.e. assessing the determinants of well-being and testing the robustness of GDP as a good indicator for welfare.

Fourth and lastly, the final Section deals with the research methodology, which encompasses the method used to answer to the research questions. The research methodology also presents the main assumptions which are at the basis for the subsequent tests of the research questions.

2.1 Problem background

As mentioned in the introduction, the problem background is what provides evidence of the motivation underneath the selection of the topic for the research project.

Although shortcomings of GDP as an index for measuring welfare are long recognized, they have been prominently featured again in the public debate in recent years. Many of the changes in the structure of the society have made these deficiencies of greater consequence. For instance, take the crisis that hit the society during the last years. In periods of prosperity, GDP growth is considered the measure which best described such bold times; however, when lower and less regular economic growth is experienced, many countries (at least among the most developed ones) cast doubt on GDP as a measure of welfare. This happens especially because economic insecurity comes in conjunction with a progressive re-assessment of human goals. Changes in goals necessarily need to go along with changes in indicators.

In fact, on the academic side, a large number of economists focused on the development of new measures of well-being are able to fill this gap. In particular, interest in the economic analysis of *subjective well-being* variables has gone through an impressive boom over the last years. Kahneman and Krueger (2006) identified only 4 papers on this topic in 1991-1995 and more than 100 over the 2001-2005 period. According to Clark et al. (2007) this figure climbed to 173 papers for the 2003-2006 period. The central message from this very recent literature is that the relation between subjective well-being and monetary income is only partial, therefore, leaving a room for further studies direct to identify other well-being "drivers".

The growing interest in this field of economics reflects the intrinsic discrepancy between monetary valuations of welfare and citizens' real perception of the same concept. The present thesis aims at giving a new contribution to this flourishing field of study.

A comparison between a subjective well-being measure such as reported life satisfaction observations and a composite index as Human Development Index (HDI) will serve the interest to highlight why this topic has a great potential.

HDI takes into account aspects as education, income and health, while the life satisfaction measure embraces theoretically all the aspects related to individual well-being. From Figure 4, it is easy to demonstrate that the two measures differ substantially. In particular, it is striking to

notice how HDI constantly "over-rates" OECD countries (highlighted in green color) compared to the aggregate level of life satisfaction in the same countries. In the authors' opinion such divergences may be explained by a wrong determination of weights associated to each factor in the count of HDI. The weights in HDI as in many other indices have been determined more or less in an arbitrary fashion. This arbitrary determination of relative importance of the different elements composing the index does reveal one important deficiency: weights are common to every country in the world. While being a very good way to compare different countries, equal weighting does not take into consideration cultural differences between regions of the world. For instance, consider the inclusion of income in the HDI. By having income as one of the main determinants of the index, this creates a bias towards the most developed countries which will therefore rank among the top positions. Even under the plausible hypothesis that income explains a part of well-being, it seems very unlikely that every individual on the earth will judge the importance of income in their lives in the same way, i.e. by associating to income the same weight. Moreover, it seems even more unlikely that this equal weight will count for exactly one third of everybody's well-being.

The arbitrary weights in HDI involve that people have not been considered at all when attempting to measure their own quality of life.

On the contrary, a key point in this thesis is the recognition of two essential aspects of human well-being: first, there are intimate characteristics of the individual, who is the solely repository of the well-being, that need to be consulted when trying to assess her well-being; second, each person belongs to a different cultural and geographical area, which inevitably affect his or her welfare.

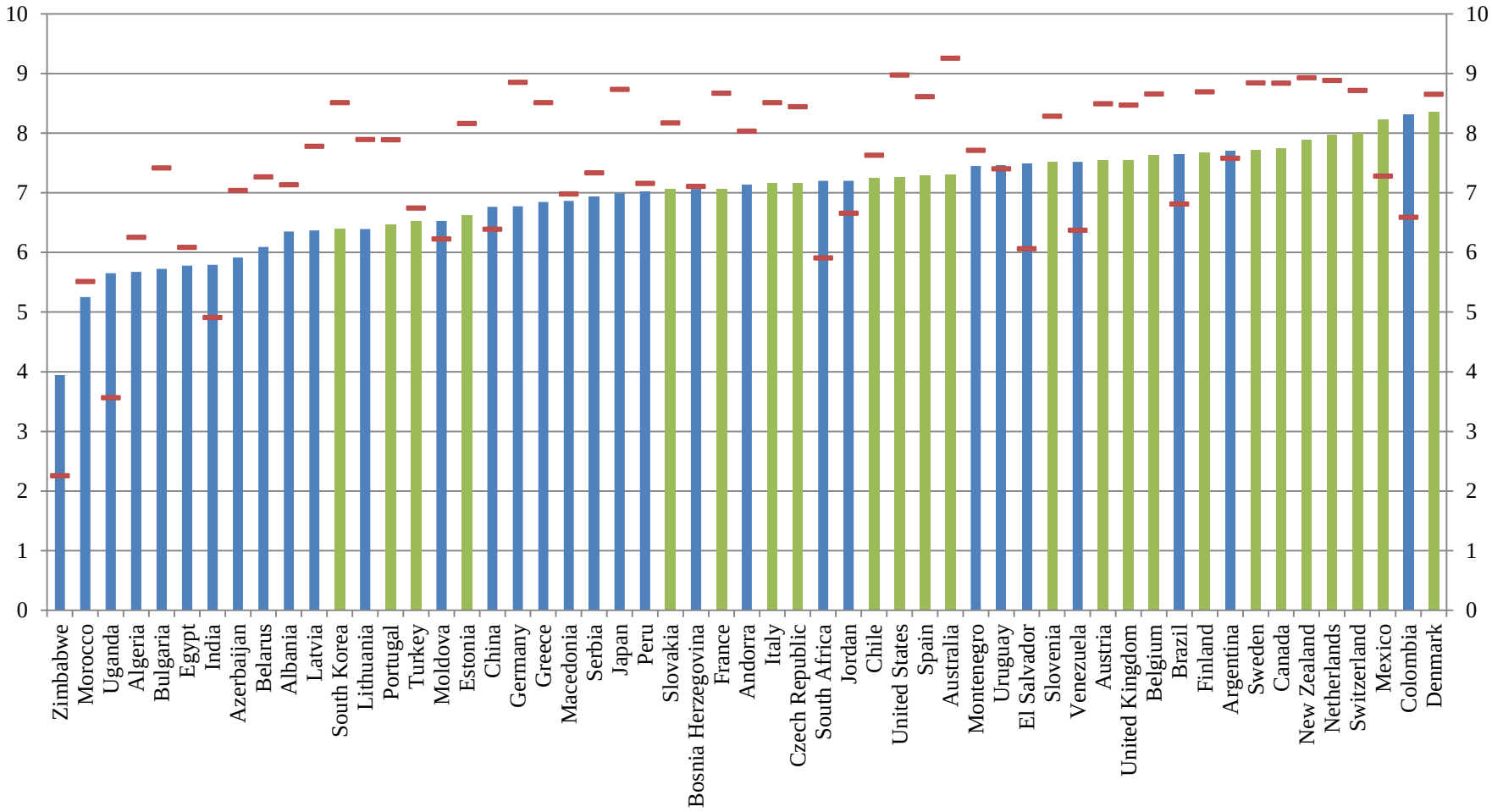
In this framework, the power and the beauty of the subjective well-being approach lies in the acknowledgment that all individuals strive for the same achievement regardless of country and personal characteristics: to be satisfied with their lives. A European citizen and a Latin American one have few in common when compared in terms of their income, educational level and life expectation. However, they both aim at reaching a goal which is common to all mankind. It is this unity in goals and diversity in ways which needs to be studied in depth, if an appropriate understanding of well-being of people is to be truly assessed.

Thus, an accurate understanding of individuals' well-being can only be fully assessed by taking into consideration all of its different determinants; this does not imply mixing various indicators

in a more or less arbitrary fashion as in the HDI, but on the contrary, assessing the evaluation of well-being that individuals make themselves when asked about their level of happiness or how satisfied they feel with the life they lead. Consequently, in order to accomplish to this task, it is necessary to consider both objective and subjective conditions of life of citizens, and drill into their perceptions of them.

In conclusion, the real challenge in understanding and measuring welfare of people, at both individual and aggregate levels, is to study both objective and subjective conditions, but also considering the geo-cultural belonging of the individual. In this sense, people's opinions are essential for understanding how their well-being is affected by circumstances beyond individuals' control and for analyzing behaviors that cannot be explained by a purely economic approach.

Figure 4 - Comparison between HDI and level of life satisfaction



Note: OECD countries are colored in green. Values of HDI (red bars) have been converted on the same scale as life satisfaction ,0 – 10,(columns).

2.2 Model

The general framework

Let consider a representative agent from a world population composed by *n* individuals, who live in country *c* and macroarea *m*, at time *t*. The total number of countries is C, grouped into M macroareas and agent live until time T. A macroarea is a set of countries which share similar conditions. The well-being of the representative agent depends on a set of *objective variables*, *subjective variables* and *intimate characteristics*.

The representative agent's utility is affected by her level of consumption, her age and gender, the level of pollution, the inequality and the degree of political freedom of the country where she lives. All these characteristics are good proxies of objective variables. In particular, the first three, consumption, age and gender, are objective characteristics of the agent herself, while the last three, pollution, inequality and degree of political freedom, are objective characteristics of the country in which she lives. The first group of variables is defined therefore as *individual objective variables*, while the second *country objective variables*. Of course, objective variables play a major role in determining the utility of agents.

However, this group of variables is not the only one which may affect her utility function. Reality shows that two people who share the same objective characteristics may have different utility levels. Thus, other variables are to be taken into consideration; for instance, her state of health, how much she enjoys her spare time, the awareness of an environmental emergency. These variables describe her perception, her approach to life and her ideas. These variables, called *subjective variables*, also play an important role in the determination of her well-being and are inevitably affected by country variables. This idea reflects one of the most characterizing features of human beings: life in community. A community exists when members share vision, values and institutions. Thus, when estimating the welfare of individuals who are different one from another, it is absolutely necessary to consider the country objective characteristics which affect everybody's way of approaching life.

Last but not least, individual's welfare is also affected by her *intimate characteristics* which can be easily explained by referring to the genetics of the individual or to her mood or temper. Intimate characteristics also play a major role in determining subjective variables.

With this in mind, it is possible to move forward to the specification of the utility function of the representative agent.

The utility function

The utility function of a representative agent,[13] henceforth called individual *i*, that lives in country *c*, at time *t*, is given by the following equation:

$$(1) \qquad U_{i,c,t} = f_{i,c,t}(X_{i,c,t}, I_{i,c,t}, K_{c,t}, J_{i,t}, \Phi_{i,c,t}) \qquad for\ i=1,\ldots,n;\ c=1,\ldots,m;\ t=1,\ldots,T$$

$U_{i,c,t}$ stands for utility, $X_{i,c,t}$ represent the set of subjective variables, $I_{i,c,t}$ the set of individual objective variables, $K_{c,t}$ is the set of country objective variables, $J_{i,t}$ is the set of intimate characteristics and Φ a set of non-explicated variables. Variables included in the set $X_{i,c,t}$, i.e. subjective variables, are dependent on a set of intimate characteristics called $J_{i,t}$, on the individual objective variables $I_{i,c,t}$, on the country objective variables $K_{c,t}$, and on a set of non-explicated country variables, $\Omega_{c,t}$, as shown in equation (2):

$$(2) \qquad X_{i,c,t} = g_{i,c,t}(J_{i,t}, I_{i,c,t}, K_{c,t}, \Omega_{c,t}) \qquad for\ i=1,..,n;\ c=1,\ldots,m;\ t=1,\ldots,T$$

The set of intimate characteristics $J_{i,t}$, individual objective variables $I_{i,c,t}$ and subjective variables $X_{i,c,t,}$ can be grouped together to form a unique group called *personal variables.* Personal variables, *country* variables and non-explicated country variables determine the agent utility as described in the equation (1). Equation (2) shows that subjective variables are in turn affected by both individual and country objective variables as well as a set of intimate characteristics of the agent.

[13] Other authors have used simple individual utility functions as the basis for their models. As in Jones & Klenow (2011) and Becker & Rayo (2008), the model has its foundation in the formulation of a utility function for the representative agent.

Objective and Subjective variables

There is no doubt that determining which element should be included in the list of personal and country variables inevitably depends on a set of human values which are time and place dependent. In theory, these elements may be different for each individual on the earth. In order to reflect this diversity between individuals but without exaggerating the number of covariates, the analysis will be limited to a number of potential determinants of individual welfare, derived from a thorough analysis of the existing literature on well-being. In particular these are the main determinants studied in the literature (Stiglitz, Sen, & Fitoussi, 2009a): consumption, leisure, wealth, non-market activity, unemployment, insecurity, environment, health, inequality, education, political freedom, genetics, gender, age, family, friends, work satisfaction, community ties.[14]

While for some of these determinants the classification in personal and country variables is easy to assess, for some others a more detailed explanation is necessary. First of all, it could be useful to reassume with Figure 5 how the variables are divided in this thesis' framework.

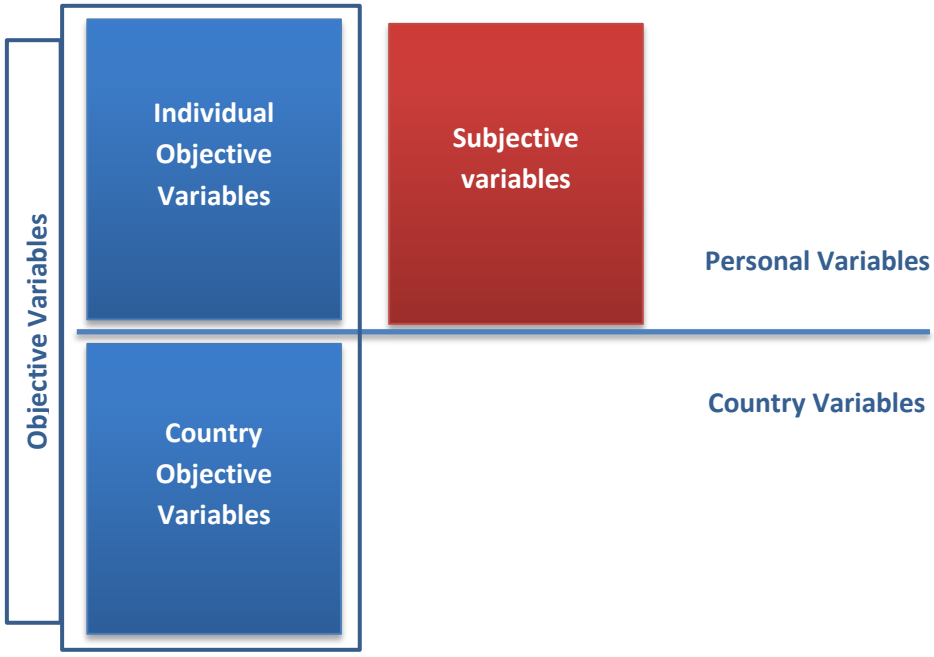


Figure 5 - Personal and country variable scheme

[14] Doubtlessly, including many variables present a tradeoff: while the choice of increasing the number of explanatory variables makes it easier to explain real-world phenomena, it lowers the "predictive" value of the theoretical model (Tirole, 1988). However, the present work concerns more the analysis of real phenomena, rather than making inference from the model.

There are three sets of variables: individual objective variables, subjective variables and country objective variables. The first two sets of variables collect characteristics of the individuals; their union forms the so-called *Personal Variables*, i.e. upper part of Figure 5. The third and last set presented in Figure 5 contains all the variables providing information on characteristics of the country as a whole, and they will referred to as *Country Variables*.

Coming back to the list of determinants of welfare presented above, an innovative trait of this thesis is that it allows for a multi-dimensional analysis of the determinants of well-being. This is to say that the impact on well-being of each determinant, or aspect of life, will not only be studied using one single variable, but on the contrary, it will be assessed including a total of three variables: an objective individual variable, a variable describing the situation in the country but also a subjective measure of the determinant under analysis. An example will help clarifying this framework. For instance, take one of the potential determinants of well-being: environment. In theory it is possible to estimate the level of pollution in the country (country variable), register what is the level of pollution in the area where the individual live (individual objective variable) as well as include a variable which register the individual's awareness of an environmental emergency (subjective variable). In this way, the impact of environment on well-being can be analyzed considering different dimensions of the determinant.

Consequently such framework of analysis permits to study more in details the contribution that each dimension makes on the overall well-being. In theory, this type of analysis could be conducted for all the determinants of well-being. In practice, many variables are still hard to collect. This aspect will become more clear and intuitive when the econometric model will be presented and commented in Chapter 4.

The dependent variable

While for the variables presented above, i.e. the independent variables, there is no need for further explanations in this chapter, more words need to be spent on the dependent variable. Indeed, until now, the utility of an individual has been referred to without expressly mentioning that it represents what previously defined as individual well-being. The following step is therefore to decide which variable better embodies the concept of welfare at individual level. While many studies usually utilize questions on happiness to embody the concept of welfare at

individual level, recent works such as Clark and Georgellis (2010) and Powdthavee (2009) consider more appropriate to use responses obtained from a life satisfaction question rather than happiness. The choice of the subjective well-being measure, in this study, has fallen on a measure of life satisfaction.

The reasons behind the choice of life satisfaction as a measure of subjective well-being are the following. First, even if both happiness and life satisfaction are measured by survey questions, life satisfaction is considered more reliable due to the cardinal and numerical scale used (10 for the best possible life, and 0 for the worst possible life). Happiness is instead normally measured by a shorter qualitative scale with responses such as "very happy", "quite happy", "not very happy" and "not happy at all", which is more vulnerable to an objective interpretation (Stevenson & Wolfers, 2008). Second, life satisfaction seems to be less dependent on current moods or daily experiences as reported in Haller and Hadler's paper (2006). Finally, even if both depend on people expectations, standards and ambitions and are closely correlated with each other, life satisfaction is influenced more strongly by objective-material conditions of life, including macro-social structures and institutions, while happiness by positive experiences, particularly close personal relationships (Haller & Hadler, 2006).

Direct and Indirect Effect

As a final remark, it is essential to stress that until here the analysis of the determinants of well-being was limited to "direct effects". Doubtlessly, also indirect effects should be taken into account. In particular, two of the variables of analysis, namely education and unemployment, do not only possess a direct impact on well-being but also affect well-being indirectly through their effect on income.

Thus, income directly depends on education, employment status, as well as a set of other variables:

(3) $$Y_{i,c} = g_{i,c}(EDU_{i,c}, EMPL_{i,c}, \boldsymbol{\lambda}_{c,t}, h_{c,t}, \Phi_{i,c})$$

where $Y_{i,c}$ is the individual income, *EDU* represents the level of human capital measured as years of education attained by individual *i*, *EMPL* is the employment status of the individual, λ is the level of productivity of factors in the country**,** *h* is the average number of hours worked in the country, and Φ is a set of non-explicated variables such as the institutions' efficiency, individual ability and initial endowment. Similar variables are adopted in standard wage regressions (Mroz, 1987).

2.3 Research question

The research project has been divided into different hypotheses in order to i) develop a structured analysis of the impact of the determinants of life satisfaction and ii) to assess countries' level of welfare and compare this finding to GDP.

The first two hypotheses are needed to determine, under various assumptions, the relation of a set of observed personal determinants with life satisfaction measure (LS, henceforth) when there are observed country characteristics and several unobserved variables. Due to data availability it was not possible to include all the determinants mentioned in the theoretical part. Thus, the analysis will focus on the following determinants: consumption, wealth, country growth, leisure time, inequality, environment, education and employment. Even if limited, this list of variable is comprehensive of all the variables which are consider to be the most relevant in the literature.

The third hypothesis allows instead to investigate if the determinants of life satisfaction influence differently the well-being depending on the macroarea considered. Such hypothesis represents a novelty of this research project in as far as the above mentioned relations are not treated at world level but are considered in relation to the affiliation to a specific group of countries that shares similar socio-economic characteristics.

Finally, the last hypothesis allows for a comparison between GDP and the index obtained from countries' welfare analysis in the attempt to understand whether the classic metric may be a good proxy for welfare in some countries, or not.

Below are listed all the four hypotheses, each followed by a literature that supports and justifies the authors' choice to address the analysis to these specific aspects.

Hypothesis 1: Life satisfaction is positively affected by consumption, education, health, leisure time, environment and country growth.

Evidences of these relations are reported in several papers. The positive correlation of well-being with growth in GDP is one of the findings presented in Di Tella *et al.* (2005) paper, "The

Macroeconomics of Happiness" as in many other articles.[15] The underlying reasoning is that individuals are more sensitive to growth in GDP value rather than to the absolute measure when assessing their wealth. Hence, they prefer to compare their current economic situation to the past, instead of comparing the absolute GDP value of their country with others.

The relations between welfare and consumption, health and leisure time are instead all treated in Jones and Klenow's (2011) article where it appears that higher country welfare can be explained by longer life expectancy, additional leisure time, and high level of consumption. Analyzing more in details these variables, health represents certainly one of the most influential determinants of life satisfaction. Indeed, the health of a person determines his or her approaching of life, the capacity to interact with others as well as participating and ultimately the length of this person's life. Moreover, it seems evident that without health all the other determinants lose their value. It can therefore be hypothesized that the concept of health, measured both at country and subjective individual level, is positively correlated with individuals' well-being.

Referring to leisure time, Nordhaus and Tobin (1973) were among the first to make an explicit adjustment of national income measures for the value of leisure, recognizing that more leisure adds to the well-being of persons. Throughout the literature, the evidence that time available for leisure and recreation affects positively individuals' life satisfaction has been nothing but confirmed (Stiglitz, Sen, & Fitoussi, 2009a).

Finally, even if income flows are an important gauge for individuals' well-being, in the end it is consumption and consumption possibilities over time that matter. This position is supported by Nordhaus and Tobin (1973) as well as Easterlin (1974; 1995) findings and more recently by Sliglitz, Sen and Fitoussi's (2009a) report that shows how is crucial to consider the consumption for assessing living standards.

Concerning the other variables, economic research recognizes that education, literacy, reasoning and learning are important for the quality of life. Evidence indicates that individuals who attended school for longer, or who achieved higher educational qualifications, are more likely to report greater subjective well-being (Stiglitz, Sen, & Fitoussi, 2009a). The importance of education for life satisfaction is however twofold: on one side, education influence individuals' income in as far as it is generally assumed that to a higher level of education corresponds a better

[15] For example, Kenny (2005), Haller and Hadler (2006).

working position; on the other, there exists an educational status that affects individual's well-being. Helliwell (2008) shows indeed how people with a tertiary education report higher evaluation of their satisfaction of life, and this effect holds even after controlling for income.

Ferrer-i-Carbonell and Gowdy (2007) using micro-level data have instead found robust correlations between life satisfaction and individuals' environmental awareness about ozone depletion and biodiversity loss. Importantly, they show that caring about positive environmental features (e.g. nature landscapes) has positive effects on subjective well-being whereas the opposite is true about negative environmental features (e.g. pollution).

Hypothesis 2: Life satisfaction is negatively affected by inequality and unemployment.

Haller and Hadler (2006) in their article tested a very similar hypothesis, confirming how involuntary unemployment and low occupational status reduce satisfaction. Unemployment if recurrent or persistent leads to economic insecurity and affects in the first instance individuals' income and thus their evaluation of life. As illustrated in Stiglitz, Sen and Fitoussi's report (2009a), however, unemployed people report lower life-evaluations that do the employed even after controlling for their lower income, a pattern that holds both when looking at cross-sectional data (Clark & Oswald, 1994; Blanchflower, 2008) and when following the same person over time (Winkelmann & Winkelmann, 1998); this pattern suggests the existence of non-pecuniary costs of unemployed, such as loss of friendship, meaning and status.

Concerning inequality, Jones and Klenow's (2011) research explains how lower levels of economic inequality determine a higher country welfare. This is supported also by several other papers that investigate the relation between inequality in the distribution of economic resources within countries and country's well-being. However, there are also non-monetary inequalities, such as differences across genders, groups and generations, which affect individuals' quality of life (Stiglitz, Sen, & Fitoussi, 2009a).

Hypothesis 3: The determinants of life satisfaction influence differently the well-being depending on the macroarea considered.

One of the novelties of this research is the use of macroareas as units of analysis. An advantage of this approach is that much of the unobserved heterogeneity at the individual level is likely to even out since only individuals from the same macroarea are compared. This represents an extension of Diener and Suh (Diener & Suh, 1999) findings that "*there is a high degree of homogeneity of subjective well-being within nations"*.[16] The authors of this thesis believe that this can be true also if macroareas are considered. Indeed, the identified macroareas collect countries with very similar cultures and behaviors and consequently, the effect of the determinants on life satisfaction it is expected to be the same within each macroarea. On the contrary, it is hypothesized that the influence of some variables on country well-being varies highly between cultures totally different.

Hypothesis 4: GDP is not a good indicator for well-being.

Although shortcomings of GDP as an index for measuring well-being are long recognized and treated in the literature, this research aims at focusing only on one drawback of this measure, i.e. GDP does not rank countries according to the aggregate well-being of its citizens. If this hypothesis is proven true, GDP could not be seen as a good proxy for well-being and should not be utilized for comparison of well-being across countries and time.

[16] See also the discussion in Kroll (2008).

2.4 Methodology

It is worthwhile to highlight that, in this study, the relation between life satisfaction and its determinants is not set arbitrarily or following a theory, as it happens in the dashboards of indicators or the composite indices as HDI, but it is legitimated by people's own judgment. In other words, this study leaves inevitable preconceptions aside and directs its focus on individuals as the center of research; using therefore an inductive method, this paper starts from the observations of individuals' preferences gathered through a worldwide and multi-temporal survey, namely the World Value Survey (WVS). The WVS's database with about 350,000 observations of subjective well-being provides the basis for analyzing the research question.

In addition, some assumptions need to be done to be able to conduct the analysis. The first two assumptions deal with the utilization of the variable life satisfaction (LS) as a proxy for welfare (W) (Ferrer-i-Carbonell & Frijters, 2004), while the third one is a prerequisite to make broad statements from the results obtained per macroarea:

A1. Life satisfaction is a positive monotonic transformation of an underlying unobservable variable called well-being/welfare and denoted by W(.): if $LS_{it} > LS_{is}$ then $W_{it} > W_{is}$, where *i* are the individuals and *t* the time;

A2. Life satisfaction is interpersonally ordinally comparable: if $LS_{im} > LS_{jm}$ then $W_{im} > W_{jm}$, where *i* and *j* are two individuals that lives in the same macroarea *m*.

A3. Life satisfaction and welfare are influenced by the same determinants if the individual *i* and *j* live in the same macroarea *m*.

The first assumption implies a correspondence between what is measured, LS_{it}, and the latent variable well-being, W_{it}. In so doing, it guarantees that a higher outcome of the life satisfaction variable corresponds to a higher level of the unobservable variable well-being.

Although welfare cannot be easily and objectively measured, it is known[17] that there is a strong positive correlation between emotional expressions like smiling, frowning and brain activity, and the answers to the satisfaction questions. LS_{it} are also predictive in the sense that individuals will

[17] See Sandvik *et al.* (1993), Fernaindez-Dols and Ruiz-Belda (1995), Shizgal (1999).

not choose to continue activities which yield low satisfaction levels (Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993; Clark & Oswald, 1994; Frijters, 2000; Shiv & Huber, 2000). If emotional expressions and choice behavior are truly related to the underlying concept of welfare, then life satisfaction can also be used as a proxy for welfare.

The second assumption, ordinal comparability, implies that individuals share a common opinion of what life satisfaction is. This assumption relies on supporting evidence from two psychological findings. The first is that individuals are somewhat able to recognize and predict the satisfaction level of others. In interviews in which respondents are shown pictures or videos of other individuals, respondents were somewhat accurate in identifying whether the individual shown to them was happy, sad, jealous etc. (Sandvik, Diener, & Seidlitz, 1993; Diener & Lucas, 1999). This also held when individuals were asked to predict the evaluations of individuals from other cultural communities. Hence, it is arguable that there is a common human "language" of satisfaction and that satisfaction is roughly observable and comparable among individuals. The second finding is that individuals in the same language community have a common understanding of how to translate internal feelings into a number scale, simply in order for individuals to be able to communicate with each other (Van Praag, 1991). In this study the common language communities are represented by the macroareas. The empirical analysis of life satisfaction under the ordinal comparability assumption makes therefore use of latent variable models, such as ordered probit and logit.

Finally, the third assumption is strictly necessary in order to be able to conduct an analysis per macroarea even when missing data and countries hamper a precise specification of macroareas of the world.

Chapter 3: Data

In order to study the determinants of well-being and, in particular, to shed some light on the existing relations between life satisfaction and a number of covariates, the understanding of the variables involved is necessary.

The first Section of this Chapter provides a comprehensive description of the variables and the sources from which they are derived. Variables are presented according to the classification in *personal* and *country* variables.

The second Section introduces the six macroareas and presents the criteria behind such division. Moreover, descriptive statistics of all the variables are briefly discussed by highlighting the main trends and differences existing between different macroareas and countries. This analysis furnishes a first starting point for the understanding of the study on determinants of well-being.

3.1 Description of variables

The main source of variables is represented by the integrated World Value Survey and European Value Survey questionnaire (WVS and EVS, henceforth). The WVS and EVS are global and longitudinal survey research programs on human values. The WVS and EVS together register results from more than 90 countries, starting from 1981 up to 2008, totaling more than 300,000 interviews. Up to today, the WVS organization has conducted five waves, while the EVS four ones. For each wave, samples are drawn from the entire population of 18 years and older. The minimum sample is 1,000 people. Sampling was conducted on a random base in each country. The WVS and EVS are a set of cross-sections and not a panel dataset. The WVS-EVS survey is a free dataset and it is a very valuable source of data as demonstrated by the large number of articles which base their findings on it or which simply refer to it.[18] The WVS-EVS data contain information on various areas of the respondents' lives, ranging from life satisfaction to income, employment status, education, health, but also social and political values.

As presented in the previous chapter, one of the goals of the thesis is to study the determinants of well-being and, in particular, to shed some lights on the existing relations between life satisfaction and a number of covariates, such as consumption, health, social factors, as well as a large number of other well-known factors from the literature on subjective well-being.

An exposition to the main variables of interest is needed to better understand the determinants studied in this thesis as well as to have a first picture of the different topics which will be discussed later on.

In the description that follows, variables are categorized and described following the affiliation *personal* or *country* variables.

Personal variables

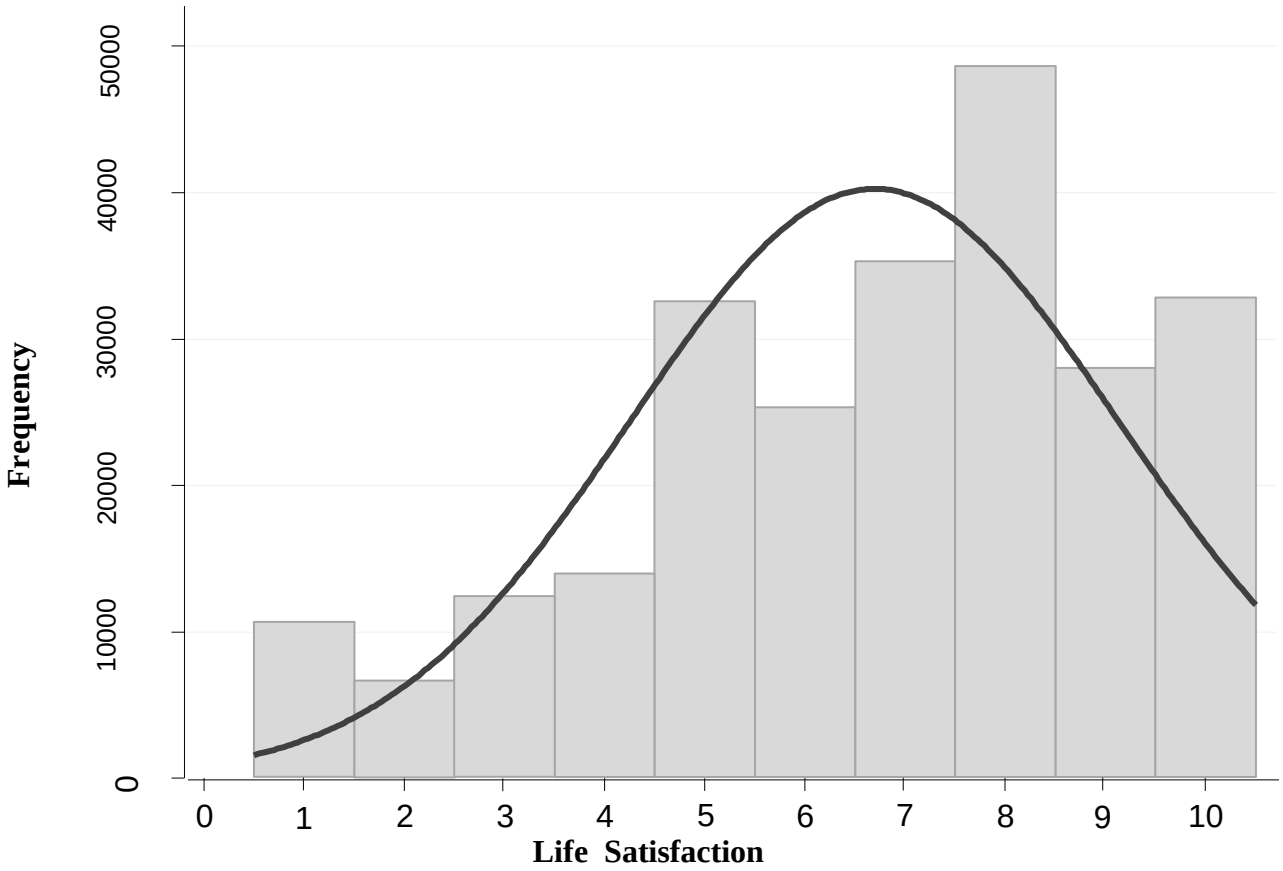
Without any doubt the variable which is at the core of this study is the individual's life satisfaction. The WVS-EVS surveys investigate individual's life satisfaction through the following question *"All things considered, how satisfied are you with your life as a whole these*

[18] The list of publications which base their findings on data from the WVS and EVS are a very large number and span from economics to ethics, polics and studies on human values.

days?". The question is tracking life satisfaction ordinated on a ten point scale, ranging from "dissatisfied" (1) to "satisfied" (10).

A histogram showing the distribution of life satisfaction in the WVS-EVS surveys is displayed in Figure 6.

Figure 6 - Histogram for life satisfaction variable, overlaid with a best-fit Gaussian density (fitted to the empirical mean and standard deviation)



The second most important personal variable is consumption. Unfortunately no questions in the WVS-EVS survey directly investigate on individual's level of consumption. Nevertheless, approximation for the level of consumption of agents can be derived indirectly from income. Even though discontinuously, the WVS-EVS asked interviewees to estimate their annual level of income in local currency. Thus, in order to obtain observations for consumption the WVS-EVS

annual individual income has been first converted to international dollars using Purchasing Power Parity (PPP) exchange rates, and then multiplied by the percentage of consumption over GDP in the country. Both PPP and portion of consumption over GDP are taken from the most-up-to date version of the Penn Tables, as the widely accepted database for national account measures (Jones & Klenow, 2011). Moreover, in accordance with recent consensus in the literature,[19] a logarithm specification has been adopted for the income measure and, consequently, for consumption, assuming that a given change in the proportion of income or consumption results in the same proportional change in well-being. This assumption of a decreasing marginal utility of income has been found to be quite robust and common throughout countries, and although the functional form of the life satisfaction-income relationship is slightly more concave than the logarithm, using logarithm of income seems to be an appropriate approximation (Layard, Nickell, & Mayraz, 2008).

Another key variable of analysis is the measure of individuals' health. In particular this study focuses on an individual's subjective assessment of health, which is scaled on a five point scale, ranging from "very good" (1) to "very poor" (5). Subjective measure of health is able to predict objective health fairly well in some cases (e.g., regarding morbidity); however, whether objective health is sufficiently well captured by subjective health assessments is still debated (Johnston, O'Malley, & Bachman, 2009).

All the remaining personal indicators, i.e. wealth, environmental awareness, importance of leisure time, employment status and educational level are measured through questions which directly address the issue in consideration. The table below gives an overview of all the personal variables included in this study, and provides details about their source.

Figure 7 - Description and sources of personal level variables

Variable	Description	Source
Life Satisfaction Level	The empirical analysis of the determinants of individuals' well-being is based on the response to the question: (A170) *"All things considered, how satisfied are you with your life as a whole these days? Please use this card for your answer.* *1 2 3 4 5 6 7 8 9 10* *Dissatisfied Satisfied*	**Integrated WVS-EVS**

[19] Easterlin (2001, p. 468); Stevenson and Wolfers (2008).

Consumption	The value of individual consumption is computed by multiplying individual income- extracted from question X047CS- to the Consumption Share of PPP Converted GDP per capita at current prices – a percentage of GDP – taken from Penn Tables. Thus, individuals are assigned a level of consumption which reflects the mean consumption of their own country. The variable utilized to run the regression is the logarithm of the individual level of consumption as calculated above.	**Integrated WVS-EVS + Penn Tables**
Wealth	A direct observation of the absolute level (in monetary terms) of wealth was not investigated in the WVS-EVS surveys. However, it is possible to infer the level of wealth of respondents from the answers to the following question on social class (subjective): *(X045) "People sometimes describe themselves as belonging to the working class, the middle class, or the upper or lower class. Would you describe yourself as belonging to the: 1) Upper class; 2) Upper middle class; 3) Lower middle class; 4) Working class; 5) Lower class*	**Integrated WVS-EVS**
State of health	Data on the status of health of respondents are taken from responses to the following question: *(A009) "All in all, how would you describe your state of health these days? Would you say it is: 1) Very good; 2) Good; 3) Fair; 4) Poor; 5) Very poor".*	**Integrated WVS-EVS**
Educational Level	Data are taken from question X025R which records responses from X025, on a country basis. X025 registers the highest level of education attained by respondents. In X025R, education level is coded on a three element scale: Lower, Middle, Upper.	**Integrated WVS-EVS**
Importance of Leisure	Data is taken from responses to the question: *(A003)"How important is leisure time in your life? Would you say it is: 1) Very important; 2) Rather important; 3) Not very important; 4) Not at all important."*	**Integrated WVS-EVS**
Employement Status	At a micro level, an individual can be either employed or not. The variable "*unemployed*" is directly derived from the answer to the question X028 of the WVS: *(X028) "Are you employed now or not? If more than one job: only for the main job.* *1) Full time; 2) Part time; 3) Self-employed; 4) Retired; 5) Housewife;* *6) Students; 7) Unemployed; 8) Other."* The variable employment status is a dummy variable which takes value 1 if the individual is unemployed (answer number 7), 0 otherwise.	**Integrated WVS-EVS**
Environmental Awareness	A measure of environmental awareness is derived from the following question: *(E035) " I am now going to read out a statement about the environment. Can you tell me whether you agree strongly, agree, disagree or strongly disagree? I would agree to an increase in taxes if the extra money were used to prevent environmental pollution.* *1) Strongly agree; 2) Agree; 3) Disagree; 4) Strongly disagree. "*	**Integrated WVS-EVS**

Country variables

The second category of variables collects all country variables (see Figure 8). These are the full set of indicators which refer to the country as a whole and which will be mainly used as control variables in the regressions. The variables chosen are: economic growth, life expectancy at birth, mean years of schooling, leisure time, income inequality, unemployment rate, CO_2 emissions and political freedom.

Figure 8 - Description and sources of country level variables

Variable	Description	Source
Household final consumption expenditure	Actual final consumption consists of the goods or services that are acquired by resident institutional units for the direct satisfaction of human needs, whether individual or collective.	**United Nations Statistics Division**
Economic Growth	Economic growth is measured as the average growth in GDP during the previous 5 years. Data is expressed as a % of GDP.	**Penn Tables**
Life expectancy at birth	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Data is expressed in number of years.	**World Bank**
Mean year of Schooling	Mean years of schooling is a summary measure of education. Education at a country level is the average years of schooling in the country. Data is expressed in years. (Barro & Lee, 2010)	**Barro, Robert and Jong-Wha Lee**
Leisure time	Leisure is computed as the total number of hours available per week (excluding rest time) minus total hours worked. Data for total hours worked were taken from the online database of LABORSTA, the labor statistics arm of the International Labor Organization. Data is expressed in hours per week.	**ILO, LABORSTA**
Income Inequality	Inequality of income is computed as it follows: $\frac{Standard\ deviation\ of\ income\ in\ contry\ c}{Mean\ income\ in\ country\ c}$ This measure of income inequality yields a pure, currency-free and therefore comparable measurement of inequality of income.	**Integrated WVS-EVS**

Unemployment rate	Unemployment rate at country level. Data is derived from the International Labor Organization ("ILO") Labor statistics database.	**ILO, LABORSTA**
CO^2 Emissions	Data for CO_2 emissions is measured in metric tons per capita. Data is expressed in metric tons per capita.	**World Bank**
Political freedom	The variable "political freedom" is an indicator that measure where a country stands in terms of political voice and democratic governance, as well as legislative guarantees and the rule of law. Data is measured as an indicator which ranks countries on a scale from minus 10 (autocratic regime) to 10 (democracy). The data is a time series estimated for all independent countries with total population greater than 500,000 in 2010.	**Polity IV Annual Time-Series - Political Regime Characteristics and Transitions, 1800-2009.**

3.2 Macroareas and descriptive statistics

It is worthwhile remembering that one of the central points of the present research study is that the analysis will not be conducted on a global scale, but on the contrary for different macroareas of the world.

In particular, the world has been divided into six macroareas. The main criteria adopted for defining the macroareas is geography and it follows the division adopted by the United Nations Statistics Division.

The six macroareas are the following (abbreviation in brackets):

1. *Asia Pacific (AP):*
   China, Japan, South Korea, India.

2. *Eastern Europe & Central Asia (ECA):*
   Albania, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Montenegro, Macedonia, Moldova, Russia, Serbia.

3. *Europe (EU):*
   Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Latvia, Lithuania, Netherlands, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom, Andorra, Switzerland.

4. *Middle East & Africa (MEA):*
   Algeria, Egypt, Jordan, Morocco, Saudi Arabia, South Africa, Uganda, Zimbabwe.

5. *Latin American & Caribbean (LAC):*
   Argentina, Chile, Colombia, El Salvador, Mexico, Peru, Puerto Rico, Uruguay, Venezuela.

6. *North America, Australia & New Zealand (NAAN):*
   Canada, United States, Australia, New Zealand.

While for some countries it was possible to comply with the division provided by the United Nation Statistics Division, for two areas in particular this required a different specification. First, Africa and Middle East are grouped into one single macroarea and second Australia and New Zealand are put together with United States and Canada to form another one. The rationale behind these divisions is that only few countries of Africa and Middle East responded to the WVS surveys and the same holds true for countries of the Oceania. The authors are aware that this country classification might be cause of criticisms. As a matter of fact, in theory, countries belonging to the same macroarea should share common values and characteristics and usually geography can be a good approximation. In practice, due to missing data for many countries, gathering together countries which apparently belong to very diverse political and social regimes, was needed. For example Egypt, Algeria, South Africa and Uganda are all part of the same macroarea, i.e. Middle East & Africa, while it seems more plausible they should be split into two distinct macroareas. Creation of macroareas MEA and NAAN were driven by association of four macroareas ("North Africa and Middle East", "Sub Saharan and Central Africa", "North America" and "Oceania") into only two. Note that assumption A.3, i.e. life satisfaction and welfare are influenced by the same determinants if the individual *i* and *j* live in the same macroarea *m*, as presente in the Methodology, has been included with the purpose to amend for the lack of countries.

Descriptive statistics

The WVS-EVS global surveys report observations from more than 92 countries, totaling around 320,000 observations. After cleaning of data the total number of observations falls to about 100,000, for a total number of countries equal to 60. This large loss in data is mainly determined by missing observations in the reported answers. In particular, almost 1/3 of the countries in the dataset did not report answers to question X047CS (income scale in local currency) at all, while the others did it discontinuously. In addition, some individuals did not respond to, or they were not asked, some questions therefore leaving gaps in the dataset. Nevertheless, after data cleaning the number of the observations still remains very large thanks to the broad scope of the WVS-EVS surveys.

Figure 9 below report descriptive statistics for each macroarea. Few considerations can be already done by looking at descriptive statistics at aggregate level. Starting from the main variable, i.e. life satisfaction, the macroarea where people are on average the most satisfied with their lives is surprisingly LAC and not EU nor NAAN, i.e. the two most developed macroareas. In fact, according to the WVS-EVS dataset, life satisfaction is on average very high in LAC (2.30), immediately followed by NAAN (2.29) and EU (2.14). On the other hand, inhabitants of developing countries as Asia, Africa and Eastern Europe are among the least satisfied: AP region has a mean value of 1.99, MEA 1.95 and ECA 1.85.

This surprising ranking of macroareas arouses interest and merit a deeper understanding. The first most natural remark that comes to mind is the following: if people were to judge their own lives according to the same standards regardless of their geographical origins, then it would be natural to think that the most developed countries in the world should score the highest values of life satisfaction. In another words, if the well-being of people was to depend only on objective elements, it would seem natural that the most well-off macroares in the world should be the first in terms of well-being of their citizens. However, this does not hold true. This result alone unveils the large potential of data on subjective well-being. For the same reason an approach that studies determinants of welfare should discern between the macroareas and do not refer to a global sample so as to reflect these different approaches to well-being existing between different regions of the world.

Evidence from data on life satisfaction highlights the existence of a multitude of ways of conceiving the concept of well-being, and above all, other than just raw economic growth. As a consequence, it seems plausible that the beliefs on what it is “important” for people should be studied in depth, not only through theory (which could lead to misinterpretations and preconceptions) but also through observations and study of the determinants of subjective well-being of agents.

Another important remark on life satisfaction is that this measure is more volatile in developing countries rather than developed ones. Standard deviation in the six macroareas varies from 0.573 for NAAN to 0.727 in MEA. Thus in developing countries it is more common to observe larger differences between the most and the least satisfied, whereas in the most developed countries this dispersion is almost one third lower. What could explain the different levels of life satisfaction

between macroareas and also its standard deviation? The answer to this question lies on the study of the potential determinants of life satisfaction. For instance, as far as consumption is concerned, population of NAAN consume on average two times as much as Europeans, three times as much as Asian people, four and a half times as much as inhabitants of MEA, almost seven times as much as LAC, and eleven and a half times ex-soviet union countries. Consumption seems to be a good way to explain why Western World registers very high life satisfaction scores. Moreover, if standard deviations of consumption in the different macroareas are considered, a comparison with the mean values for each of the macroareas reveals that the only two regions where the ratio between standard deviation and mean is lower than one, i.e. low dispersion of income among the population, are NAAN and EU. Hence, consumption apparently also explains the higher values of dispersion of life satisfaction in developing countries rather than developed ones.

Nevertheless, consumption still does not clarify why LAC is reporting such high levels of life satisfaction. Different explanations should be looked for in other well-being determinants.

Another very central aspect of human life is health. Without health, all the other aspects lose their value. The measure of life expectancy at birth recognizes higher chances of living for people who live in more developed countries. People in AP and ECA have a life expectancy of around 71 years, EU 76.7 years, MEA 63 years, LAC 72.6 and NAAN 78.1.

Level of education at both personal and country level report the same trends: people from macroarea NAAN have on average attended more years of schooling than anyone else in the world (11.8 years) while Africans the least (6.2 years). LAC (7.27 years) is definitively closer to MEA (6.2 years) rather than ECA (around 9 years). Personal level data on education just reflects this tendency.

As a last consideration, out of total sample, 53.26 percent are female. The mean age is 42.38 years (s.d. 16.793) with maximum age at 108 years and minimum age at 15 (younger individuals were not interviewed in the WVS-EVS surveys).

Consumption, health, education, together with some other features such as income inequality, leisure time and degree of political freedom grant the best results to Western Countries. However this ranking is inverted when other indicators are considered; this happens in particular for two of them: economic growth and level of pollution. Considering growth, AP has grown for an average total of 33% in 5 years (on average 8% per year), Eastern Europe 37%, MEA almost

21%, LAC 20%, while Western Countries only around 16-17% in five years (3.5% per year on average). As far as pollution is considered, the emission of CO_2 measured as tons per capita was chosen to represent the impact of pollution on people. EU and NAAN stand out as the most polluting regions in the world with 8.22 and 16.44 tons per capita respectively. These values are especially striking if compared with the lowest levels of CO_2 registered in LAC, 2.71 and MEA, 4.54.

In conclusion, it seems that a simple analysis of determinants of well-being cannot completely explain the existing ranking of life satisfaction of individuals. Tell it differently, many of the existing measures of welfare, which only base their ranking on the objective characteristics of a country, are not capable of explaining the ranking of life satisfaction measure. Therefore, the analysis should not only be pursued at a macro level but on the contrary, the basis for understanding the link between determinants and actual well-being are to be drilled down at a micro level (individual level) so as to shed some lights on the existing hidden relations between life satisfaction and its determinants. More considerations will be presented in the next chapter, where results from the regressions will be presented.

As a final remark, out of total sample, 53.26 percent are female. The mean age is 42.38 years (s.d. 16.793) with maximum age at 108 years and minimum age at 15 (younger individuals were not interviewed in the WVS-EVS surveys).

Figure 9 - Descriptive statistics

a) Macroarea AP and ECA

	AP						ECA					
Personal Variables	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Life Satisfaction Level	16099	1.99	2	0.60	1	3	53154	1.85	2	0.66	1	3
Consumption ($)	14772	10820	4894	12846	127	96235	22543	2696	1464	3515	10	25727
Log (Consumption)	14772	8.51	8.49	1.43	4.84	11.47	22543	7.06	7.28	1.53	2.28	10.16
Wealth	15710	2.69	3	1.00	1	5	27406	2.62	3	0.92	1	5
Health	17647	3.76	4	0.86	1	5	47824	3.51	4	0.93	1	5
Educational Level	16519	1.90	2	0.76	1	3	52068	2.00	2	0.70	1	3
Employment Status	17719	0.05	0	0.22	0	1	53756	0.14	0	0.34	0	1
Importance of Leisure	17201	2.87	3	0.86	1	4	52913	3.04	3	0.81	1	4
Enviromental Awareness	15042	2.69	3	0.78	1	4	28492	1.94	3	0.87	1	4
Age	17708	41.63	40	14.31	17	99	53618	42.80	40	16.08	15	95
Male	17719	0.51	1	0.50	0	1	53756	0.46	0	0.50	0	1
Country Variables	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Economic Growth (%)	17719	1.33	1.32	0.18	1.04	1.66	52556	1.37	1.25	0.52	0.40	3.39
Life expectancy at birth	17719	71.01	73	7.97	59.64	81.93	53756	70.86	70	3.24	65.22	76.63
Mean year of Schooling (years)	17719	7.40	7	3.18	3.27	11.14	53756	9.09	9	1.52	5.15	10.59
Leisure time (weekly)	16470	65.82	66	2.65	62	70	53756	73.22	72	4.40	62.30	78.80
Income Inequality	15679	1.04	1.24	0.59	0.44	1.94	24919	0.87	0.79	0.21	0.64	1.50
Unemployment rate (%)	17719	3.72	4	0.89	2.00	4.70	52240	13.76	10	9.92	0.80	46.60
Co2 Emissions	17719	5.43	5	3.84	0.99	9.92	53756	5.48	5	2.78	0.57	10.97
Political freedom	17719	15.86	19	6.23	3	20	53756	13.10	17	5.69	3.00	19.00

b) Macroarea EU and MEA

	EU						MEA					
Personal Variables	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Life Satisfaction Level	134956	2.14	2	0.60	1	3	24089	1.95	2	0.73	1	3
Consumption ($)	44672	15393	11831	12990	35	141171	16663	6210	2979	8187	10	69840
Log (Consumption)	44672	9.14	9.37	1.28	3.54	11.86	16663	7.90	7.99	1.52	2.28	11.15
Wealth	26289	2.77	3	0.88	1	5	23185	2.51	3	1.09	1	5
Health	105272	3.76	4	0.93	1	5	24126	3.98	4	0.90	1	5
Educational Level	92137	1.86	2	0.74	1	3	24124	1.70	2	0.68	1	3
Employment Status	135984	0.06	0	0.24	0	1	24147	0.15	0	0.35	0	1
Importance of Leisure	119979	3.18	3	0.73	1	4	23986	2.90	3	0.90	1	4
Enviromental Awareness	79580	2.52	3	0.88	1	4	15365	2.28	2	0.95	1	4
Age	135594	45.67	44	17.55	15	108	24128	37.35	35	14.61	16	98
Male	135984	0.46	0	0.50	0	1	24147	0.48	0	0.50	0	1
Country Variables	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Economic Growth (%)	117302	1.16	1.14	0.14	0.57	1.59	24147	1.21	1.24	0.09	1.04	1.40
Life expectancy at birth	122453	76.69	77	3.35	68.78	81.99	24147	62.4	68	9.06	42.19	72.48
Mean year of Schooling (years)	122453	9.63	10	1.39	5.63	12.63	24147	6.2	6	1.60	3.47	8.27
Leisure time (weekly)	93132	75.16	76	2.39	70.00	79.20	24147	67.5	70	5.64	58.00	73.00
Income Inequality	53517	0.59	0.55	0.16	0.32	1.17	19896	1.04	1.12	0.32	0.68	1.67
Unemployment rate (%)	129339	8.20	7	4.22	0.60	22.90	24147	14.02	10	8.48	3.20	29.40
Co2 Emissions	109366	8.22	8	2.52	2.77	17.44	24147	4.54	3	3.27	0.06	8.98
Political freedom	121756	19.64	20	0.75	16.00	20.00	24147	10.6	7	6.54	4.00	19.00

c) Macroarea LAC and NAAN

	LAC						NAAN					
Personal Variables	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Life Satisfaction Level	33308	2.30	2	0.64	1	3	20736	2.29	2	0.57	1	3
Consumption ($)	23341	4726	2909	5561	53	69160	12016	31224	23930	26821	1890	183352
Log (Consumption)	23341	7.96	7.95	1.05	3.96	11.14	12016	10.05	10.08	0.81	7.54	12.12
Wealth	28136	2.53	3	0.93	1	5	12943	2.91	3	0.91	1	5
Health	29286	3.83	4	0.82	1	5	20804	4.12	4	0.86	1	5
Educational Level	33459	1.78	2	0.75	1	3	13537	2.13	2	0.75	1	3
Employment Status	33585	0.10	0	0.29	0	1	20858	0.06	0	0.23	0	1
Importance of Leisure	30258	3.21	3	0.80	1	4	17083	3.31	3	0.68	1	4
Enviromental Awareness	25417	2.66	3	0.88	1	4	16686	2.63	3	0.81	1	4
Age	33567	38.35	35	15.16	16	97	20739	45.37	43	17.82	15	97
Male	33585	0.48	0	0.50	0	1	20858	0.46	0	0.50	0	1
Country Variables	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Economic Growth (%)	33585	1.20	1.19	0.10	1.01	1.52	17279	1.17	1.19	0.04	1.12	1.23
Life expectancy at birth	33585	72.50	72	2.3	68.53	78.25	17279	78.13	78	1.8	75.21	80.84
Mean year of Schooling (years)	33585	7.27	7	1.3	4.84	9.40	17279	11.82	12	0.7	10.35	13.33
Leisure time (weekly)	33585	67.46	68	3.07	61.00	72.70	13710	77.93	78	2.24	73.21	81.10
Income Inequality	25111	0.98	0.97	0.32	0.40	1.63	13710	0.72	0.68	0.23	0.40	1.13
Unemployment rate (%)	33585	9.60	10	3.88	2.56	18.80	20858	6.88	7	1.95	4.00	11.00
Co2 Emissions	33585	2.71	2	1.46	0.96	6.26	15440	16.44	17	3.59	7.87	19.90
Political freedom	33585	17.37	18	1.81	11.00	20.00	20858	20.00	20	0.00	20.00	20.00

Chapter 4: Econometric model, Estimation issues and Results

The model presented in Chapter 2 introduced a notion of well-being of individuals that depends both on *personal variables*, i.e. individual objective and subjective variables, and *country variables.*

The elements which have been included in the theoretical specification of the individual's well-being are only *potential* (or theoretical) determinants of well-being of agents. One of the aims of this Chapter is to test whether these theoretical determinants have an effect (or not) on the well-being of individuals according to the macroarea.

This Chapter has the following structure: Section 1 covers a more formal treatment of the model which is at the basis for the subsequent econometrical analysis. In particular, the crucial characteristic of the model is the ordered nature of the observed outcomes and the correspondingly ordered nature of the underlying preference scale. Estimations are obtained through an ordered probit model. The coefficients obtained from the estimations help to understand the directional relations between independent variables and life satisfaction more than the magnitude of the influence. At an aggregate level the econometric model yields probability for each country to be in a certain level of life satisfaction.

Section 2 presents the results of the econometrical analysis conducted to provide answers to the four research questions of the thesis and focuses on two main objectives. First, an analysis of the regressions is conducted so as to provide with a deep study on what drives life satisfaction in the different macroareas. Results are presented in key findings. Second, predicted values of the ordered probit are compared with GDP in order to assess robustness of GDP as a good proxy for subjective well-being.

Section 3 concludes and summarizes the findings, providing answers for the research questions.

4.1 Econometric model and estimation issues

As presented in Chapter 2 individuals are assumed to derive their utility from a series of determinants belonging to subjective as well as objective sphere of human life. While such theoretical model was mainly direct to explore the relations between the variables and provide a clear picture of the framework, the econometric model focuses on determining the proper specification for describing these relations in order to be able to better understand the subsequent econometrical analysis and to correctly interpret the results.

The econometric model described here is an *ordered choice* model (Greene & Hensher, 2009). This model can be derived, under the assumptions presented in the methodology section, from a latent variable model. Indeed, if life satisfaction (observable variable) is assumed to be a good proxy for welfare (latent variable) the empirical analysis of life satisfaction under the ordinal comparability assumption allow to use an ordered choice model, such as ordered probit and logit, to investigate the relations between the a set of observable determinants and life satisfaction.

The general underlying model

The general framework is the same as before, i.e. the world is populated by n individuals, every individual lives in a country c.[20] Every agent has a level of utility W_i^*. Given that no natural way of measuring welfare exists, the utility can be described as ranging over the entire real line:

(4) $$-\infty < W_i^* < \infty$$

Therefore, for any individual there is a continuously varying "amount" of welfare, which can take any value from minus to plus infinity. W_i^* is called *latent variable*.

Being interested in estimating and studying individuals' welfare, some researches submit the WVS-EVS to citizens of different countries. Among other questions, each individual is asked to report her level of life satisfaction. Variable LS_i is an ordered response taking discrete values {1,2,..,J} with J equal to 10 equal to the answer given to question on life satisfaction.[21] The

[20] Note that time is excluded only for the sake of simplicity, as not particularly relevant in this part.

[21] In the econometric analysis the responses of life satisfaction variables have been split in only three levels of life satisfaction in order to facilitate the interpretation of the results. Thus, the model for an underlying utility function is

ordered probit model for LS_i (conditional on some explanatory variables) can be derived from a latent variable model.

Models of ordered choice are still rarely deployed as a way to study existing relations between subjective well-being measures and other variables. Instead, most of the time, linear regressors such as OLS are utilized.[22] The model introduced in this chapter is, for this reason, at edge of the literature but with an interesting potential (Stevenson & Wolfers, 2008).

If life satisfaction is indeed a good proxy for welfare, then, the life satisfaction score submitted by interviewees, can be seen as a *censoring* mechanism of this kind:

(5)
$$\begin{cases} LS_i = 1 \text{ if } -\infty < W_i^* \leq \mu_{i1} \\ LS_i = 2 \text{ if } \mu_{i1} < W_i^* \leq \mu_{i2} \\ LS_i = 3 \text{ if } \mu_{i2} < W_i^* \leq \mu_{i3} \\ LS_i = 4 \text{ if } \mu_{i3} < W_i^* \leq \mu_{i4} \\ LS_i = 5 \text{ if } \mu_{i4} < W_i^* \leq \mu_{i5} \\ LS_i = 6 \text{ if } \mu_{i5} < W_i^* \leq \mu_{i6} \\ LS_i = 7 \text{ if } \mu_{i6} < W_i^* \leq \mu_{i7} \\ LS_i = 8 \text{ if } \mu_{i7} < W_i^* \leq \mu_{i8} \\ LS_i = 9 \text{ if } \mu_{i8} < W_i^* \leq \mu_{i9} \\ LS_i = 10 \text{ if } \mu_{i9} < W_i^* \leq \infty \end{cases}$$

where LS_i is the observation of life satisfaction submitted through the WVS-EVS surveys, and μ_{iK} are the thresholds, also called cut-points.

Through the censoring mechanisms individuals, who have a continuous range of utility W_i^* to express their level of utility, are obliged to answer in terms of a value between 1 and 10. Thus,

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applied to a life satisfaction measure which take three values: $LS_i = 1, 2, 3$. The theoretical framework developed here for a ten category case is exactly equal to a three case one.

[22] For example, Di Tella, MacCulloch, & Oswald (2005), Welsch & Bonn (2006), Lora & Chaparro (2008).

the life satisfaction observation provides a "censored version" of the true underlying utility, W_i^*. This censoring mechanism works thanks to the thresholds, μ_{ij}. Thresholds are crucial because they divide the range of utility into levels that are identified with the observed score. Their number is equal to *J-1* splits, where *J* is the number of possible values. A last but not at all least consideration on thresholds is that they are specific to each individual.

A very handy assumption would be to impose that thresholds are the same for all individuals, thus making the analysis very simple. However, unfortunately, this assumption is definitively unrealistic. It is also important to note that the difference between two levels of the value scale (for instance one compared to two, two compared to three) is not the same on the utility scale; hence, the thresholds capture a strictly non-linear transformation (Greene W. , 2002). The fact that 10 is a better rating than 5 conveys useful information, even though the welfare rating itself only has ordinal meaning. For example, it cannot be said that the difference between six and four is somehow twice as important as the difference between nine and eight.

The model as presented thus far provides a simplistic description of the mechanism underlying an observed rating and can be improved. In fact, the utility of each individual can be described by a set of personal characteristics,[23] $X_{i,n}$, such as e.g., health status, educational level, income or wealth. Individuals also bring their own aggregate of unmeasured and not measurable idiosyncratic errors, denoted ε_i.

How these characteristics enter in the utility function is not clear at the beginning of the analysis and thus it is convenient to use a linear function, which produces a random utility function of this kind:

$$W_i^* = \beta_{i,0} + \beta_{i,1}X_{i,1} + \beta_{i,2}X_{i,2} + \cdots + \varepsilon_i \quad (6)$$

where $X_{i,n}$ with n=1,…N is a set of *n* personal variables, while ε_i the source of idiosyncratic error.

While the model accommodates the intrinsic heterogeneity of individuals by allowing the coefficients to vary across individuals, it is quite obvious that this model cannot explain welfare

[23] Here personal characteristics include both subjective and objective individual characteristics.

as a whole. According to the vast literature in fact, well-being does not only depends on personal variables. In particular, a possible shortcoming of the model is that it does not take into consideration that people might naturally feel more enthusiastic about life, according to their country of provenance. Thus it seems more natural to include characteristics of countries. The set of country variables is called K_c and it gathers common country features for citizens of the same country. Equation (7) presents a more general model which includes these characteristics:

(7) $$W_i^* = \beta_i' X_i + \delta_i' K_c + \varepsilon_i + v_c$$

where X_i is a set of personal variables, K_c is the set of country variables, ε_i the source of idiosyncratic error and v_c is an element which captures all the unmeasured or not measurable country effects.

This model seems to be a better approximation of welfare of individuals and in fact it respects two of the most important features of welfare:

1. the model accommodates the intrinsic heterogeneity of individuals by allowing the coefficients to vary across individuals, i.e. each individual has different marginal utility coefficients (β, δ);
2. the model reflects both personal and country determinants of welfare;
3. the model let two otherwise identical persons have different level of utility. This is possible thanks to the idiosyncratic error ε_i.

Now that a better specification of the utility of individuals has been developed, the second step is to apply the censoring mechanisms to this specification:

(8) $$\begin{cases} LS_i = 1 \text{ if } -\infty < W_i^* = \beta_i' X_i + \delta_i' K_c + \varepsilon_i + v_c \leq \mu_{i1} \\ LS_i = 2 \text{ if } \mu_{i1} < W_i^* = \beta_i' X_i + \delta_i' K_c + \varepsilon_i + v_c \leq \mu_{i2} \\ \dots \\ \dots \\ LS_i = 9 \text{ if } \mu_{i8} < W_i^* = \beta_i' X_i + \delta_i' K_c + \varepsilon_i + v_c \leq \mu_{i9} \\ LS_i = 10 \text{ if } \mu_{i9} < W_i^* = \beta_i' X_i + \delta_i' K_c + \varepsilon_i + v_c \leq \infty \end{cases}$$

Considering the large number of observations collected by WVS-EVS, the central limit theorem can be applied. Aggregating the innumerable small influences that add up to the individual idiosyncrasies, it is possible to assume that the random components, ε_i and v_c are normally distributed with zero means and constant variances (Greene & Hensher, 2009). The assumption of normality allows to attach probabilities to the ratings.

In particular, probability for each score is the following:

(9)
$$Pr[LS_i = J|\mathrm{X_i}, \mathrm{K_c}, \varepsilon_i, v_c] = Pr\left(\mu_{iJ-1} \leq W_i^* < \mu_{iJ}\right)$$
$$= Pr\left(\mu_{iJ-1} \leq \beta_i^{'}\mathrm{X_i} + \delta_i^{'}\mathrm{K_c} + \varepsilon_i + v_c < \mu_{iJ}\right)$$

Rearranging:

(10)
$$Pr[LS_i = J|\mathrm{X_I}, \mathrm{K_c}, \varepsilon_I, v_c] =$$
$$= Pr\left[\varepsilon_i \leq \mu_{iJ} - (\beta_i'\mathrm{X_i} + \delta_i'\mathrm{K_c} + v_c)\right] - Pr\left[\varepsilon_i \leq \mu_{iJ-1} - (\beta_i'\mathrm{X_i} + \delta_i'\mathrm{K_c} + v_c)\right]$$

According to the assumptions made on the distribution of ε_i it is possible to derive two different specifications: probit and logit. A standard normal distribution corresponds to the probit regression model, while a logistic distribution to the logit model. If standard normal:

(11)
$$Pr\left[\varepsilon_i \leq \mu_{iJ} - (\beta_i'\mathrm{X_i} + \delta_i'\mathrm{K_c} + v_c)\right] - Pr\left[\varepsilon_i \leq \mu_{iJ-1} - (\beta_i'\mathrm{X_i} + \delta_i'\mathrm{K_c} + v_c)\right] =$$
$$\phi\left(\mu_{iJ} - (\beta_i'\mathrm{X_i} + \delta_i'\mathrm{K_c} + v_c)\right) - \phi\left(\mu_{iJ-1} - (\beta_i'\mathrm{X_i} + \delta_i'\mathrm{K_c} + v_c)\right)$$

where ϕ (.) is the cumulative normal function. Parameters μ_{iJ} , β_i and δ_i can be estimated by maximum likelihood using the appropriate command *oprobit* in STATA.

Interpretation Issues

Models of ordered choice cannot be simply interpreted as the most well-known linear model, such as OLS, WLS and so on. As far as the interpretation of results is concerned, they present some peculiarities which need further explanations. This section covers some important elements which will clarify and help in understanding the outcome of the results as they will be presented. In particular, three main issues are covered: first, the interpretation of the "raw" coefficients of the ordered probit; second, the marginal fixed effects; third, the goodness of model fit.

The interpretation of the estimates, β_i and δ_i, is not straightforward because W_i^* is measured in units where the magnitude is irrelevant (Wooldridge, 2002). Thus β_i and δ_i are not directly comparable. The relationship between the observed random variable, LS_i, and covariates, X_i and K_c is to be interpreted more as a directional relation than considering its magnitude. For instance, in a binary choice model, a positive regression coefficient indicates that an increase in the respective variable shift weight from category 0 into category 1, which means that the probability of category 1 increases and the probability of category 0 decreases. On the other hand, in a multi-choice framework the sign of β only unambiguously determines the direction of the first and last elements, respectively $Prob(LS_i = 1 \,|X_i, I_i, K_c, \varepsilon_i, v_c)$ and $Prob(LS_i = J \,|X_i, I_i, K_c, \varepsilon_i, v_c)$, while it does not always determine the direction of intermediate outcomes.

This last concept needs additional clarifications and an example will help with the interpretation. The example is based on a three category case. In fact, as previously mentioned, in this thesis responses of life satisfaction variables have been split in three levels of life satisfaction in order to facilitate the interpretation of the results. The analysis is applied to a life satisfaction measure which take three values: $LS_i = 1, 2, 3$.

For the sake of simplicity consider the visible variable $LS_i = X'\beta$. Thus, equation (10) and (11) would yield the following results:

(12)
$$Prob(LS = 1) = \phi(\mu_1 - \beta'X)$$
$$Prob(LS = 2) = \phi(\mu_2 - \beta'X) - \phi(\mu_1 - \beta'X)$$
$$Prob(LS = 3) = 1 - \phi(\mu_2 - \beta'X)$$

Figure 10 shows graphically the situation.

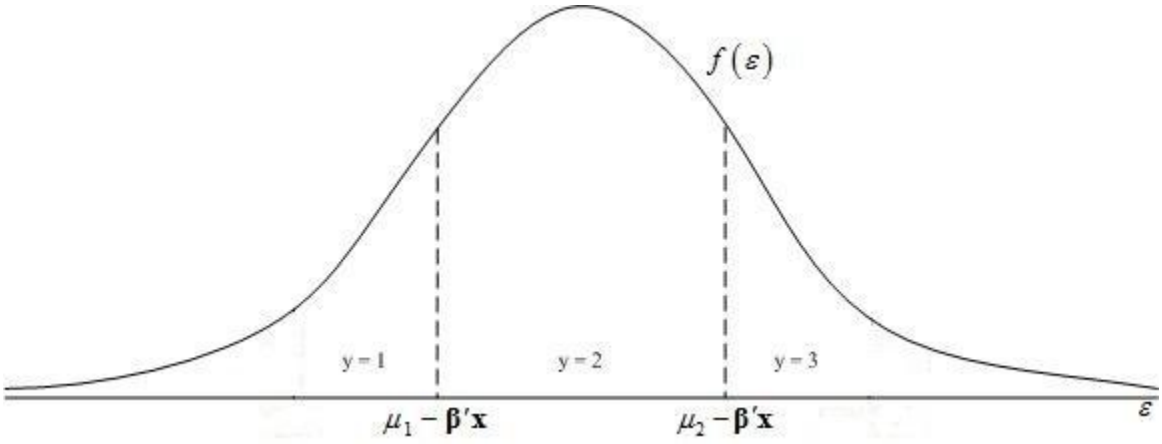


Figure 10 - Distribution of the error term in the ordered-probit model

An important take out from Figure 10 is that the cut-off locations change when the values of the explanatory variables change.

Figure 11 describes the effect of an increase in one of the explanatory variables. The solid curve shows the distribution of the latent and the visible variable. An increase in one of the X's (X_K) while holding the β constant is the same as shifting the entire distribution of outcome to the right (from the solid to the dashed line) with the thresholds remaining constant. As a result the probabilities that y takes on the values of 0, 1, and 2 changes. Clearly, as shown in Figure 11, $Prob(y = 1)$ decreases and $Prob(y = 3)$ increases. The $Prob(y = 2)$ may increase or decrease and, thus, the effect of an increase in one of the explanatory variables is ambiguous.

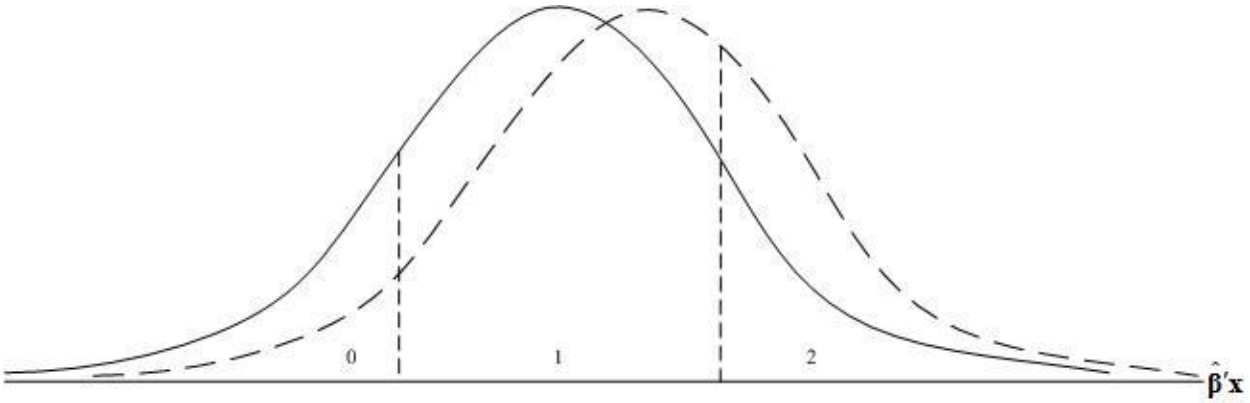


Figure 11 - A rise in one of the explanatory variables whose parameter is positive will shift the probability distribution of the outcome to the right (from the solid line to the dashed line)

It is easy to show this result algebraically. The three marginal effects of the three probabilities in equation (12) assuming $\beta_K > 0$, are:

(13)
$$\frac{\partial \Pr(LS=1)}{\partial X_K} = -\beta_K \, \phi(\mu_1 - \beta' X) < 0$$

$$\frac{\partial \Pr(LS=2)}{\partial X_K} = \beta_K \phi(\mu_2 - \beta' X) - \beta_K \phi(\mu_1 - \beta' X)$$

$$\frac{\partial \Pr(LS=2)}{\partial X_K} = \beta_K \, \phi(\mu_2 - \beta' X) > 0$$

Therefore two cases are possible for the interpretation of the marginal effect of the intermediate score:

Case 1

Life Satisfaction level	Sign of the Marginal Effect of the independent variable	Interpretation
0	-	If the LS level is 0 and the value of the independent variable increases, the probability to remain in level 0 is negative; thus the probability to move to level 1 increases
1	-	If LS level is 1 and the value of the independent variable increases, the probability to remain in level 1 is negative; thus the probability to move to level 2 increases
2	+	If LS level is 2 and the value of the independent variable increases, the probability to remain in level 2 is positive; thus the probability to come back to level 1 decreases

Case 2

Life Satisfaction level	Sign of the Marginal Effect of the independent variable	Interpretation
0	-	If the LS level is 0 and the value of the independent variable increases, the probability to remain in level 0 is negative; thus the probability to move to level 1 increases
1	+	If LS level is 1 and the value of the independent variable increases, the probability to remain in level 1 is positive; thus the probability to move to level 2 descreases
2	+	If LS level is 2 and the value of the independent variable increases, the probability to remain in level 2 is positive; thus the probability to come back to level 1 decreases

The tables show that, when there is an increase in the value of an independent variable, the overall probability to reach the second level of LS is higher in the first case than in the second. The difference is made by the sign of the coefficient in the intermediate level. The interpretation of the coefficients is the same but in the opposite way when the value of an independent variable decreases.

Another important interpretation issue is the way to measure fit in an ordered probit model.
For a linear regressor such as OLS the most common way to measure the goodness of the model is to compute the coefficient of determination, R^2, i.e. the proportion of the variation in the dependent variable that is explained by variation in the independent variables.
In particular R^2 is equal to:

(14)
$$R^2 \equiv 1 - \frac{RSS}{TSS} = \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (y_i - \bar{y})^2}$$

where $TSS = \sum_i (y_i - \bar{y})^2$ is the total sum of squares, $RSS = \sum_i (y_i - \hat{y}_i)^2$ is the sum of squares of residuals, y_i the observed data, $\bar{y}$ their mean and $\hat{y}_i$ are the predicted values derived from the regression analysis.
An equivalent statistic to R^2 does not exist for ordered choice models. Greene (2009) reports the following two reasons why the search of a measure of the goodness-of-fit is hard:

1. There is no "dependent variable". In fact, the observed variable is just a labeling convention for the real underlying latent variable.
2. There is no "variation" around the mean to be explained.

For these reasons, "*one needs to exert a considerable amount of caution in computing and reporting "measures of fit in this setting*". (Greene & Hensher, 2009)

In addition, remember that estimates from an ordered probit regression are maximum likelihood estimates reached through an iterative process. Estimates are not calculated to minimize variance, so that is another reason why the OLS approach to goodness-of-fit does not apply. However, to evaluate the goodness-of-fit of ordered choice models, several "pseudo R^2" have been developed. These statistics are "pseudo" because they are bounded by 0 and 1 with higher values indicating better model fit. In any case, they cannot be interpreted as a measure of the proportion of variation explained.

A measure of fit that is quite commonly reported in the contemporary literature is the McFadden's (1974) "pseudo R^2" which is computed as:

(15)

$$Pseudo\ R^2 = 1 - \frac{\log L_{Model}}{\log L_{No\ Model}}$$

where L_{Model} is the estimated likelihood of the model with predictors while $L_{No\ Model}$ is the estimated likelihood of the model without predictors.

The McFadden's pseudo R^2 possesses the over mentioned property of falling between 0 and 1 and increases with a better goodness-of-fit of the model. All pseudo R^2 in the thesis are McFadden's pseudo R^2.

4.2 Results and discussion

The previous section has introduced a framework in which individuals are assumed to derive utility from a series of determinants according to the country in which they live. Since welfare is not directly observable, life satisfaction is used as a proxy variable for estimating determinants of welfare. The underlying general model is one of a random utility model or latent regression model. The crucial characteristic of the model is the ordered nature of the observed outcomes and the correspondingly ordered nature of the underlying preference scale. Estimations are obtained through an ordered probit model. The coefficients obtained from the estimations help to understand the directional relations between independent variables and life satisfaction more than the magnitude of the influence. The model describes probabilities of outcomes and its goodness-to-fit can be assessed through a pseudo R^2.
All the elements are now there to move to the econometrical analysis.

This section provides the answers to the four hypotheses presented in the research questions. It is worthwhile recalling the hypotheses which are at the core of this thesis:

Hypothesis 1: Life satisfaction is positively affected by consumption, education, health, leisure time, environment and country growth.

Hypothesis 2: Life satisfaction is negatively affected by inequality and unemployment.

Hypothesis 3: The determinants of life satisfaction influence differently the well-being depending on the macroarea considered.

Hypothesis 4: GDP is not a good indicator for well-being.

The structure of this section is as it follows: first, the study of the determinants of individual well-being will be conducted in order to present a solution for hypothesis 1, 2 and 3; second, hypothesis 4 will be tested by comparing GDP to the innovative index developed using the results from the study of the determinants of well-being.

4.2.1 Hypothesis 1 - 2 - 3: A study on the determinants of welfare between and within macroareas

Determinants of life satisfaction have been studied through different specifications. The main specification tested for each macroareas is the following:

$$LS_{i,c,t} = \beta_1 \log(consumption)_{i,c,t} + \beta_2\, economic\ growth_{c,t} + \beta_3\, wealth_{i,c,t} + \beta_4\, health_{i,c,t} + \beta_5\, importance\ of\ leisure_{i,c,t} + \beta_6\, inequality_{c,t} + \sum Personal\ controls_{i,c,t} + \sum Country\ controls_{c,t} + v_c + \varepsilon_t + u_{i,c,t} \quad (16)$$

where $Personal\ controls_{\ i,c,t}$ is a vector of personal characteristics of the respondents which include educational level, whether employed or not, whether religious or not, age, age squared, gender and marital status; $Country_{c,t}$ is a vector including polity, leisure time and CO_2 emissions at a country level. As in Di Tella *et al.* (2005) a country fixed effect v_c and a wave fixed effect ε_t are also included in the specification. The first fixed effect captures unchanging cultural and institutional influences on reported life satisfaction within nations, and the second any global shocks that are common to all countries in each wave. No individual-specific effects can be included because the WVS-EVS dataset is made up of a series of cross sections and it is not a panel data.

Estimates for this specification are obtained including in STATA the option *cluster*, i.e. a robust variance estimate that adjusts for within-cluster correlation (Rogers, 1993) and also the option *robust,* i.e. Huber-White estimate of variance errors. Results of this specification are reported in Table 1 below for each macroarea. Key findings and discussion of the results are mainly based on the results from this specification.

Robustness of the results obtained in the first specification is tested through different specifications of the econometric model. Outcomes are collected in Table 2 to 7 (see Annex I). In particular in each table:

- column 1 reports results of the full specification presented above;
- column 2 tests the same specification as in column 1 without country variables and controls;
- column 3 tests the same specification as in column 1 without country variables;

- column 4 tests the same specification as in column 1 without robust errors;
- column 5 tests the same specification as in column 1 without option cluster but including dummy variables for each country.[24]

Throughout all specifications suggested survey weights are used so as to ensure that estimates are nationally representative for each country in each wave.
Due to large missing data on environmental awareness in AP and MEA, and health and wealth in EU, the first specification has been tested both excluding those variables which might hamper the analysis (column "1a") and in its full format (column "1b").

As a final remark, note that the coefficients from an ordered probit estimation, as the one reported in Table 1, can provide only with indication of the direction of the relations between the dependent variable and its covariates, and not their magnitude. In the thesis "raw" coefficients of ordered probit will serve the purpose. However, it is possible to have an estimate of the magnitude effect by computing the marginal effects as in equation (13). Marginal effects deliver a change in probability for each level of the dependent variable when a change in one of the independent variables happens *ceteris paribus*. Since results are consistent across all different specifications, outcomes of the marginal fixed effects in the different macroareas have been reported only for the first specification (see Table 10 in Annex I).

[24] Because of data limitations, column 5 cannot be always estimated over the full set of waves and countries.

Table 1. Relation between Life Satisfaction and various variables in the six macroareas

Results of regressions by ordered probit (std.errors in brackets).

	Macroareas					
Dependent Variable: Life satisfaction	*AP*[a]	*ECA*	*EU*[b]	*MEA*[a]	*LAC*	*NAAN*
Main variables of interest						
Log(consumption)	0.084*	0.167***	0.145***	0.086***	0.084***	0.032**
	(0.046)	(0.032)	(0.034)	(0.025)	(0.022)	(0.015
GDP growth	-2.780**	0.097***	0.081	2.382***	-1.733*	1.542
	(1.215)	(0.031)	(0.263)	(0.537)	(0.927)	(1.437)
Wealth	0.210***	0.222***		0.137*	0.118***	0.098***
	(0.061)	(0.037)		(0.074)	(0.013)	(0.031)
Health	0.382***	0.295***		0.165***	0.250***	0.408***
	(0.079)	(0.033)		(0.055)	(0.024)	(0.033)
Importance of Leisure	0.004	0.055***	0.125***	0.037	0.090***	0.08*
	(0.018)	(0.019)	(0.0146)	(0.025)	(0.015)	(0.046)
Inequality	0.341***	0.508***	-0.004	0.095	0.081*	-0.282
	(0.059)	(0.086)	(0.235)	(0.099)	(0.183)	(0.236)
Environmental Awareness		0.104***	0.089***		0.056**	0.017
		(0.026)	(0.019)		(0.023)	(0.012)
Country and Control variables						
Polity	-0.097***	-0.021***	0.091	-0.016	0.008	(omitted)
	(0.033)	(0.005)	(0.072)	(0.013)	(0.033)	-
Life Expectancy	-0.080**	-0.040***	0.050*		0.049	-0.0181
	(0.037)	(0.013)	(0.027)		(0.042)	(0.024
Leisure time	0.038***	-0.046***	0.025	0.009*	-0.019	0.053***
	(0.011)	(0.004)	(0.026)	(0.005)	(0.031)	(0.007)
Unemployed (dummy)	-0.039	-0.080*	-0.416***	-0.205***	-0.190***	-0.09
	(0.072)	(0.045)	(0.071)	(0.030)	(0.040)	(0.081)
Educational Level	0.023	-0.028*	0.053**	0.038***	-0.131***	-0.043***
	(0.016)	(0.015)	(0.0255)	(0.013)	(0.032)	(0.0125)
CO_2 emissions	0.135**	0.022***	0.022	0.060**	-0.012	-0.018
	(0.055)	(0.008)	(0.019)	(0.030)	(0.099)	(0.012)
Religious (dummy)	0.135	0.038	0.127***	0.045	0.138***	0.153***
	(0.099)	(0.040)	(0.027)	(0.032)	(0.022)	(0.03
Age	-0.010	-0.025***	-0.039***	-0.012**	-0.011*	-0.027***
	(0.015)	(0.005)	(0.004)	(0.005)	(0.006)	(0.004
Age squared	0.0002	0.0003***	0.0004***	0.000*	0.0001**	0.0003***
	(0.0002)	(0.0001)	(0.0000)	(0.000)	(0.000)	(0.000)
Male	-0.099***	-0.042*	-0.041**	-0.089**	0.0023**	-0.072**
	(0.019)	(0.025)	(0.020)	(0.042)	(0.019)	(0.038)
Married	0.136	-0.410	0.321***	-0.306***	-0.205	0.064
	(0.085)	(0.525)	(0.104)	(0.099)	(0.175)	(0.155)
Living together	0.142*	-0.486	0.271**	-0.498***	-0.319*	-0.13

	(0.074)	(0.529)	(0.110)	(0.108)	(0.191)	(0.144)
Divorced	-0.215***	-0.490	0.085	-0.525***	-0.425**	-0.352**
	(0.069)	(0.513)	(0.106)	(0.115)	(0.167)	(0.156)
Separated	-0.147	-0.730	-0.174*	-0.697***	-0.445**	-0.42**
	(0.261)	(0.511)	(0.089)	(0.241)	(0.190)	(0.201)
Widowed	0.166***	-0.486	0.035	-0.370***	-0.319	-0.283**
	(0.061)	(0.518)	(0.105)	(0.118)	(0.200)	(0.114)
Single	0.0129	-0.583	0.055	-0.423***	-0.408**	-0.337**
	(0.094)	(0.524)	(0.099)	(0.083)	(0.193)	(0.171)
Wave 4	-0.407***	0.283**	0.138	-0.136*	-0.363	-0.089
	(0.093)	(0.133)	(0.140)	(0.081)	(0.296)	(0.106)
Wave 5	(omitted)	0.473***	-0.103	-0.495**	-0.195	-0.092 *
	-	(0.072)	(0.163)	(0.216)	(0.219)	(0.05)
N	10459	12689	37948	15944	16974	10939
Num. Countries	4	9	22	7	9	4
Pseudo R^2	0.0979	0.1283	0.0913	0.0487	0.0424	0.089

Source: Authors' regressions.

a) The variable Environmental Awareness is omitted because of missing data. Please refer to column 1.1 of Tables 1 and 4 in Annex I to find regression including these variables too for macroarea AP and MEA respectively.
b) Variables Wealth and Health are omitted because of missing data. Please refer to column 1.1 of Tables 3 in Annex I to find regression including these variables too.

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Key Finding 1: Well-being is positively related with consumption, wealth, health and environment in all macroareas.

Unsurprisingly, increase in the level of consumption and level of wealth come together with higher level of life satisfaction. Results confirm the findings of a vast literature on the relation between income and welfare.[25] In particular they show that higher level of consumption is statistically significant in all areas of the world, comprising the most developed ones. As a consequence this result seems to advocate against existence of the so-called Easterlin Paradox. This topic deserves a deeper analysis. In particular, does consumption (or income) display diminishing returns as predicted by the Easterlin Paradox in our global sample? And what about within macroareas?

The way to test for global validity of Easterlin Paradox on a global scale is to include a variable "income" and "income squared" in a global regression and test it significance with respect to life satisfaction. As of Table 8, the results show that an increase in income entails an increase in the level of life satisfaction but with diminishing marginal returns, i.e. income squared has a negative coefficient. Figure 12 presents the situation.

Table 8. Testing Easterlin Paradox between and within macroares (extract)

The specifications chosen to test Easterlin Paradox are the one among others that guarantee the largest number of observations.
Results of regressions by ordered probit (std.errors in brackets).

	Macroareas						
Dependent Variable: Life satisfaction	*AP* [a]	*ECA*	*EU* [b]	*MEA* [a]	*LAC*	*NAAN*	*World*
Income[c]	0.083***	2.215***	0.067***	0.251***	0.165***	0.007***	0.054***
	(0.025)	(0.574)	(0.018)	(0.036)	(0.049)	(0.001)	(0.011)
Income squared	-3.203***	-99.312***	-2.510***	-10.267***	-7.111***	-0.244***	-1.849***
	(1.012)	(25.623)	(0.711)	(1.654)	(2.131)	(0.054)	(0.441)
N	10459	12689	37948	15944	16974	10939	106875
Num. Countries	4	9	22	7	9	4	56
Pseudo R^2	0.9774	0.9716	0.9153	0.9571	0.9585	0.9776	0.8241

Source: Authors' regressions.

a) The variable Environmental Awareness is omitted because of missing data.

b) Variables Wealth and Health are omitted because of missing data.

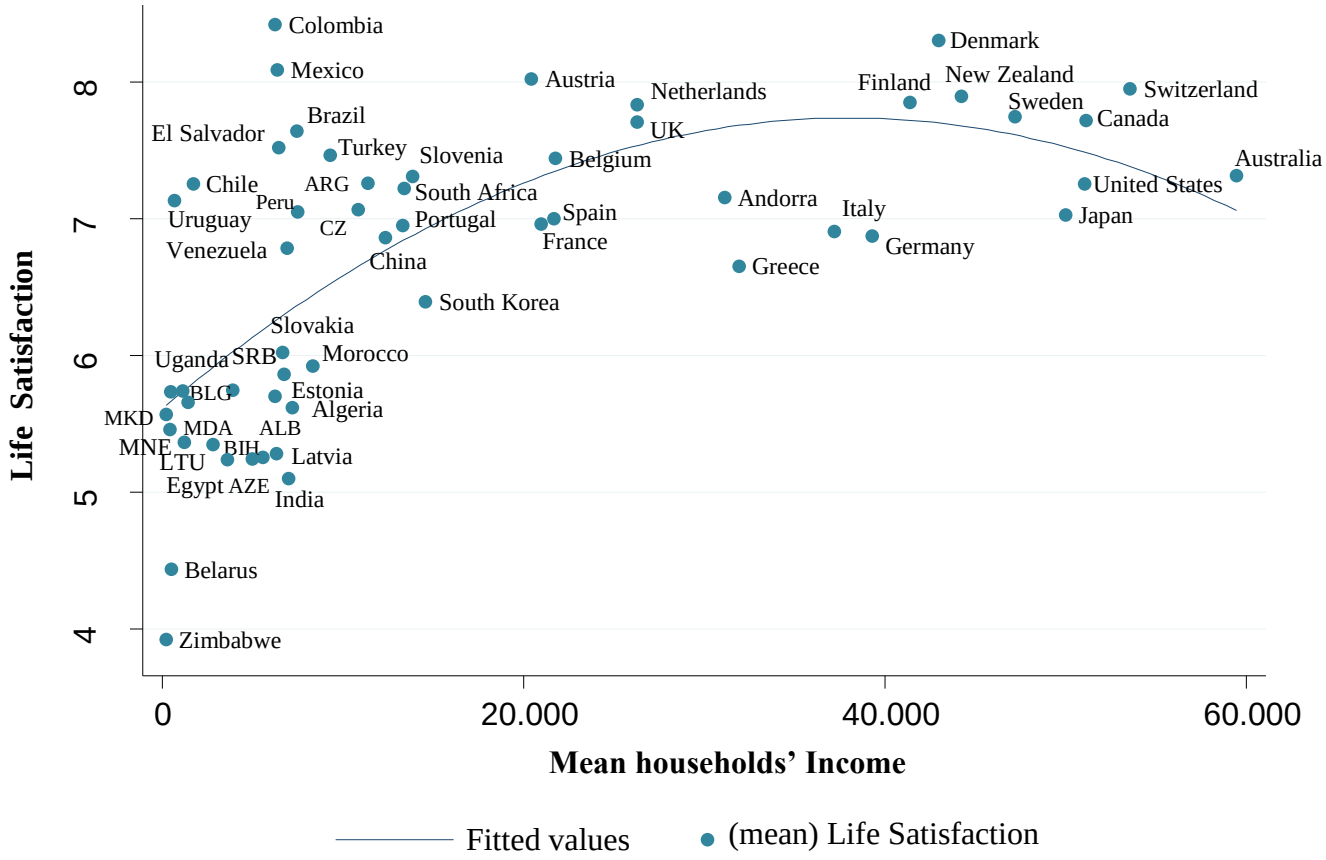
c) Income has been scaled in the regressions by a factor of 1000.

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

[25] Easterlin (1974), Di Tella *et al*. (2005) and Stevenson & Wolfers (2008).

Table 8 shows the presence of Easterlin Paradox both between, i.e. column World, and within macroareas, i.e. in each macroareas. Thus, the WVS - EVS dataset advocates for existence of the Easterlin Paradox both between and within macroareas.

Figure 12 - Easterlin Paradox in WVS-EVS Survey



As far as health is concerned, the variable confirms its role as one of the main driver for the well-being of people across all macroareas. The measure of subjective health for EU is not available for different years and thus it was omitted from the first specification. A second regression which includes this variable for the EU is reported in column 1b of Table 4. Nevertheless, the variable life expectancy seems like a reasonable substitute to health for the equation in Table 1; the sign is positive and significant at the 10% level.

Last but not least, the environmental awareness seems to positively affect welfare of people almost all over the world. Nowadays, this finding brings a whole new world into the old and

static paradigm of the identification of welfare with income and wealth. The evidence that caring about the environment has an effect on subjective well-being of people seems to be perfectly in tune with the emergence of an environmental awareness in the public conscience. According to research performed by the Urban Institute,[26] an economic and social policy research group, the number of so-called environmental NGOs, i.e. non-profit organizations dedicated to conservation and the environment between 1995 and 2005 rose faster than the number of non-profit groups overall, growing by 4.6 percent per year compared to 2.8 percent per year for all non-profits. The study shows that, on the side of a core group of prominent national organizations, there is a larger, fast growing group of regional, local and other specialized volunteer groups. People who engage in environmental conservation are usually also part of associations and public education organizations. In this sense, an environmental attitude, apart from increasing life satisfaction *per se*, can also enhance social relations and thus life satisfaction. The only area where this sense of importance for the environment seems to not be felt in a significant way is NAAN.

Key Finding 2: Inequality and well-being are positively related in Asia Pacific and Eastern Europe & Central Asia, while not significant in all the others.

The findings concerning the effect of the income distribution within a country, i.e. inequality, show the existence of a positive and significant relation between inequality and life satisfaction in both AP and ECA. This relation is robust to different specifications.

This finding, even though surprising at first sight, becomes more plausible when an analysis of the countries involved and some researches in the literature is done. In particular, three are the main sources of explanation. First, it is typical for the post-communist and communist countries to aspire to a higher inequality, after years of "excessive and enforced egalitarianism" (Hayek, 1960; Schoeck, 1960; Letwin, 1983); thus, for this country evidence of a non-homogeneous income distribution can add value to their life satisfaction (Oswald & Blanchflower, 2003; Haller & Hadler, 2006). Second, these results also find meaning because, as John Rawls puts it in the masterpiece "A theory of justice": inequality is tolerable if it is combined with positive perspective for an improvement of all and, thus, acceptable also to the less privileged groups (Rawls, 1972). Third, another source of theoretical explanation is the so-called Kuznets curve,

[26] See Straughan & Pollak (2008).

which is the graphical representation of Kuznets' hypothesis that economic inequality increases over time while a country is developing, and then after a certain average income is attained, inequality begins to decrease. Thus, according to this stream of literature, AP and ECA could still be on the mounting part of the Kuznets Curve.

On the contrary, estimates of the regressions are not statistically significant for MEA, EU, LAC and NAAN. Beyond the statistical significance, it is interesting to note that the only two regions in which the signs predict a negative impact on the dependent variable, are NAAN and EU. People in these countries will seem to suffer from an increase in inequality. Nevertheless, the insignificant relation in EU and NAAN can be justified by the idea that more developed countries being for the most market-oriented and capitalist societies recognize inequality as an intrinsic feature already established in their society and most likely simply take it for granted.

Key Finding 3: Leisure time does not affect well-being in Asia Pacific and Middle East & Africa.

According to Table 1, the importance of leisure time for individual life satisfaction has resulted not to be statistically significant in Asia Pacific and Middle East & Africa, while positive and statistically significant for the remaining four macroareas. As far as MEA is concerned, it is important to stress that the relation is quite close to be significant in the full specification (P>t-statistics=0.140 in column 1 of Table 5) and that the relation actually become significant in other specifications (column 3 and 4). On the contrary the relation for AP is much more robust.

The absence of a statistically significant relation in AP and MEA can find, among others, two explanations.

A first source of explanation is that being unemployment extremely low or practically inexistent, especially in countries such as China, India or the developing countries in Africa, people are simply dedicating entirely to their work, thus not conceiving free time as a positive element in their life. For AP this finding is also backed by the dummy variable *being unemployed* which is not significant, which once again can only be explained by the very low level of unemployment in those regions.

Second, this matter is strictly linked to the concept of leisure time itself. People in Asia or Africa as opposed to Europeans or Americans might have a different understanding of what importance

of leisure is. For some people in Asia and Africa leisure time might still mean hours subtracted from work and thus lower earnings.

In conclusion, while issues related to leisure time are critical concerns for developed countries, they are less pressing for poor countries (Stiglitz, Sen, & Fitoussi, 2009a).

Key Finding 4: GDP growth has a negative effect on life satisfaction for people in Asia and Latin America, a positive effect in Eastern Europe & Central Asia and Middle East & Africa, while it does not play any role in influencing the well-being of individuals in the most developed macroareas.[27]

Even though findings for GDP growth are very diverse according to macroareas, a pattern seems to arise; in fact, the predictions break the macroareas in two groups: developed and developing countries. Well-being of people living in NAAN and EU are not affected by changes in GDP, while citizens of the developing countries apparently are. These findings are particularly interesting.

First of all, a positive and robust relation between growth in GDP and well-being is found in ECA and MEA, in accordance with the idea that higher levels of income per capita result in higher life satisfaction (Di Tella, MacCulloch, & Oswald, 2005). However, for AP and LAC results suggest people tend to feel less satisfied. Evidence of the so-called "Unhappy Growth Paradox" finds large consensus among researches[28] especially in Latin American countries. This paradox of an association of strong growth and unsatisfied people happens in those countries that have enjoyed the highest growth rates in recent years, i.e. AP and LAC, especially if compared to pears with similar income levels but that have grown less. This dissatisfaction in rapidly growing countries can be seen as the result of the accelerated increase in expectations of material consumption, and competition for economic and social status (Development in the Americas, 2008).

[27] The variable Economic Growth as reported in Table 1 to 7 is computed as the total growth over a period of 5 years. Robustness of results have also been tested over a period of 2, 7 and 10 year average and have yielded consistent results.

[28] Development in the America (2008), Juan Camilo Chaparro (2008).

But perhaps the most striking result is that neither Western Europe nor North America seem to give importance to growth of GDP. This is an especially crucial result if interpreted in the face of the recent crisis. People in most developed countries are less and less convinced that growth (or loss) in GDP could be a good indicator for their well-being. The relation between well-being and GDP will be studied more in details in the next section.

Key Finding 5: Education and unemployment have an indirect influence on well-being through their effect on income.

Evidence for this finding can be found in the regressions of Table 9. In Table 9 income is regressed against the variables of interest education and employment status while controlling for a set of personal, i.e. age, age squared and gender as well as a set of country variables, i.e. the mean income level,[29] total hours worked, unemployment rate and mean years of schooling. An extract of Table 9 is provided here below.

Table 9. Relation between Income, Education and Employment status (extract)
Results of regressions by ordinary least squares (std.errors in brackets).

	Macroarea					
Dependent Variable: Log(Income)	*AP*	*ECA*	*EU*	*MEA*	*LAC*	*NAAN*
Education	0.420*	0.359***	0.112**	0.693***	0.565***	0.272***
	(0.141)	(0.038)	(0.045)	(0.175)	(0.063)	(0.036)
Unemployed (dummy)	-0.220***	-0.533***	-0.589***	-0.522***	-0.237***	-0.585**
	(0.048)	(0.058)	(0.065)	(0.058)	(0.019)	(0.200)
N	12575	21312	44287	16634	23297	11866
Num. Countries	4	11	24	7	9	4
R^2	0.52	0.61	0.60	0.44	0.45	0.2277

Source: Authors' regressions

a) Country average income has been scaled in the regressions by a factor of 1000

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three1%. No asterisk indicates that the coefficient is not statístically different from zero.

[29] Mean income level is utilized as a proxy for productivity in accordance with the neo classical marginal productivity theory of wages as in Clark (1886) and Wisksell (1898).

The Table shows significant and identical relations across macroareas. People who achieved higher levels of education can expect bigger salaries and more profitable revenues. At the same time, unemployment enters in the analysis as a detrimental effect on income, and this does not come as a surprise.
As proven previously, consumption (and income) clearly affects quality of life. Unemployment and education play an important role in determining income and therefore also consumption, which in turn affects well-being.

Key Finding 6: The well-being is not influenced by the same determinants across the world, but according to macroareas.

All the information reported in the *Key Findings 1* to *5* show the existence of a portrait of human well-being which cannot be untied from the socio-cultural belonging of individuals. This result is utterly important in which it brings a new perspective in the world of well-being measurement. The consideration of the cultural belonging is one of the hardest features of human to capture; it belongs to that part of intangible aspects of human life which could never be properly measured by economists or statisticians. The authors believe that splitting the analysis of countries in macroareas and comparing the countries not across the globe but on the contrary with a selected group of peers, could help recognizing that, even though all human being strive to a common goal, i.e. reach life satisfaction, the ways how to reach that goal are multifold. In this sense, an ideal measure of well-being should take into consideration that welfare of people is inevitably connected to the beliefs, habits and background of the society in which they live, and even though the very globalized world of today, many differences still survive between regions of the world.

4.2.2 Hypothesis 4: Is GDP a good indicator of well-being?

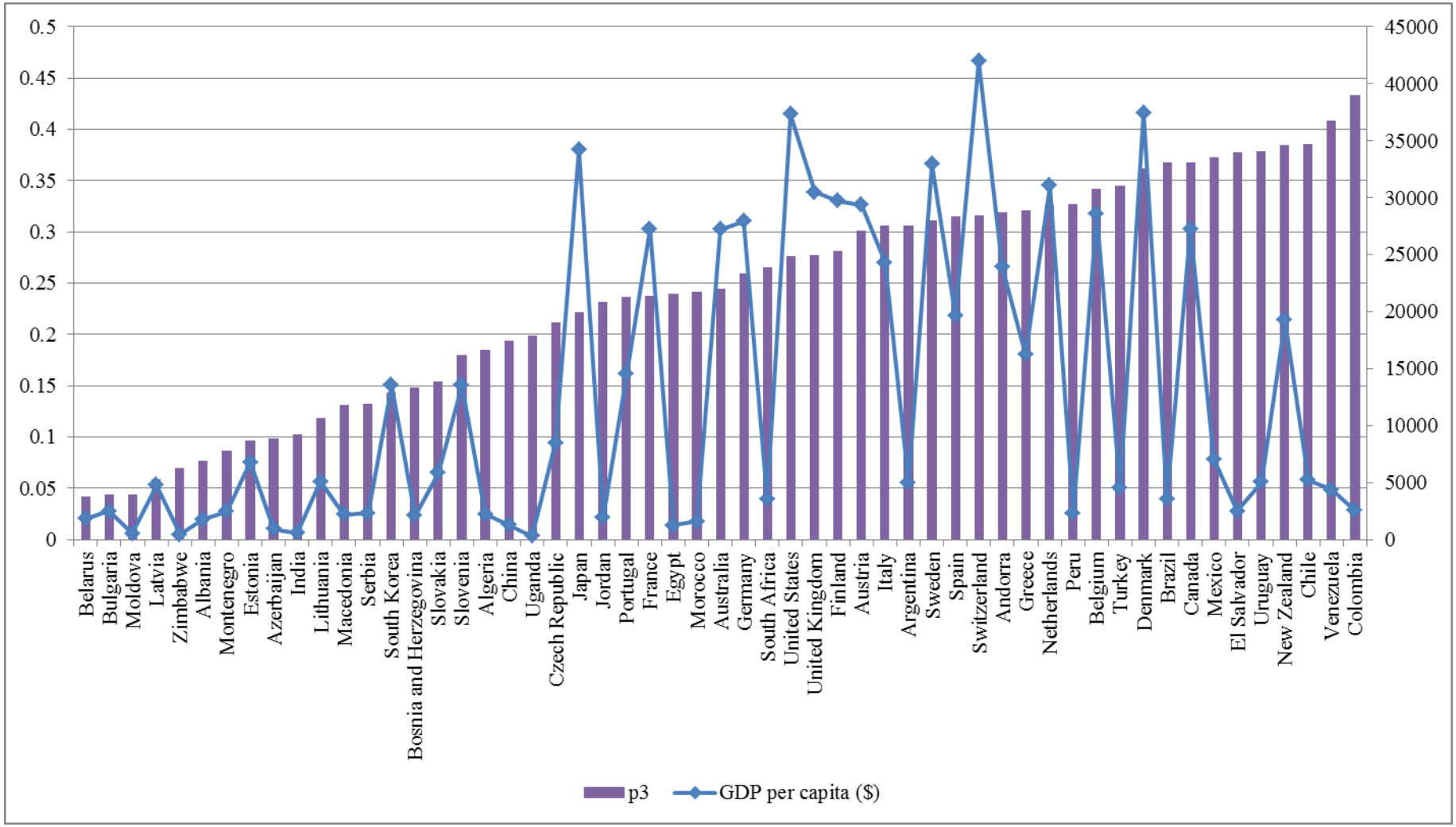
This fourth hypothesis will be tested using a descriptive approach and thus through a graphical analysis in which the probabilities to belong to the three different levels of life satisfaction are compared to GDP. In particular the goodness of GDP as a measure of well-being will be put

against the aggregate predicted probabilities computed after running the full specification for each macroarea. Thus, each country has a certain probability of being in one of the three level of life satisfaction. These three probabilities are indicated as *p1* (probability of belonging to the lowest tier of life satisfaction), *p2* (probability of belonging to the middle tier of life satisfaction) and *p3* (probability of belonging to the highest tier of life satisfaction). The level of the predicted probability in a country is obtained aggregating all the individuals' predicted probabilities, *p1 p2* and *p3*. In this fashion, the measurement of well-being at macro level does reflect the average *p1 p2* and *p3* of all the country's citizens. Note that the sum of *p1, p2* and *p3* at individual level sum to 1.

Key Finding 7: GDP is not a robust indicator of well-being, as it is not reliable to compare countries' welfare both between and within macroareas.

The first and most natural comparison to conduct is the one between *p3* and GDP. Indeed, if GDP is a good proxy of well-being, countries with a high level of GDP should also report higher level of *p3*, which means there is a high percentage of individuals who are very satisfied of their lives. However, this evidence has not proven to be valid (Figure 13). Figure 13 reports the level of *p3* (columns) and the GDP per capita (diamonds) converted in US$ at current prices. Countries are ranked according to *p3*. From the many kinks of the straight line that connects the different observations of GDP, it is clear that *p3* and GDP do not follow the same trend. The line continuously fluctuates, proving that the ranking of country according to *p3* does not correspond to an increase in the corresponding level of GDP.

Figure 13 - Countries' ranking according to *p3*



In conclusion, this first analysis seems to advocate for a lack in robustness of GDP as a good indicator of subjective well-being, at least in what it concerns the power to predict the probability of citizens to report a very high level of life satisfaction.

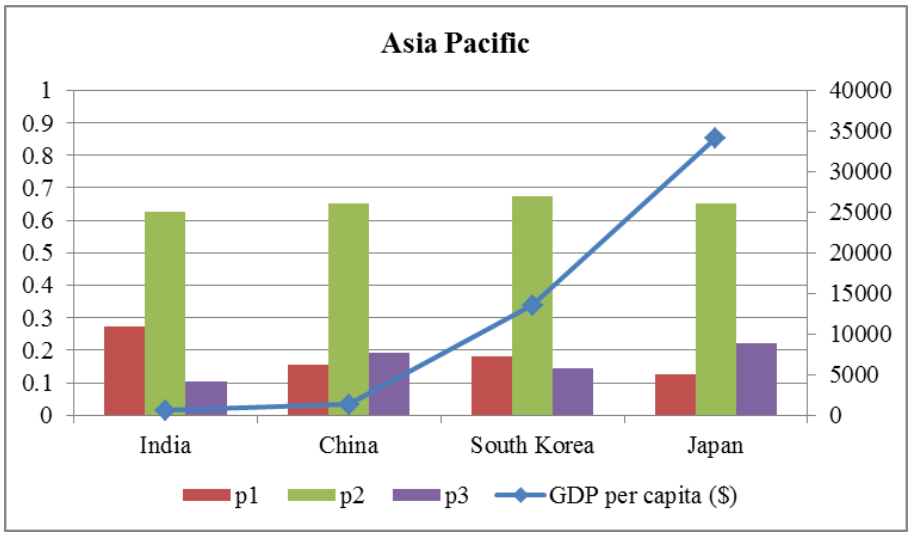
However, in order to provide with a more robust answer to Hypothesis 4, the next step is to test if this finding can be confirmed also within each macroareas and for all levels of life satisfaction.

In order to do so, the same relation is investigated now within each macroarea, but with a more in-depth analysis. In particular, GDP is compared to the probability of belonging to all three levels of life satisfaction jointly. The reason behind this analysis is that since *p1 p2* and *p3* sum to one, it is essential to understand the distribution of the three probabilities together. For instance, if two countries would be compared only on the basis of their level of *p2*, the analysis would miss the relevance of the extreme probabilities *p1* and *p3*. Thus, the only way to tackle Hypothesis 4 is to look at the distribution of three probabilities jointly with GDP in a single picture.

For instance, comparing GDP with the level of *p1*, *p2* and *p3* in the Asia Pacific region it is possible to find two contrasting trends (Figure 14). Take India and Japan first. India has a much lower GDP per capita than Japan associated with an higher level of *p1*, i.e. being unsatisfied, and a lower probability of *p3*, being very satisfied. The level of *p2* is similar in two countries and thus it does represent a useful term of comparison. In this first case GDP is a good predictor of individual well-being. But is it reliable? If China and South Korea are compared, their levels of *p1*, *p2* and *p3* appear quite similar. Instead, if the two countries are compared in terms of GDP they are very distant.

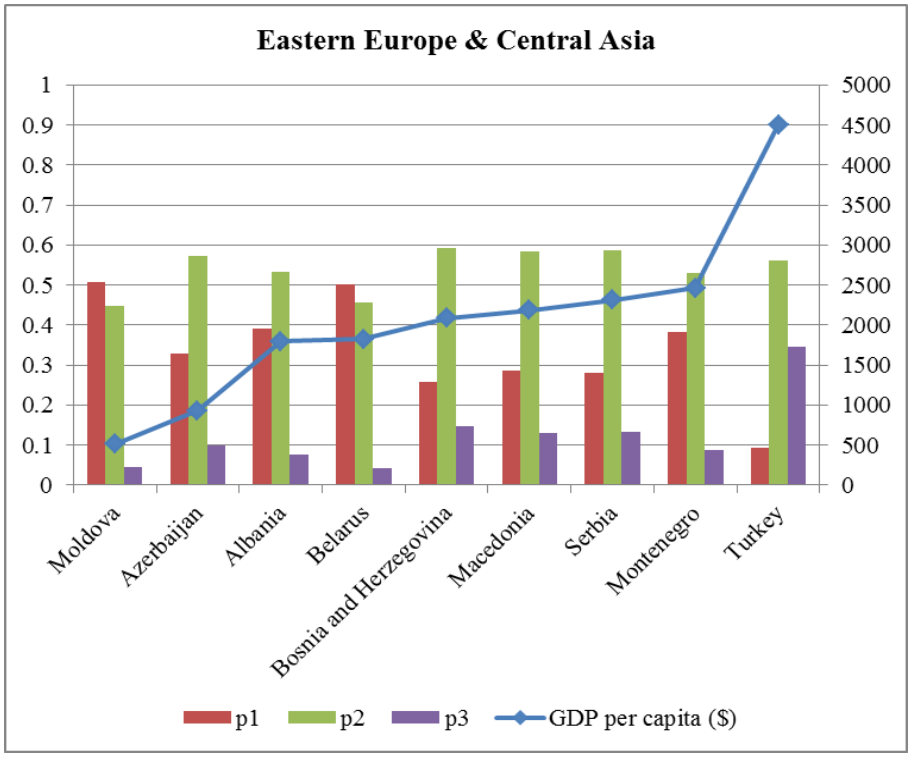
The simple possibility of finding one case where GDP fails so blatantly provides with the evidence that GDP is not a good indicator of well-being in Asia Pacific.

Figure 14 - AP three-level scale graph



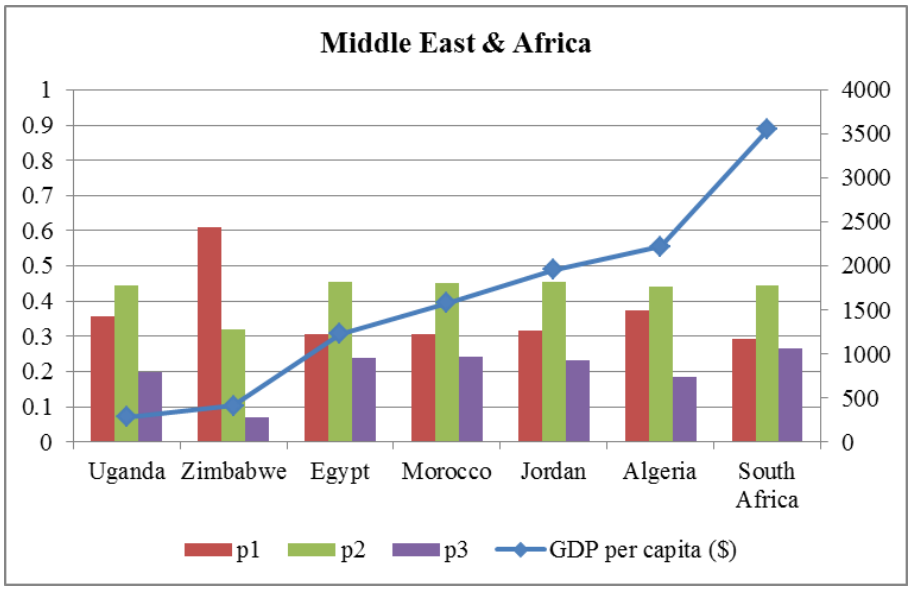
The same reasoning can be made for countries as Moldova and Belarus in macroarea ECA (Figure 15): GDP is incapable of tracing the change in the reported life satisfaction measure.

Figure 15 - ECA three-level scale graph



Egypt, Morocco, Jordan and South Africa provide with evidences that GDP fails also in MEA (Figure 16).

Figure 16 - MEA three-level scale graph



In order to accommodate for an easier analysis of the European sample, European countries have been split in two groups: Europe (1) which correspond to the countries that belong to EU15[30] plus Switzerland, and Europe (2) which includes the remaining ones, i.e. the more recent candidate entrants.

Figure 17 reporting results from Europe (1) also presents the same discrepancies between the ranking of probabilities and the ranking of GDP, as already shown in macroareas AP, ECA and MEA. In fact, for quite a stable level of *p2* across countries, *p3* and *p1* are very volatile, and not in a way that respect the ranking according to GDP. In addition, if Spain, Belgium and Switzerland are compared their *p1, p2* and *p3* are essentially the same, while the three countries lies in completely different positions of the GDP scale.

Key Finding 7 is also confirmed in region Europe (2). Despite the overall ascending trend of *p3* and the diminishing of *p1* which would advocate for GDP as a good proxy for well-being in this area, it still fails in explaining the ranking of Estonia, Lithuania and Slovakia.

[30] EU15 represents the group of countries which belong to European Union in 1995.

Figure 17 - Europe (1) three-level scale graph

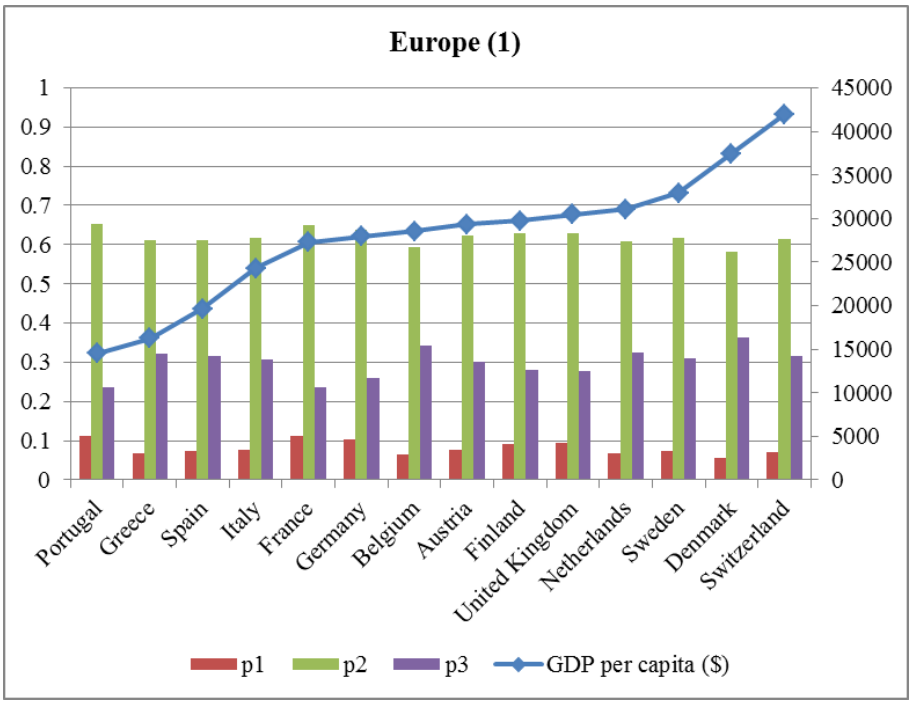
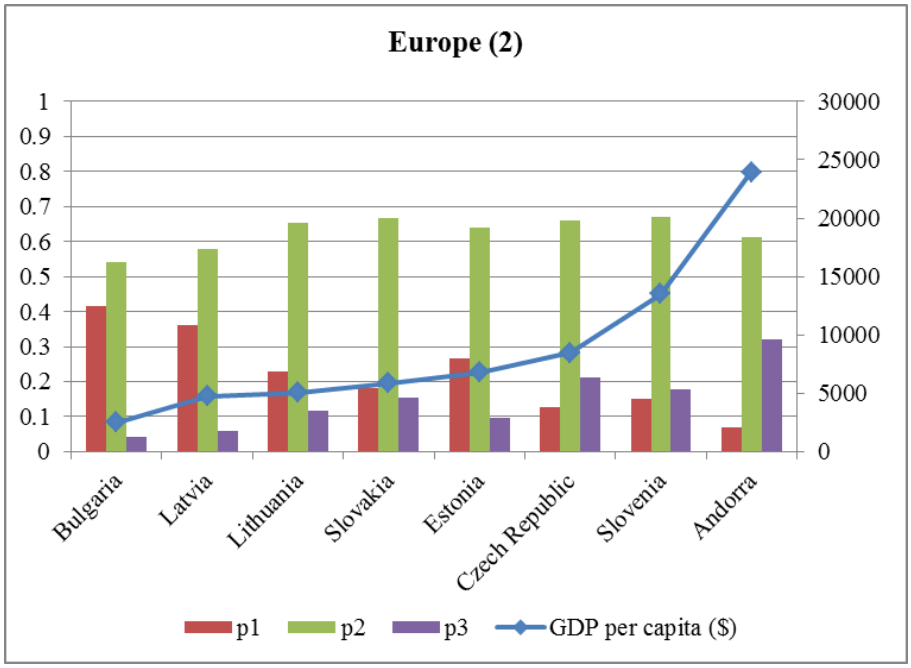
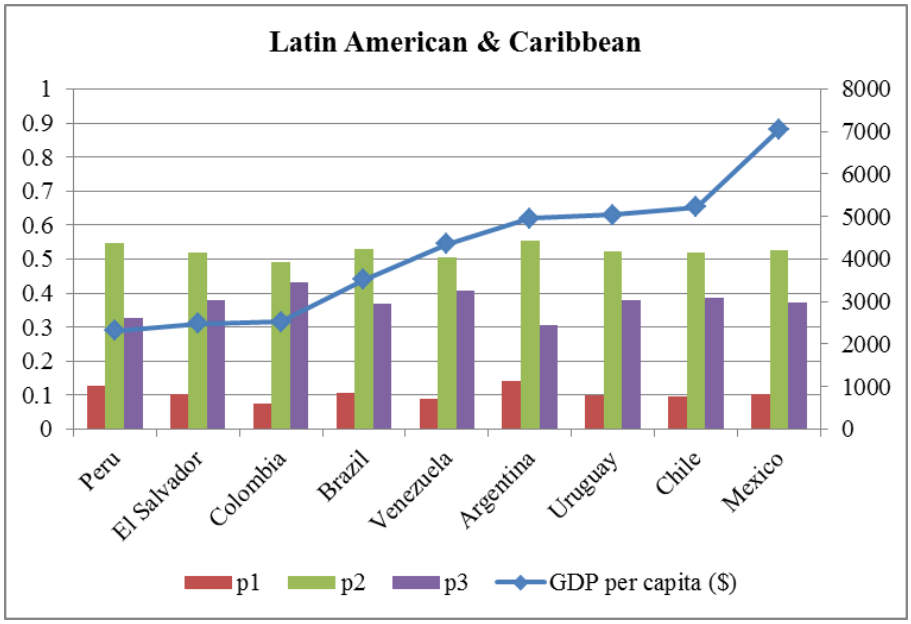


Figure 18 - Europe (2) three-level scale graph



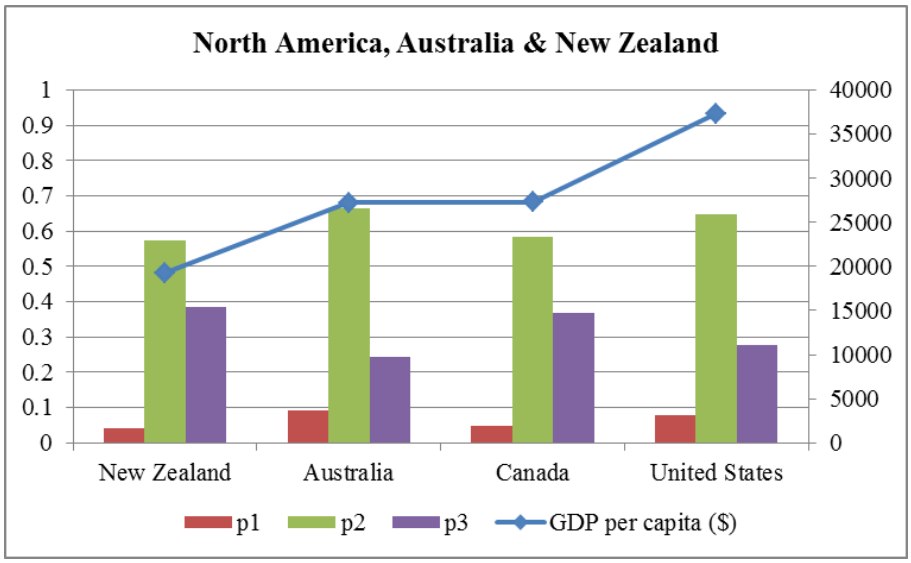
As far as the region LAC (Figure 19) is considered, it is straightforward to note that all Latin American and Caribbean countries share approximately the same probabilities distribution between the three levels of life satisfaction, with a very high probability to belong to *p2* and *p3*. GDP for instance completely fails to recognize the difference existing between levels of life satisfaction in Colombia and Brazil.

Figure 19 - LAC three-level scale graph



In macroarea NAAN (Figure 20) the GDP does not deliver better results. In fact, New Zealand is ranked forth terms of GDP while it should be number one if ranked according to probabilities. On the contrary, United States, which is the first in terms of GDP per capita, should be third according to life satisfaction probabilities.

Figure 20 - NAAN three-level scale graph



In conclusion, from this analysis, the main critic moved to GDP concerns its robustness in ranking the welfare of countries. Although inside macroareas there are some examples where GDP ranking matches the ranking according to probabilities well, these evidences are offset by a number of contradictory examples. In other words, depending on which countries are selected to make the comparison the results can be both that high-GDP countries have also high satisfaction level and that low-GDP countries have the same high level of life satisfaction, and *vice versa*. Therefore, considering the number of cases in which the two measures are totally contrasting, GDP is not reliable to compare countries' welfare both between macroareas and within macroareas.

To test consistency of results presented in *Key Finding 7*, the same type of analysis has been conducted in a case where life satisfaction has been classified in only two steps. This methodology thus delivers a "satisfied/unsatisfied" outcome which helps making even more evident the relation between GDP and well-being. Due to the presence of only two levels, the estimation of results was obtained with probit instead of ordered probit.

The set of graphs with the two-level scale for all macroareas are reported in Annex II.

4.3 Final remarks

The purpose of the research project has been to assess countries' welfare starting from the perception that people themselves have their own individual subjective well-being.

Hence, through a subjective approach this thesis has tested the impact of various determinants on individuals' well-being according to macroareas in order to understanding how much they could affect the aggregate welfare. Moreover, the research has allowed to derive an innovative method to rank countries' welfare from subjective measures of well-being, i.e. according to the probability of belonging to a certain level of life satisfaction. The last step has been to compare this measure to GDP with the aim to prove that GDP is not a robust and reliable proxy for welfare.

More in details, the research has yielded the following findings:

Key Finding 1: Well-being is positively related with consumption, wealth, health and environment in all macroareas.

Key Finding 2: Inequality and well-being are positively related in Asia Pacific and Eastern Europe & Central Asia, while not significant in all the others.

Key Finding 3: Leisure time does not affect well-being in Asia Pacific and Middle East & Africa.

Key Finding 4: GDP growth has a negative effect on life satisfaction for people in Asia and Latin America, a positive effect in Eastern Europe & Central Asia and Middle East & Africa, while it does not play any role in influencing the well-being of individuals in the most developed macroareas.

Key Finding 5: Education and unemployment have an indirect influence on well-being through their effect on income.

Key Finding 6: The well-being is not influenced by the same determinants across the world, but according to macroareas.

Key Finding 7: GDP is not a robust indicator of well-being, as it is not reliable to compare countries' welfare both between and within macroareas.

The above findings may be summarized in few lines that enclose the overall answer to research question. For a long time GDP has been criticized as measure of countries' welfare in so far as it lacks in incorporating several aspects of human life that influence people's well-being. This thesis has therefore proved how this deficiency is true and real since there are aspects as consumption, wealth, health, environment, inequality, leisure time, country growth, education and unemployment, which contribute to shape the welfare, which are not included in GDP calculation. Consequently, if GDP is used as a measure to rank countries, this would lead to wrong results. Indeed, GDP fails in giving an accurate indication of how much people, considering their personal characteristics, their primary needs and the country they live, feel satisfied in their own lives.

Chapter 5: Conclusion

For over half a century, GDP has been severely criticized as not adequately capturing human welfare. All the same, GDP has maintained a firm position as a dominant economic indicator. Indeed, most economists in business and governments, professors of economics, journalists, policy makers and politicians continue to recognize much importance to GDP and to call for unconditional GDP growth as a term of evaluation of the living standards of different countries. An independent observer might therefore conclude that GDP, although the critics on its shortcomings, is still a good indicator for judging not only the position of an economy, but also its welfare across countries and over time.

In such a context, this thesis aims at unveiling the evident paradox that surrounds the persistence of GDP against its critics, through a sound study of the determinants of individuals' welfare, first, and then through an innovative way to test whether or not GDP might still actually be a good measure for countries' welfare.

The thesis started by presenting the critics moved to GDP and retracing the history of the most relevant alternative measures. Among other approaches, choice was given to the subjective well-being approach because of two reasons: first because it represents an innovative and mostly still uncovered domain, and second, because it provides an excellent ground for the study of the determinants of individual's welfare.

The study of the determinants of well-being was the first essential step. The analysis of the determinants of life satisfaction was conducted using data from the most recent waves of the WVS-EVS surveys. The main variable of interest was the subjective well-being of agents which came in the form of answers to the question *"How satisfied are you with life as a whole?"*. After an examination of the estimates obtained with ordered probit, the authors concluded that there is statistical evidence that people welfare, as a whole, is influenced by consumption, wealth, health, environment, inequality, leisure time, country growth, education and unemployment. However, individuals living in different regions of the world do not always share the same determinants of well-being.

The second step was the assessment of GDP robustness in measuring welfare. The persuasive evidence from the comparison between GDP and an index based on the probabilities to belong to

a certain level of life satisfaction, led the authors to conclude that GDP cannot be considered a good proxy for individuals' well-being.

The novelty and relevance of this thesis is encompassed in the method developed. This is innovative for which it considers the socio-cultural belonging of individuals and it introduces a comparison between countries based on the probability of their citizens being satisfied with their lives.

In conclusion, the results are especially relevant because they provide new evidences that GDP is a misplaced measure for assessing people's well-being. When different countries are compared in terms of their GDP per capita, it is revealed who is, between the average citizen belonging to one country or another, the richer and the poorer, but not who is the more satisfied. GDP therefore misses the element that would make it a good measure of well-being: it does not recognize how much people are satisfied by their life. In conclusion, a deeper understanding of the subjective well-being approach presents a good solution to accommodate the ever growing interest by world leaders to find new ways to consider what truly counts in their citizens' lives.

Shortcomings and improvements

The first main critic that can be moved to this thesis is related to the approach used for the analysis, i.e. the subjective approach. Indeed, the intrinsic limitation of some subjective measures is that they cannot be validated by the relative objective measures of the same phenomena, simply because there are no obvious external benchmarks. However, if a wider range of measures is taken into account, it is possible to find rational justifications for using subjective measures. For example, people's self-reported well-being is often compared with the frequency and intensity of people's smiles or with reports provided by other persons, and this do confirm that these measures have some validity against these benchmarks (Krueger, Kahneman, Schkade, Schwarz, & Stone, 2008).

Moreover, in order to overcome definitively this critic, there is the need to further improvements of the current statistical data in terms of number of variables considered and gathered, and quality of data. As also recommended in Stiglitz, Sen and Fitoussi paper (2009a, p. 15) *"steps should be taken to improve measures of people's health, education, personal activities and*

environmental conditions. In particular, substantial effort should be devoted to developing and implementing robust, reliable measures of social connections, political voice, and insecurity that can be shown to predict life satisfaction". More in general, surveys should be designed to assess as many aspects of human life as possible.

The second main critic concerns the quality of WVS-EVS data. In fact, the database used although is one of the most accredited and complete, misses of data on several countries and does not cover all the years. Consequently, the results obtained from the regressions and affected by this weakness, may be slightly biased.

Doubtlessly, new efforts are required to gather new and more complete data from as many countries as possible. This could definitively lead to a better specification of variables and macroareas. In particular, efforts should focus more on the collection of data at individual level, of both tangible and intangible elements. Moreover, the WVS-EVS dataset should also invest energies in the creation of a panel data, thus gathering observations from the same set of individuals in different years over time. These improvements could allow for better analysis of changes in variables over time, both at micro and macro level.

Another central improvement set forth by this thesis is the importance of the consideration of people well-being as inevitably affected by cultural and geographical belonging. Future measures of well-being will need to take "provenance" into consideration. This can be accomplished in either two ways: a) developing a method for taking direct account of the geo-cultural belonging; b) differentiating the measures according to macroareas, so as to provide with a fair comparison between peers which share a common background and potential aspirations.

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Annex I: Tables of regressions

Table 1. Relation between Life Satisfaction and various variables in the six macroareas

Results of regressions by ordered probit (std.errors in brackets).

	Macroarea					
Dependent Variable: Life satisfaction	*AP*[a]	*ECA*	*EU*[b]	*MEA*[a]	*LAC*	*NAAN*
Main variables of interest						
Log(consumption)	0.084*	0.167***	0.145***	0.086***	0.084***	0.032**
	(0.046)	(0.032)	(0.034)	(0.025)	(0.022)	(0.015
GDP growth	-2.780**	0.097***	0.081	2.382***	-1.733*	1.542
	(1.215)	(0.031)	(0.263)	(0.537)	(0.927)	(1.437)
Wealth	0.210***	0.222***		0.137*	0.118***	0.098***
	(0.061)	(0.037)		(0.074)	(0.013)	(0.031)
Health	0.382***	0.295***		0.165***	0.250***	0.408***
	(0.079)	(0.033)		(0.055)	(0.024)	(0.033)
Importance of Leisure	0.004	0.055***	0.125***	0.037	0.090***	0.08*
	(0.018)	(0.019)	(0.0146)	(0.025)	(0.015)	(0.046)
Inequality	0.341***	0.508***	-0.004	0.095	0.081*	-0.282
	(0.059)	(0.086)	(0.235)	(0.099)	(0.183)	(0.236)
Environmental Awareness		0.104***	0.089***		0.056**	0.017
		(0.026)	(0.019)		(0.023)	(0.012)
Country and Control variables						
Polity	-0.097***	-0.021***	0.091	-0.016	0.008	(omitted)
	(0.033)	(0.005)	(0.072)	(0.013)	(0.033)	-
Life Expectancy	-0.080**	-0.040***	0.050*		0.049	-0.0181
	(0.037)	(0.013)	(0.027)		(0.042)	(0.024
Leisure time	0.038***	-0.046***	0.025	0.009*	-0.019	0.053***
	(0.011)	(0.004)	(0.026)	(0.005)	(0.031)	(0.007)
Unemployed (dummy)	-0.039	-0.080*	-0.416***	-0.205***	-0.190***	-0.09
	(0.072)	(0.045)	(0.071)	(0.030)	(0.040)	(0.081)
Educational Level	0.023	-0.028*	0.053**	0.038***	-0.131***	-0.043***
	(0.016)	(0.015)	(0.0255)	(0.013)	(0.032)	(0.0125)
CO_2 emissions	0.135**	0.022***	0.022	0.060**	-0.012	-0.018
	(0.055)	(0.008)	(0.019)	(0.030)	(0.099)	(0.012)
Religious (dummy)	0.135	0.038	0.127***	0.045	0.138***	0.153***
	(0.099)	(0.040)	(0.027)	(0.032)	(0.022)	(0.03
Age	-0.010	-0.025***	-0.039***	-0.012**	-0.011*	-0.027***
	(0.015)	(0.005)	(0.004)	(0.005)	(0.006)	(0.004)
Age squared	0.0002	0.0003***	0.0004***	0.000*	0.0001**	0.0003***
	(0.0002)	(0.0001)	(0.0000)	(0.000)	(0.000)	(0.000)

Male	-0.099***	-0.042*	-0.041**	-0.089**	0.0023**	-0.072**
	(0.019)	(0.025)	(0.020)	(0.042)	(0.019)	(0.038)
Married	0.136	-0.410	0.321***	-0.306***	-0.205	0.064
	(0.085)	(0.525)	(0.104)	(0.099)	(0.175)	(0.155)
Living together	0.142*	-0.486	0.271**	-0.498***	-0.319*	-0.13
	(0.074)	(0.529)	(0.110)	(0.108)	(0.191)	(0.144)
Divorced	-0.215***	-0.490	0.085	-0.525***	-0.425**	-0.352**
	(0.069)	(0.513)	(0.106)	(0.115)	(0.167)	(0.156)
Separated	-0.147	-0.730	-0.174*	-0.697***	-0.445**	-0.42**
	(0.261)	(0.511)	(0.089)	(0.241)	(0.190)	(0.201)
Widowed	0.166***	-0.486	0.035	-0.370***	-0.319	-0.283**
	(0.061)	(0.518)	(0.105)	(0.118)	(0.200)	(0.114)
Single	0.0129	-0.583	0.055	-0.423***	-0.408**	-0.337**
	(0.094)	(0.524)	(0.099)	(0.083)	(0.193)	(0.171)
Wave 4	-0.407***	0.283**	0.138	-0.136*	-0.363	-0.089
	(0.093)	(0.133)	(0.140)	(0.081)	(0.296)	(0.106)
Wave 5	(omitted)	0.473***	-0.103	-0.495**	-0.195	-0.092*
	-	(0.072)	(0.163)	(0.216)	(0.219)	(0.05)
N	10459	12689	37948	15944	16974	10939
Num. Countries	4	9	22	7	9	4
Pseudo R^2	0.0979	0.1283	0.0913	0.0487	0.0424	0.089

Source: Authors' regressions.

a) The variable Environmental Awareness is omitted because of missing data. Please refer to column 1.1 of Tables 1 and 4 in Annex I to find regression including these variables too for macroarea AP and MEA respectively.
b) Variables Wealth and Health are omitted because of missing data. Please refer to column 1.1 of Tables 3 in Annex I to find regression including these variables too.

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 2. Relation between Life Satisfaction and various variables in Asia Pacific

Results of regressions by ordered probit (std.errors in brackets).

	Asia Pacific					
	Specification					
Independent Variables	*1a*	*1b*	*2*	*3*	*4*	*5*
Log (Consumption)	0.084*	0.077	0.132**	0.133**	0.084**	0.084***
	(0.046)	(0.050)	(0.059)	(0.059)	(0.046)	(0.014)
GDP growth	-2.780**	-3.402**	0.736***	0.764***	-2.780***	-2.780**
	(1.215)	(1.403)	(0.287)	(0.284)	(1.215)	(1.137)
Wealth	0.210***	0.199***	0.194***	0.194***	0.210***	0.210***
	(0.061)	(0.060)	(0.061)	(0.059)	(0.061)	(0.015)
Health	0.382***	0.357***	0.331***	0.358***	0.382***	0.382***
	(0.079)	(0.066)	(0.076)	(0.075)	(0.079)	(0.016)
Importance of Leisure	0.004	-0.045	-0.001	0.080	0.004	0.004
	(0.018)	(0.043)	(0.016)	(0.015)	(0.018)	(0.016)
Inequality	0.341***	0.356***	0.010	0.017	0.341***	0.341***
	(0.059)	(0.061)	(0.169)	(0.159)	(0.059)	(0.129)
Environmental Awareness		0.224***				
		(0.037)				
Polity	-0.097***	-0.107***			-0.097***	-0.097***
	(0.033)	(0.036)			(0.033)	(0.035)
Life Expectancy	-0.080**	-0.095**			-0.080**	-0.080
	(0.037)	(0.040)			(0.037)	(0.059)
Leisure time	0.038***	0.024***			0.038***	0.038*
	(0.011)	(0.009)			(0.011)	(0.021)
Unemployed (dummy)	-0.039	-0.006			-0.039	-0.039
	(0.072)	(0.048)			(0.072)	(0.060)
Educational Level	0.023	-0.012			0.023	0.023
	(0.016)	(0.025)			(0.016)	(0.019)
CO_2 emissions	0.135**	0.166***			0.135**	0.135
	(0.055)	(0.061)			(0.055)	(0.093)
Religious (dummy)	0.135	0.110			0.135	0.135***
	(0.099)	(0.100)			(0.099)	(0.032)
Age	-0.010	-0.011		-0.015	-0.010	-0.010*
	(0.015)	(0.017)		(0.019)	(0.015)	(0.006)
Age squared	0.0002	0.0002		0.0002	0.0002	0.0002***
	(0.0002)	(0.0002)		(0.0002)	(0.0002)	(0.0001)
Male	-0.099***	-0.095***		-0.103***	-0.099***	-0.099***
	(0.019)	(0.023)		(0.025)	(0.019)	(0.025)
Married	0.136	0.068		0.068	0.136	0.136
	(0.085)	(0.067)		(0.135)	(0.085)	(0.188)
Living together	0.142*	0.088		0.025	0.142*	0.142
	(0.074)	(0.070)		(0.117)	(0.074)	(0.200)
Divorced	-0.215***	-0.303***		-0.211**	-0.215***	-0.215
	(0.069)	(0.078)		(0.115)	(0.069)	(0.215)
Separated	-0.147	-0.051		-0.200	-0.147	-0.147

	(0.261)	(0.265)		(0.195)	(0.261)	(0.277)
Widowed	0.166***	0.082***		0.047	0.166***	0.166
	(0.061)	(0.031)		(0.114)	(0.061)	(0.197)
Single	0.0129	-0.058		-0.083	0.013	0.013
	(0.094)	(0.052)		(0.130)	(0.094)	(0.192)
Wave 4	-0.407***	-0.473***	-0.144	-0.151	-0.407***	-0.407***
	(0.093)	(0.111)	(0.122)	(0.123)	(0.093)	(0.099)
Wave 5	(omitted)	(omitted)	0.001	-0.015	(omitted)	(omitted)
	-	-	(0.114)	(0.106)	-	-
China						(omitted)
						-
India						(omitted)
						-
South Korea						(omitted)
						-
Japan						(omitted)
						-
N	10459	9071	11354	11349	10459	10459
Num. countries	4	4	4	4	4	4
Pseudo R^2	0.9773	0.9805	0.9753	0.9754	0.9773	0.9773

Source: Authors' regressions.
The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 3. Relation between Life Satisfaction and various variables in Eastern Europe & Central Asia

Results of regressions by ordered probit (std.errors in brackets).

	Eastern Europe & Central Asia				
	Specification				
Independent Variables	*1*	*2*	*3*	*4*	*5*
Log (Consumption)	0.167***	0.181***	0.186***	0.167***	0.179***
	(0.032)	(0.031)	(0.0298)	(0.032)	(0.014)
GDP growth	0.097***	-0.036	-0.037	0.097***	0.422***
	(0.031)	(0.060)	(0.062)	(0.031)	(0.158)
Wealth	0.222***	0.220***	0.223***	0.222***	0.221***
	(0.037)	(0.050)	(0.050)	(0.037)	(0.015)
Health	0.295***	0.235***	0.253***	0.295***	0.304***
	(0.033)	(0.033)	(0.036)	(0.033)	(0.015)
Importance of Leisure	0.055***	0.088***	0.098***	0.055***	0.052***
	(0.019)	(0.022)	(0.021)	(0.019)	(0.015)
Inequality	0.508***	0.400**	0.409**	0.508***	0.109
	(0.086)	(0.172)	(0.170)	(0.086)	(0.095)
Environmental Awareness	0.104***	0.105***	0.106***	0.104***	0.107***
	(0.026)	(0.024)	(0.024)	(0.026)	(0.014)
Polity	-0.021***			-0.021***	0.188***
	(0.005)			(0.005)	(0.045)
Life Expectancy	-0.040***			-0.040***	0.002
	(0.013)			(0.013)	(0.019)
Leisure time	-0.046***			-0.046***	-0.061***
	(0.004)			(0.004)	(0.008)
Unemployed (dummy)	-0.080*			-0.080*	-0.077**
	(0.045)			(0.045)	(0.035)
Educational Level	-0.028*			-0.028*	-0.038**
	(0.015)			(0.015)	(0.019)
CO_2 emissions	0.022***			0.022***	-0.025
	(0.008)			(0.008)	(0.032)
Religious (dummy)	0.038			0.038	0.053**
	(0.040)			(0.040)	(0.026)
Age	-0.025***		-0.028***	-0.025***	-0.026***
	(0.005)		(0.004)	(0.005)	(0.005)
Age squared	0.0003***		0.0003***	0.0003***	0.0003***
	(0.0001)		(0.0001)	(0.0001)	(0.0001)
Male	-0.042*		-0.050**	-0.042*	-0.041*
	(0.025)		(0.025)	(0.025)	(0.023)
Married	-0.410		-0.108	-0.410	-0.367
	(0.525)		(0.149)	(0.525)	(0.486)
Living together	-0.486		-0.206	-0.486	-0.447
	(0.529)		0.167	(0.529)	(0.495)
Divorced	-0.490		-0.191	-0.490	-0.450
	(0.513)		(0.135)	(0.513)	(0.491)

Separated	-0.730		-0.469***	-0.730	-0.667
	(0.511)		(0.144)	(0.511)	(0.506)
Widowed	-0.486		-0.183	-0.486	-0.436
	(0.518)		(0.136)	(0.518)	(0.488)
Single	-0.583		-0.286*	-0.583	-0.539
	(0.524)		(0.147)	(0.524)	(0.485)
Wave 4	0.283**	0.066	0.060	0.283**	-0.151*
	(0.133)	(0.115)	(0.120)	(0.133)	(0.077)
Wave 5	0.473***	0.547***	0.547***	0.473***	-0.332**
	(0.072)	(0.129)	(0.131)	(0.072)	(0.150)
Albania					-0.457***
					(0.172)
Azerbaijan					2.678***
					(0.553)
Belarus					2.902***
					(0.554)
Bosnia and Herzegovina					-1.118***
					(0.373)
Croatia					(omitted)
					-
Montenegro					(omitted)
					-
Macedonia					(omitted)
					-
Moldova					(omitted)
					-
Russia					(omitted)
					-
Serbia					(omitted)
					-
N	12689	13782	13776	12689	12689
Num. Countries	9	10	10	9	
Pseudo R^2	0.9718	0.9718	0.9691	0.9718	0.9718

Source: Authors' regressions.
The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 4. Relation between Life Satisfaction and various variables in Europe

Results of regressions by ordered probit (std.errors in brackets).

	Europe					
	Specification					
Dependent Variables: Life satisfaction	*1a*	*1b*	*2*	*3*	*4*	*5*
Log (Consumption)	0.145***	0.049*	0.173***	0.167***	0.145***	0.171***
	(0.034)	(0.030)	(0.039)	(0.037)	(0.034)	(0.012)
GDP growth	0.081	-0.306	0.228	0.237	0.081	-0.176*
	(0.263)	(0.525)	(0.299)	(0.287)	(0.263)	(0.102)
Wealth		0.176***				
		(0.021)				
Health		0.402***				
		(0.0199)				
Importance of Leisure	0.125***	0.077***	0.122***	0.132***	0.125***	0.112***
	(0.0146)	(0.022)	(0.014)	(0.014)	(0.015)	(0.010)
Inequality	-0.004	0.008	-0.186	-0.190	-0.004	-0.087
	(0.235)	(0.330)	(0.157)	(0.164)	(0.235)	(0.064)
Enviromental Awareness	0.089***	0.066***	0.092***	0.095***	0.089***	0.083***
	(0.019)	(0.016)	(0.021)	(0.020)	(0.019)	(0.008)
Polity	0.091	-0.054			0.091	0.062
	(0.072)	(0.060)			(0.072)	(0.080)
Life Expectancy	0.050*	0.136***	0.066***	0.069***	0.050*	0.106**
	(0.027)	(0.039)	(0.014)	(0.014)	(0.027)	(0.046)
Leisure time	0.025	-0.081***			0.025	-0.011
	(0.026)	(0.025)			(0.026)	(0.014)
Unemployed (dummy)	-0.416***	-0.302***			-0.416***	-0.414***
	(0.071)	(0.057)			(0.071)	(0.028)
Educational Level	0.053**	0.005			0.053**	0.060***
	(0.0255)	(0.024)			(0.026)	(0.010)
CO_2 emissions	0.022	0.041*			0.022	-0.129***
	(0.019)	(0.022)			(0.019)	(0.027)
Religious (dummy)	0.127***	0.163***			0.127***	0.149***
	(0.027)	(0.033)			(0.027)	(0.014)
Age	-0.039***	-0.037***		-0.040***	-0.039***	-0.041***
	(0.004)	(0.005)		(0.004)	(0.004)	(0.003)
Age squared	0.0004***	0.0004***		0.0004***	0.0004***	0.0004***
	(0.0000)	(0.0000)		(0.0000)	(0.0000)	(0.0000)
Male	-0.041**	-0.079**		-0.060***	-0.041**	-0.047***
	(0.020)	(0.033)		(0.023)	(0.020)	(0.013)
Married	0.321***	0.523***		0.439***	0.321***	0.333***
	(0.104)	(0.071)		(0.121)	(0.104)	(0.113)
Living together	0.271**	0.463***		0.356***	0.271**	0.249**
	(0.110)	(0.072)		(0.131)	(0.110)	(0.116)
Divorced	0.085	0.301***		0.166	0.085	0.055
	(0.106)	(0.083)		(0.121)	(0.106)	(0.116)

Separated	-0.174*	0.091		-0.084	-0.175*	-0.114
	(0.089)	(0.086)		(0.106)	(0.089)	(0.122)
Widowed	0.035	0.262***		0.150	0.035	0.056
	(0.105)	(0.056)		(0.125)	(0.105)	(0.116)
Single	0.055	0.274***		0.143	0.056	0.078
	(0.099)	(0.066)		(0.114)	(0.099)	(0.113)
Wave 4	0.138	-0.215	0.072	0.083	0.138	0.043
	(0.140)	(0.157)	(0.131)	(0.124)	(0.140)	(0.046)
Wave 5	-0.103	-0.302*	-0.223*	-0.221**	-0.104	-0.310***
	(0.163)	(0.168)	(0.115)	(0.106)	(0.163)	(0.120)
Austria						0.522***
						(0.148)
Belgium						0.668***
						(0.212)
Bulgaria						0.498
						(0.484)
Czech Republic						0.804**
						(0.339)
Denmark						1.039***
						(0.237)
Estonia						1.201*
						(0.647)
Finland						0.871***
						(0.228)
France						-0.237*
						(0.127)
Germany						0.463**
						(0.194)
Greece						-0.502***
						(0.166)
Italy						-0.139
						(0.116)
Latvia						-0.296
						(0.521)
Lithuania						-0.509
						(0.366)
Malta						(omitted)
Netherlands						- 0.491**
						(0.208)
Portugal						0.031
						(0.209)
Slovakia						0.203
						(0.390)
Slovenia						0.431*
						(0.252)
Spain						-0.074
						(0.096)
Sweden						-0.248***
						(0.057)

United Kingdom						0.546***
						(0.207)
Andorra						-0.107
						(0.101)
Iceland						(omitted)
						-
Switzerland						(omitted)
						-
N	37948	16714	39867	39786	37948	37948
Num. Countries	22	13	24	24	22	
Pseudo R^2	0.0913	0.1602	0.0739	0.0838	0.0913	0.1093

Source: Authors' regressions.
The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero

Table 5. Relation between Life Satisfaction and various variables in Middle East & Africa

Results of regressions by ordered probit (std.errors in brackets).

	Middle East and Africa					
	Specification					
Independent Variables	*1a*	*1b*	*2*	*3*	*4*	*5*
Log (Consumption)	0.137***	0.180***	0.120***	0.120***	0.137***	0.130***
	(0.040)	(0.053)	(0.024)	(0.023)	(0.040)	(0.015)
GDP growth	3.402***	-2.011***	1.624***	1.567***	3.402***	3.92
	(0.803)	(0.587)	(0.468)	(0.566)	(0.803)	(0.294)
Wealth	0.129*	0.189***	0.142*	0.134*	0.129*	0.131
	(0.071)	(0.028)	(0.078)	(0.074)	(0.071)	(0.017)
Health	0.174***	0.059***	0.146***	0.166***	0.174***	0.172
	(0.059)	(0.023)	(0.046)	(0.056)	(0.059)	(0.017)
Importance of Leisure	0.024	0.035***	0.037*	0.046*	0.024	0.024
	(0.021)	(0.009)	(0.028)	(0.024)	(0.021)	(0.015)
Inequality	0.007	-2.565***	0.035	0.048	0.007	-0.458
	(0.101)	(0.344)	(0.088)	(0.096)	(0.101)	(0.09)
Environmental Awareness		0.082**				
		(0.041)				
Polity	-0.016**	-0.004			-0.162**	-0.396
	(0.074)	(0.004)			(0.074)	(0.035)
Life Expectancy	-0.032***				-0.032**	-0.064
	(0.015)				(0.015)	(0.005)
Leisure time	0.033***	-0.113***			0.033***	0.093
	(0.011)	(0.029)			(0.011)	(0.009)
Unemployed (dummy)	-0.191***	-0.173***			-0.191***	-0.201
	(0.032)	(0.040)			(0.032)	(0.042)
Educational Level	0.033	0.007			0.003	0.01
	(0.017)	(0.027)			(0.017)	(0.02)
CO_2 emissions	0.032**	-0.092**			0.320**	0.749
	(0.013)	(0.037)			(0.136)	(0.061)
Religious (dummy)	0.054**	0.036			0.054*	0.067
	(0.027)	(0.064)			(0.027)	(0.035)
Age	-0.013**	-0.027***		-0.011	-0.013**	-0.011
	(0.005)	(0.0075)		(0.007)	(0.005)	(0.005)
Age squared	0.0001**	0.0004***		0.000	0.000**	0
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Male	-0.091**	-0.092**		-0.084*	-0.091**	-0.09
	(0.044)	(0.039)		(0.046)	(0.044)	(0.0277)
Married	-0.195	-0.126***		-0.350**	-0.195	-0.258

	(0.150)	(0.048)		(0.120)	(0.150)	(0.283)
Living together	-0.412***	-0.321***		-0.508***	-0.412***	-0.461
	(0.134)	(0.071)		(0.116)	(0.134)	(0.300)
Divorced	-0.418***	-0.414***		-0.560***	-0.418***	-0.471
	(0.157)	(0.052)		(0.131)	(0.157)	(0.299)
Separated	-0.592***	-0.460		-0.761***	-0.592**	-0.647
	(0.247)	(0.287)		(0.239)	(0.247)	(0.309)
Widowed	-0.260	-0.257***		-0.410***	-0.260	-0.319
	(0.160)	(0.089)		(0.131)	(0.160)	(0.288)
Single	-0.314***	-0.144***		-0.479***	-0.314**	-0.366
	(0.083)	(0.035)		(0.100)	(0.144)	(0.282)
Wave 4	-0.213**	(omitted)	-0.167**	-0.164**	-0.213**	-0.099
	(0.095)	-	(0.075)	(0.083)	(0.095)	(0.058)
Wave 5	-0.764***	(omitted)	-0.433*	-0.429*	-0.764***	-1.036
	(0.215)	-	(0.233)	(0.246)	(0.215)	(0.097)
Algeria						-0.845
						(0.114)
Egypt						(omitted)
						-
Jordan						(omitted)
						-
Morocco						(omitted)
						-
Saudi Arabia						(omitted)
						-
South Africa						(omitted)
						-
Uganda						(omitted)
						-
Zimbabwe						(omitted)
N	15944	9212	15969	15957	15944	15944
Num. Countries	7	4	7	7	7	7
Pseudo R^2	0.9570	0.9780	0.9565	0.9567	0.9570	0.9571

Source: Authors' regressions.
The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 6. Relation between Life Satisfaction and various variables in Latin America & Caribbean

Results of regressions by ordered probit (std.errors in brackets).

	Latin America & Caribbean				
	Specification				
Independent Variables	*1*	*2*	*3*	*4*	*5*
Log (Consumption)	0.084***	0.027	0.034	0.084***	0.07***
	(0.022)	(0.03)	(0.032)	(0.022)	(0.013)
GDP growth	-1.733*	-1.00**	-1.058**	-1.731**	0.343
	(0.927)	(0.44)	(0.443)	(0.927)	(0.232)
Wealth	0.118***	0.116***	0.116***	0.118***	0.097***
	(0.013)	(0.0166)	(0.019)	(0.013)	(0.011)
Health	0.250***	0.221***	0.239***	0.253***	0.241***
	(0.024)	(0.017)	(0.018)	(0.024)	(0.012)
Importance of Leisure	0.090***	0.092***	0.088***	0.09***	0.063***
	(0.015)	(0.032)	(0.031)	(0.015)	(0.011)
Inequality	0.081*	0.011*	0.037*	0.08*	0.001
	(0.183)	(0.183)	(0.175)	(0.183)	(0.080)
Environmental Awareness	0.056**	0.054***	0.058***	0.056**	0.063***
	(0.023)	(0.02)	(0.019)	(0.022)	(0.010)
Polity	0.008			0.008	-0.001
	(0.033)			(0.033)	(0.0097)
Life Expectancy	0.049			0.049	-0.008
	(0.042)			(0.042)	(0.016)
Leisure time	-0.019			-0.0193	0.031***
	(0.031)			(0.031)	(0.006)
Unemployed (dummy)	-0.190***			-0.19***	-0.192***
	(0.040)			(0.488)	(0.034)
Educational Level	-0.131***			-0.131***	-0.116***
	(0.032)			(0.032)	(0.014)
CO_2 emissions	-0.012			-0.018	-0.028*
	(0.099)			(0.099)	(0.016)
Religious (dummy)	0.138***			0.138***	0.119***
	(0.022)			(0.022)	(0.022)
Age	-0.011*		-0.011	-0.011*	-0.015***
	(0.006)		(0.008)	(0.006)	(0.003)
Age squared	0.0001**		0.0001	0.0001**	0.0001***
	(0.000)		(0.000)	(0.000)	(0.000)
Male	0.0023**		-0.017	0.002*	-0.005
	(0.019)		(0.022)	(0.019)	(0.018)
Married	-0.205		-0.209	-0.205	-0.159

	(0.175)		(0.207)	(0.175)	(0.321)
Living together	-0.319*		-0.315	-0.319*	-0.294
	(0.191)		(0.221)	(0.191)	(0.321)
Divorced	-0.425**		-0.465*	-0.425**	-0.303
	(0.167)		(0.206)	(0.167)	(0.327)
Separated	-0.445**		-0.465*	-0.445**	-0.425
	(0.190)		(0.219)	(0.19)	(0.323)
Widowed	-0.319		-0.326	-0.319	-0.291
	(0.200)		(0.233)	(0.2)	(0.325)
Single	-0.408**		-0.442**	-0.408**	-0.364
	(0.193)		(0.227)	(0.193)	(0.321)
Wave 4	-0.363	-0.132	-0.148	-0.363	0.128*
	(0.296)	(0.181)	(0.179)	(0.296)	(0.076)
Wave 5	-0.195	-0.019*	-0.021	-0.195	0.258***
	(0.219)	(0.142)	(0.148)	(0.219)	(0.050)
Argentina					-0.000
					(0.079)
Chile					0.011
					(0.086)
Colombia					0.783***
					(0.042)
El Salvador					0.172***
					(0.073)
Mexico					0.574***
					(0.072)
Peru					(omitted)
					-
Uruguay					(omitted)
					-
Venezuela					(omitted)
					-
N	16974	17015	17012	16974	16974
Num. Countries	9	9	9	9	
Pseudo R^2	0.9586	0.9580	0.9582	0.9586	0.9595

Source: Authors' regressions.
The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 7. Relation between Life Satisfaction and various variables in North America, Australia & New Zealand

Results of regressions by ordered probit (std.errors in brackets).

	North America, Australia and New Zealand				
	Specification				
Independent Variables	*1*	*2*	*3*	*4*	*5*
Log (Consumption)	0.032**	0.024*	0.027**	0.032**	0.031
	(0.015)	(0.013)	(0.012)	(0.015)	(0.022)
GDP growth	1.542	1.048	0.763	1.542	-4.369
	(1.437)	(0.669)	(0.753)	(1.437)	(2.963)
Wealth	0.098***	0.127***	0.092***	0.098***	0.098***
	(0.031)	(0.032)	(0.031)	(0.031)	(0.017)
Health	0.408***	0.361***	0.412***	0.408***	0.408***
	(0.033)	(0.027)	(0.033)	(0.033)	(0.017)
Importance of Leisure	0.08*	0.048	0.073	0.080*	0.080***
	(0.046)	(0.042)	(0.047)	(0.046)	(0.019)
Inequality	-0.282	-0.24	-0.310	-0.282	0.969*
	(0.236)	(0.263)	(0.266)	(0.236)	(0.565)
Environmental Awareness	0.017	0.013***	0.015	0.017	0.015
	(0.012)	(0.004)	(0.011)	(0.012)	(0.016)
Polity	(omitted)			(omitted)	(omitted)
	-			-	-
Life Expectancy	-0.0181			-0.018	-0.281**
	(0.024)			(0.024)	(0.110)
Leisure time	0.053***			0.053***	0.108***
	(0.007)			(0.007)	(0.028)
Unemployed (dummy)	-0.09			-0.090	-0.089
	(0.081)			(0.081)	(0.065)
Educational Level	-0.043***			-0.043***	-0.046**
	(0.0125)			(0.012)	(0.019)
CO_2 emissions	-0.018			-0.018	-0.135***
	(0.012)			(0.012)	(0.050)
Religious (dummy)	0.153***			0.153***	0.152***
	(0.03)			(0.030)	(0.029)
Age	-0.027***		-0.025***	-0.027***	-0.027***
	(0.004)		(0.003)	(0.004)	(0.004)
Age squared	0.0003***		0.0003***	0.0003***	0.0003***
	(0.000)		(0.000)	(0.000)	(0.000)
Male	-0.072**		-0.089**	-0.072*	-0.072***
	(0.038)		(0.036)	(0.038)	(0.026)

Married	0.064		0.091	0.064	0.068
	(0.155)		(0.150)	(0.155)	(0.186)
Living together	-0.13		-0.098	-0.130	-0.133
	(0.144)		(0.144)	(0.144)	(0.191)
Divorced	-0.352**		-0.345**	-0.352**	-0.350**
	(0.156)		(0.152)	(0.156)	(0.192)
Separated	-0.42**		-0.413**	-0.420**	-0.421**
	(0.201)		(0.194)	(0.201)	(0.198)
Widowed	-0.283**		-0.246**	-0.283**	-0.280
	(0.114)		(0.108)	(0.114)	(0.195)
Single	-0.337**		-0.330*	-0.337**	-0.336**
	(0.171)		(0.170)	(0.171)	(0.188)
Wave 4	-0.089	0.011	0.083	-0.089	0.651**
	(0.106)	(0.105)	(0.093)	(0.106)	(0.342)
Wave 5	-0.092 *	-0.013	0.002	-0.092*	0.162
	(0.05)	(0.146)	(0.128)	(0.050)	(0.118)
Australia					0.521**
					(0.214)
New Zealand					(omitted)
					-
Canada					(omitted)
					-
United States					(omitted)
					-
N	10939	11063	11023	10939	10939
Num. Countries	4	4	4	4	4
Pseudo R^2	0.9776	0.9776	0.9773	0.9776	0.9776

Source: Authors' regressions.
The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 8. Testing Easterlin Paradox between and within macroares

Note: The specification chosen to test Easterlin Paradox for each macroarea is the one among others that guarantee the largest number of observations.
Results of regressions by ordered probit (std.errors in brackets).

	Macroareas						
Dependent Variable: Life satisfaction	*AP*[a]	*ECA*	*EU*[b]	*MEA*[a]	*LAC*	*NAAN*	*World*
Income[c]	0.083***	2.215***	0.067***	0.251***	0.165***	0.007***	0.054***
	(0.025)	(0.574)	(0.018)	(0.036)	(0.049)	(0.001)	(0.011)
Income squared	-3.203***	-99.31***	-2.510***	-10.26***	-7.111***	-0.244***	-1.849***
	(1.012)	(25.623)	(0.711)	(1.654)	(2.131)	(0.054)	(0.441)
GDP growth	-1.770**	0.159***	0.186	3.985***	-1.602*	1.270	0.210
	(0.895)	(0.018)	(0.234)	(0.964)	(0.939)	(1.489)	(0.20)
Wealth	0.211***	0.252***		0.128	0.129***	0.092***	
	(0.066)	(0.033)		(0.078)	(0.012)	(0.030)	
Health	0.384***	0.313***		0.173***	0.254***	0.407***	
	(0.076)	(0.028)		(0.061)	(0.024)	(0.034)	
Importance of Leisure	0.006	0.057***	0.124***	0.019	0.091***	0.080**	0.096***
	(0.017)	(0.019)	(0.014)	(0.022)	(0.016)	(0.046)	(0.020)
Inequality	0.241***	0.603***	0.079	0.053	0.092	-0.271	-0.037
	(0.080)	(0.111)	(0.219)	(0.108)	(0.189)	(0.236)	(0.122)
Enviromental Awareness		0.102***	0.084***		0.057**	0.017	0.087***
		(0.026)	(0.019)		(0.022)	(0.012)	(0.014)
Polity	-0.067***	-0.037***	0.084	-0.142**	0.007	(omitted)	0.014
	(0.026)	(0.010)	(0.064)	(0.071)	(0.033)	-	(0.008)
Life Expectancy	-0.032	-0.013	0.060**	-0.019	0.026	-0.015	0.019***
	(0.031)	(0.011)	(0.024)	(0.012)	(0.044)	(0.022)	(0.006)
Leisure time	0.015	-0.061***	0.004	0.029**	-0.024	0.049***	-0.042***
	(0.012)	(0.006)	(0.023)	(0.011)	(0.031)	(0.008)	(0.015)
Unemployed (dummy)	-0.048	-0.096*	-0.431***	-0.173***	-0.196***	-0.087	-0.187***
	(0.072)	(0.051)	(0.071)	(0.030)	(0.03)	(0.077)	(0.027)
Educational Level	0.027	0.0005	0.046*	-0.002	-0.114***	-0.045***	-0.071***
	(0.020)	(0.0177)	(0.025)	(0.014)	(0.032)	(0.013)	(0.021)
CO_2 emissions	0.047	0.002	0.033**	0.307**	0.006	-0.020	-0.001
	(0.046)	(0.013)	(0.017)	(0.142)	(0.101)	(0.012)	(0.017)
Religious (dummy)	0.138	0.033	0.131***	0.057*	0.139***	0.154***	0.158***
	(0.098)	(0.038)	(0.027)	(0.030)	(0.022)	(0.029)	(0.040)
Age	-0.011	-0.023***	-0.040***	-0.013**	-0.011*	-0.028***	-0.022***
	(0.016)	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)	(0.003)
Age squared	0.0002	0.0003***	0.0004***	0.0002*	0.0001*	0.0003***	0.0002***
	(0.0002)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.000)
Male	-0.099***	-0.040	-0.042**	-0.094**	0.005	-0.074*	-0.051***
	(0.021)	(0.026)	(0.021)	(0.041)	(0.018)	(0.040)	(0.0130)
Married	0.147*	-0.450	0.336***	-0.173	-0.220	0.061	-0.010
	(0.085)	(0.563)	(0.101)	(0.178)	(0.178)	(0.154)	(0.123)
Living together	0.165**	-0.528	0.275**	-0.374**	-0.338*	-0.132	0.0453

	(0.076)	(0.566)	(0.108)	(0.162)	(0.192)	(0.145)	(0.140)
Divorced	-0.190***	-0.582	0.105	-0.404**	-0.441***	-0.347**	-0.174
	(0.068)	(0.547)	(0.103)	(0.181)	(0.169)	(0.158)	(0.122)
Separated	-0.139	-0.806	-0.149*	-0.593**	-0.465**	-0.415**	-0.165
	(0.262)	(0.542)	(0.089)	(0.255)	(0.192)	(0.206)	(0.126)
Widowed	0.181***	-0.572	0.034	-0.237	-0.339*	-0.282**	-0.174
	(0.064)	(0.553)	(0.106)	(0.185)	(0.201)	(0.116)	(0.122)
Single	0.026	-0.606	0.070	-0.280	-0.426**	-0.336*	-0.134
	(0.103)	(0.560)	(0.098)	(0.170)	(0.195)	(0.172)	(0.125)
Wave 4	-0.354***	0.310**	0.113	-0.229***	-0.296	-0.065	-0.186
	(0.073)	(0.144)	(0.142)	(0.087)	(0.295)	(0.110)	(0.115)
Wave 5	(omitted)	0.497***	-0.140	-0.819***	-0.123	-0.093*	-0.080
	-	(0.120)	(0.166)	(0.206)	(0.220)	(0.050)	(0.107)
N	10459	12689	37948	15944	16974	10939	106875
Num. Countries	4	9	22	7	9	4	56
Pseudo R^2	0.9774	0.9716	0.9153	0.9571	0.9585	0.9776	0.8241

Source: Authors' regressions.

a) The variable Environmental Awareness is omitted because of missing data.

b) Variables Wealth and Health are omitted because of missing data.

c) Income has been scaled in the regressions by a factor of 1000.

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 9. Relation between Income, Education and Employment status

Results of regressions by ordinary least squares (std.errors in brackets)

	Macroarea					
Dependent Variable: Log(Income)	*AP*	*ECA*	*EU*	*MEA*	*LAC*	*NAAN*
Education	0.420*	0.359***	0.112**	0.693***	0.565***	0.272***
	(0.141)	(0.038)	(0.045)	(0.175)	(0.063)	(0.036)
Unemployed (dummy)	-0.220***	-0.533***	-0.589***	-0.522***	-0.237***	-0.585**
	(0.048)	(0.058)	(0.065)	(0.058)	(0.019)	(0.200)
Country avrg income[a]	-0.046**	-0.456**	-0.079***	-0.244	0.221***	0.008**
	(0.008)	(0.051)	(0.018)	(0.137)	(0.019)	(0.002)
Hours Worked	-0.002	-0.04	0.123	0.054	-0.13	-0.798**
	(0.034)	(0.023)	(0.092)	(0.046)	(0.015)	(0.207)
Mean years schooling	0.098**	0.202*	0.100	-0.260	-0.091*	-0.069
	(0.026)	(0.111)	(0.107)	(0.316)	(0.048)	(0.038)
Unemployment rate	-0.600	0.024**	-0.004	0.007	-0.006	-0.042
	(0.224)	(0.009)	(0.022)	(0.084)	(0.008)	(0.043)
Age	0.007	-0.001	0.027***	0.017*	0.013**	0.036***
	(0.012)	(0.004)	(0.005)	(0.008)	(0.004)	(0.002)
Age squared	-0.0004	-0.0001**	-0.0004***	-0.0001	-0.0001**	-0.0004***
	(0.0001)	(0.00005)	(0.0001)	(0.0001)	(0.0004)	(0.00003)
Male	-0.092**	0.094***	0.104***	0.002	0.110***	0.122***
	(0.028)	(0.027)	(0.017)	(0.045)	(0.012)	(0.003)
Wave4	-0.616**	0.218	0.166	-0.263	0.225	-0.310**
	(0.127)	(0.212)	(0.120)	(2.061)	(0.101)	(0.073)
Wave5	0.464*	-0.222**	-0.181	0.092	0.219	0.326**
	(0.189)	(0.253)	(0.280)	(1.503)	(0.140)	(0.083)
Constant	8.56**	4.759***	1.4865	3.765**	6.701***	11.130***
	(1.031)	(1.324)	(4.720)	(2.868)	(0.607)	(1.17)
N	12575	21312	44287	16634	23297	11866
Num. Countries	4	11	24	7	9	4
R^2	0.52	0.61	0.60	0.44	0.45	0.2277

Source: Authors' regressions

a) Country average income has been scaled in the regressions by a factor of 1000.

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three1%. No asterisk indicates that the coefficient is not statistically different from zero.

Table 10. Fitted Probabilities and Marginal fixed effect

Marginal fixed effects are predicted change in probability for each category of the dependent variable, due to infinitesimal change in one of the independent variables.

Results of regressions by ordered probit (std.errors in brackets).

	Macroarea					
Dependent Variable: Life Satisfaction	*AP*	*ECA*	*EU*	*MEA*	*LAC*	*NAAN*
Log (Consumption)						
PR(LS=1)	-0.0195*	-0.060487***	-0.02725***	-0.05035***	-0.01470***	-0.0030059**
	(0.012)	(0.01164)	(0.00643)	(0.01213)	(0.00417)	(0.00156)
PR(LS=2)	0.0001**	0.0364146***	-0.01525***	0.0124297***	-0.01666***	-0.0083171**
	(0.00005)	(0.00724)	(0.00466)	(0.00693)	(0.00499)	(0.0038)
PR(LS=3)	0.0194*	0.0240724***	0.0425069	0.0379205*	0.0313753***	0.011323**
	(0.01149)	(0.00457)	(0.01012)	(0.00614)	(0.00822)	(0.00536)
GDP growth						
PR(LS=1)	0.645***	-0.03504***	-0.0153549	-1.247807***	0.3019293**	-0.1425951
	(0.252)	(0.01119)	(0.04957)	(0.25093)	(0.14586)	(0.13877)
PR(LS=2)	-0.0033217*	0.021095***	-0.008593	0.3080392***	0.3421253	-0.3945487
	(0.00184)	(0.00653)	(0.02798)	(0.15072)	(0.22269)	(0.36452)
PR(LS=3)	-0.642116***	0.0139452***	0.0239479	0.939768**	-0.6440546**	0.5371438
	(0.2503)	(0.00471)	(0.0775)	(0.152)	(0.36309)	(0.50306)
Wealth						
PR(LS=1)	-0.049***	-0.080517***		-0.0476046*	-0.02061***	-0.00910***
	(0.012)	(0.01296)		(0.0238)	(0.00238)	(0.00292)
PR(LS=2)	0.000251***	0.0484734***		0.0117519**	-0.02335***	-0.025182***
	(0.00003)	(0.00884)		(0.00957)	(0.00528)	(0.00797)
PR(LS=3)	0.048513***	0.0320441***		0.0358527	0.0439674***	0.0342832***
	(0.01214)	(0.00424)		(0.01458)	(0.00569)	(0.01082)
Health						
PR(LS=1)	-0.089***	-0.10701***		-0.06391***	-0.04360***	-0.03773***
	(0.016)	(0.01202)		(0.01829)	(0.00407)	(0.00384)
PR(LS=2)	0.00045***	0.0644285***		0.0157778***	-0.04941***	-0.10439***
	(0.00017)	(0.00737)		(0.00977)	(0.01085)	(0.00906)
PR(LS=3)	0.08825***	0.0425914***		0.0481349	0.0930157***	0.1421303***
	(0.0163)	(0.00516)		(0.00888)	(0.01063)	(0.01187)
Importance of Leisure						
PR(LS=1)	-0.001	-0.01982***	-0.02353***	-0.008999	-0.01584***	-0.0074882*
	(0.004)	(0.00689)	(0.00301)	(0.0073)	(0.00311)	(0.00421)
PR(LS=2)	0.000004	0.0119362***	-0.01317***	0.0022215	-0.01795***	-0.0207193*
	(0.00002)	(0.00389)	(0.0028)	(0.00252)	(0.00439)	(0.01192)
PR(LS=3)	0.0008629	0.0078906***	0.0367126***	0.0067775	0.0338001***	0.0282075*
	(0.0042)	(0.00301)	(0.00436)	(0.00482)	(0.00616)	(0.0161)
Inequality						
PR(LS=1)	-0.079***	-0.183983***	0.0007695	-0.002872	-0.0140552	0.0261389
	(0.015)	(0.03094)	(0.04429)	(0.03734)	(0.03247)	(0.02236)
PR(LS=2)	0.000408***	0.1107621***	0.0004306	0.000709	-0.0159264	0.0723243

	0.00006)	(0.01901)	(0.02479)	(0.00921)	(0.03555)	(0.06029)
PR(LS=3)	0.0788***	0.073221***	-0.0012002	0.002163	0.0299816	-0.0984632
	0.01522)	(0.01252)	(0.06908)	(0.02814)	(0.06792)	(0.08258)
Environmental Awareness						
PR(LS=1)		-0.03770***	-0.016858***		-0.00988***	-0.0016261
		(0.0096)	(0.0039)		(0.00464)	(0.00109)
PR(LS=2)		0.0227007***	-0.00943***		-0.01119***	-0.0044993
		(0.00547)	(0.00264)		(0.00418)	(0.00319)
PR(LS=3)		0.0150066***	0.0262922***		0.0210757***	0.0061254
		(0.00419)	(0.00587)		(0.00845)	(0.00428)
Political Freedom						
PR(LS=1)	0.023***	0.007574***	-0.0171584	0.0596491**	-0.0014547	
	(0.007)	(0.00164)	(0.01333)	(0.02526)	(0.00572)	
PR(LS=2)	-0.0001163**	-0.00455***	-0.0096023	-0.0147252**	-0.0016483	
	0.00005)	(0.00096)	(0.00816)	(0.01013)	(0.00658)	
PR(LS=3)	-0.02248***	-0.00301***	0.0267607	-0.0449238	0.003103	
	0.00646)	(0.0007)	(0.0213)	(0.01644)	(0.01229)	
Life Expectancy						
PR(LS=1)	0.019**	0.0144577***	-0.0095066	0.0119918	-0.0086346	0.0016817
	(0.008)	(0.0047)	(0.00527)	(0.00539)	(0.00762)	(0.00227)
PR(LS=2)	-0.0000961*	-0.00870***	-0.0053201*	-0.0029604*	-0.0097841	0.0046532
	0.00006)	(0.00287)	(0.00302)	(0.00215)	(0.00881)	(0.00634)
PR(LS=3)	-0.0185721**	-0.00575***	0.0148267*	-0.0090315*	0.0184187	-0.006335
	0.00791)	(0.00186)	(0.00812)	(0.00345)	(0.01626)	(0.00861)
Leisure time						
PR(LS=1)	-0.009***	0.0168198***	-0.0046551	-0.012122***	0.0033674	-0.004957***
	(0.002)	(0.00146)	(0.00499)	(0.00367)	(0.00513)	(0.00103)
PR(LS=2)	0.0000452**	-0.010125***	-0.0026051	0.0029926*	0.0038157	-0.013717***
	0.00002)	(0.00086)	(0.00276)	(0.00171)	(0.00665)	(0.00187)
PR(LS=3)	0.00874***	-0.006693***	0.0072602	0.0091299***	-0.0071831	0.018675***
	0.00224)	(0.0007)	(0.00771)	(0.00235)	(0.01177)	(0.00288)
Unemployed (dummy)						
PR(LS=1)	0.009	0.0294788*	0.0960542***	0.0719761***	0.0366915***	0.0089225
	(0.017)	(0.01684)	(0.02053)	(0.01189)	0.01103	(0.00876)
PR(LS=2)	-0.0003741	-0.0183731*	0.0084746	-0.021953***	0.0319163***	0.0217491
	0.00131)	(0.01073)	(0.01022)	(0.00819)	0.00597	(0.01841)
PR(LS=3)	-0.0088017	-0.0111057*	-0.104528***	-0.050022***	-0.068607***	-0.0306716
	0.0158)	(0.00614)	(0.01482)	(0.01015)	0.01347	(0.02715)
Educational Level						
PR(LS=1)	-0.005	0.010261*	-0.0099631**	-0.0012134	0.0228937***	0.0039834***
	(0.004)	(0.00564)	(0.00469)	(0.00653)	0.00449	(0.00139)
PR(LS=2)	0.0000269	-0.0061773*	-0.0055756*	0.0002995	0.0259415***	0.0110219***
	0.00002)	(0.0034)	(0.00315)	(0.00152)	0.00967	(0.00305)
PR(LS=3)	0.0052004	-0.0040836*	0.0155387**	0.0009138	-0.048835***	-0.015005***
	0.00416)	(0.00225)	(0.00768)	(0.005)	0.0134	(0.00443)
CO_2 emissions						
PR(LS=1)	-0.031***	-0.007964***	-0.0042016	-0.1176182**	0.0031829***	0.0017424***
	(0.011)	(0.0028)	(0.00367)	(0.04636)	(0.01742)	(0.00111)
PR(LS=2)	0.0001616**	0.0047947**	-0.0023513	0.0290358	0.0036066***	0.004821***

	0.00009)	(0.0018)	(0.00198)	(0.01895)	(0.01952)	(0.00324)
PR(LS=3)	0.0312339***	0.0031696**	0.0065528	0.0885825***	-0.006789***	-0.006563***
	0.01127)	(0.001)	(0.0056)	(0.03037)	(0.03692)	(0.00435)
Religious (dummy)						
PR(LS=1)	-0.031	-0.0137621	-0.024254***	-0.0200618*	-0.0253815	-0.01477***
	(0.020)	(0.01464)	(0.0049)	(0.01063)	(0.0058)	(0.00333)
PR(LS=2)	-0.0009418	0.0083669	-0.012851***	0.0052569**	-0.0252698	-0.037951***
	0.00149)	(0.00886)	(0.00408)	(0.00263)	(0.00498)	(0.00715)
PR(LS=3)	0.0318306	0.0053951	0.0371058***	0.0148049*	0.0506512	0.0527309***
	0.0217)	(0.00578)	(0.0082)	(0.00865)	(0.00818)	(0.01031)
Age						
PR(LS=1)	0.002	0.0092091***	0.0073643***	0.0048766***	0.0020537*	0.0025363***
	(0.004)	(0.00178)	(0.00087)	(0.0018)	(0.00121)	(0.0003)
PR(LS=2)	-0.0000116	-0.005544***	-0.011485***	-0.0012039**	0.0023271**	0.0070176***
	0.00002)	(0.00102)	(0.00146)	(0.00081)	(0.00106)	(0.00113)
PR(LS=3)	-0.0022491	-0.003665***	-0.01148***	-0.003672***	-0.0043808**	-0.009553***
	0.00353)	(0.00078)	(0.00146)	(0.00106)	(0.00222)	(0.00141)
Age squared						
PR(LS=1)	-0.00004	-0.000104***	-0.000073***	-0.0000655**	-0.0000236*	-0.000034***
	(0.00004)	(0.00002)	(0.00001)	(0.00003)	(0.00001)	(0)
PR(LS=2)	1.89E-07	0.000063***	-0.000040***	0.0000162	-0.0000267**	-0.000094***
	(0.000)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
PR(LS=3)	0.0000365	0.0000416***	0.000114***	0.0000493***	0.0000503**	0.0001281***
	0.00004)	(0.00001)	(0.00001)	(0.00002)	(0.00002)	(0.00001)
Male						
PR(LS=1)	0.023***	0.0153496*	0.0078169*	0.0337007**	-0.0004176	0.0067225*
	(0.004)	(0.00915)	(0.00369)	(0.01529)	(0.00335)	(0.00368)
PR(LS=2)	0.0000156	-0.0092444*	0.0043579*	-0.0082752	-0.0004732	0.0185469*
	0.00005)	(0.0054)	(0.00251)	(0.00548)	(0.00375)	(0.00987)
PR(LS=3)	-0.022944***	-0.0061052	-0.0121748**	-0.0254255**	0.0008908	-0.0252694*
	0.00356)	(0.00376)	(0.00608)	(0.0108)	(0.0071)	(0.01352)
Married						
PR(LS=1)	-0.033	0.1428878	-0.062170***	0.0715252	0.036208	-0.0060269
	(0.024)	(0.17384)	(0.02033)	(0.05548)	(0.03206)	(0.0147)
PR(LS=2)	0.0027211	-0.0771279	-0.030527***	-0.0171795	0.0397537	-0.0165051
	0.00332)	(0.0823)	(0.01042)	(0.01361)	(0.03406)	(0.03912)
PR(LS=3)	0.0301446	-0.0657599	0.0926977***	-0.0543457	-0.0759617	0.022532
	0.02041)	(0.09159)	(0.02864)	(0.04361)	(0.06537)	(0.05382)
Living together						
PR(LS=1)	-0.031*	0.1881057	-0.043735***	0.1593594***	0.0641213	0.0132642
	(0.017)	(0.21045)	(0.01465)	(0.05368)	(0.04598)	(0.01558)
PR(LS=2)	-0.0044562	-0.1385986	-0.0430929**	-0.0636879	0.0484569**	0.0308789
	0.00476)	(0.17699)	(0.02354)	(0.03243)	(0.02115)	(0.03166)
PR(LS=3)	0.0351265	-0.0495071	0.0868283**	-0.095671***	-0.1125782*	-0.0441432
	0.02198)	(0.03352)	(0.03756)	(0.03134)	(0.06425)	(0.04722)
Divorced						
PR(LS=1)	0.055***	0.1896227	-0.0153773	0.1622066***	0.0944025**	0.0418811*
	(0.017)	(0.20376)	(0.01815)	(0.0615)	(0.04658)	(0.02164)
PR(LS=2)	-0.011092	-0.139292	-0.0104378	-0.0667329	0.0482035***	0.0699099***
	0.00694)	(0.1705)	(0.01454)	(0.04161)	(0.01534)	(0.02243)

PR(LS=3)	-0.0443367***	-0.0503307	0.0258151	-0.0954737***	-0.142606***	-0.111791**
	0.01024)	(0.03335)	(0.0326)	(0.02919)	(0.05191)	(0.04396)
Separated						
PR(LS=1)	0.037	0.2842073	0.0363362*	0.2314981***	0.0988363**	0.053834*
	(0.069)	(0.19558)	(0.02072)	(0.09606)	(0.05348)	(0.03242)
PR(LS=2)	-0.0053526	-0.2222776	0.0115276**	-0.1085017	0.0506269***	0.0754403***
	0.01857)	(0.17666)	(0.00448)	(0.07251)	(0.01594)	(0.0205)
PR(LS=3)	-0.0314589	-0.0619297	-0.0478638**	-0.122996***	-0.149463***	-0.1292743**
	0.05026)	(0.01916)	(0.02359)	(0.03764)	(0.05856)	(0.05275)
Widowed						
PR(LS=1)	-0.035**	0.1870521	-0.006553	0.0994904	0.0665144	0.0323813**
	(0.015)	(0.20483)	(0.01905)	(0.06245)	(0.04957)	(0.01509)
PR(LS=2)	-0.0059348	-0.1351738	-0.0039776	-0.0348322	0.0443346**	0.0591441***
	0.00447)	(0.16756)	(0.01256)	(0.03067)	(0.01946)	(0.01874)
PR(LS=3)	0.0413873	-0.0518783	0.0105306	-0.0646582*	-0.110849*	-0.091525***
	0.01917)	(0.03734)	(0.03159)	(0.03498)	(0.06572)	(0.03369)
Single						
PR(LS=1)	-0.003	0.2216977	-0.0102918	0.1172323**	0.079617	0.0372505*
	(0.022)	(0.20255)	(0.01783)	(0.05468)	(0.04387)	(0.02068)
PR(LS=2)	-0.0000138	-0.1557767	-0.0062723	-0.0342779*	0.0660448	0.0734887**
	0.00031)	(0.15878)	(0.01176)	(0.02073)	(0.02712)	(0.0313)
PR(LS=3)	0.0029737	-0.065921	0.0165641	-0.0829544**	-0.1456618	-0.1107392**
	0.02216)	(0.04387)	(0.02954)	(0.03863)	(0.06724)	(0.05191)
Wave 4						
PR(LS=1)	0.100***	-0.1012055*	-0.0263687	0.0765683***	0.0701766*	0.0085922
	(0.019)	(0.04635)	(0.02714)	(0.03003)	(0.05943)	(0.01101)
PR(LS=2)	-0.0119032**	0.0586856**	-0.0140284	-0.0152712	0.0597496**	0.0221734
	0.00527)	(0.02605)	(0.0133)	(0.00931)	(0.0448)	(0.02535)
PR(LS=3)	-0.088309***	0.0425199**	0.0403971	-0.0612***	-0.1299262**	-0.0307657
	0.01442)	(0.02041)	(0.04016)	(0.02197)	(0.10292)	(0.03635)
Wave 5						
PR(LS=1)		-0.157151***	0.0203121	0.296144***	0.0366709	0.0086659*
		(0.02057)	(0.03295)	(0.07844)	(0.04139)	(0.00483)
PR(LS=2)		0.072409***	0.0095047	-0.1388919*	0.0343586	0.0234812*
		(0.00705)	(0.01284)	(0.07931)	(0.038)	(0.01262)
PR(LS=3)		0.0847427***	-0.0298168	-0.157221***	-0.0710295	-0.0321471*
		(0.01422)	(0.04563)	(0.01816)	(0.07908)	(0.01741)

Source:Authors' Regression

The asterisks represent the significance level of the estimated coefficients. One asterisk signifies 10%, two 5% and three 1%. No asterisk indicates that the coefficient is not statístically different from zero.

Annex II: Evidence of Key Finding 7 in the two-level scale

Figure 21 - AP two-level scale graph

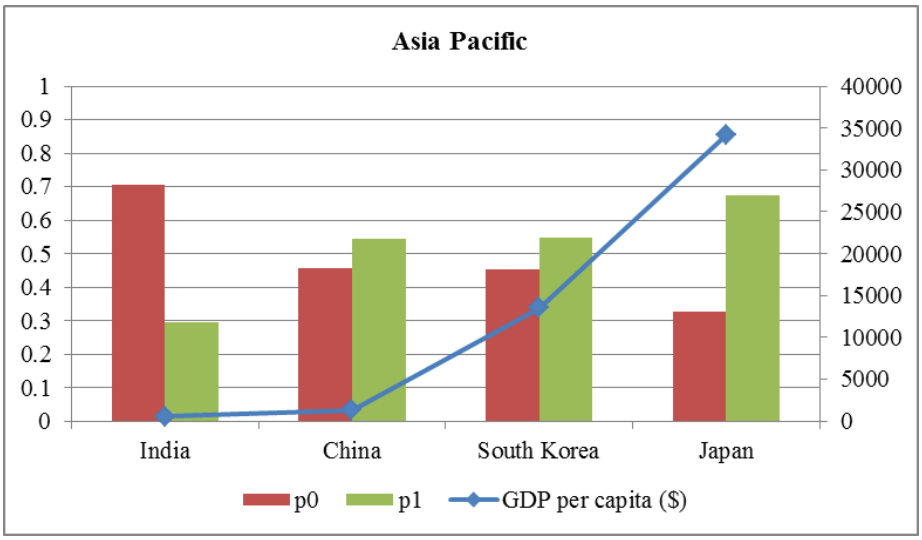

Figure 22 - ECA two-level scale graph

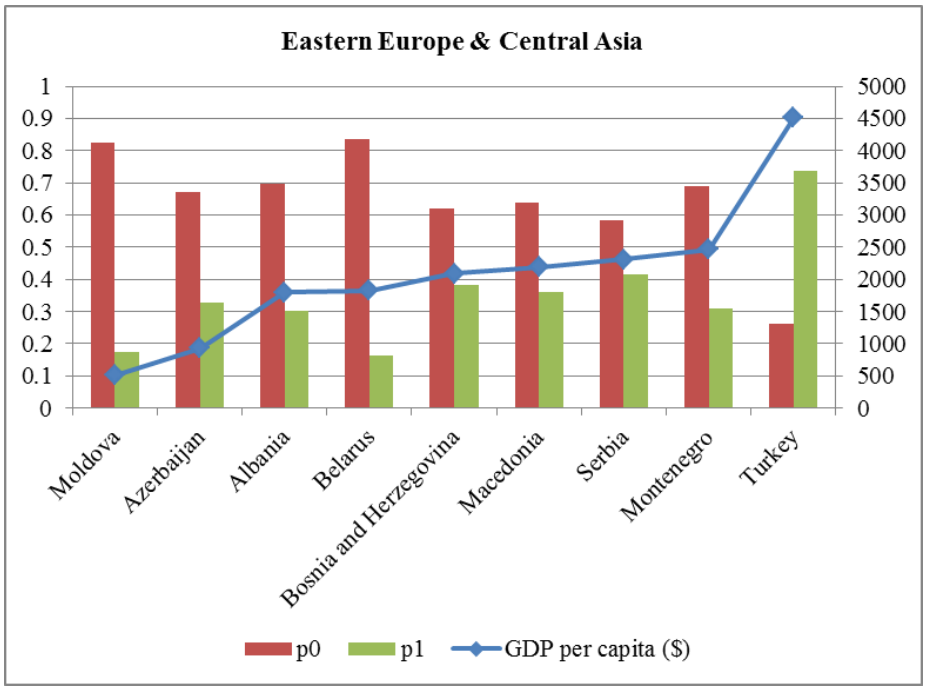

Figure 23 - MEA two-level scale graph

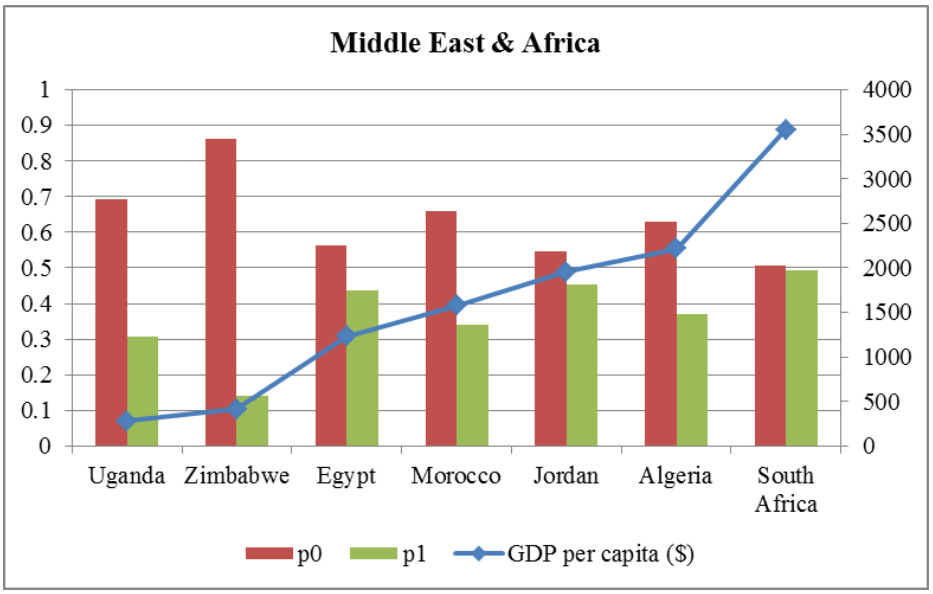

Figure 24 - Europe (1) two-level scale graph

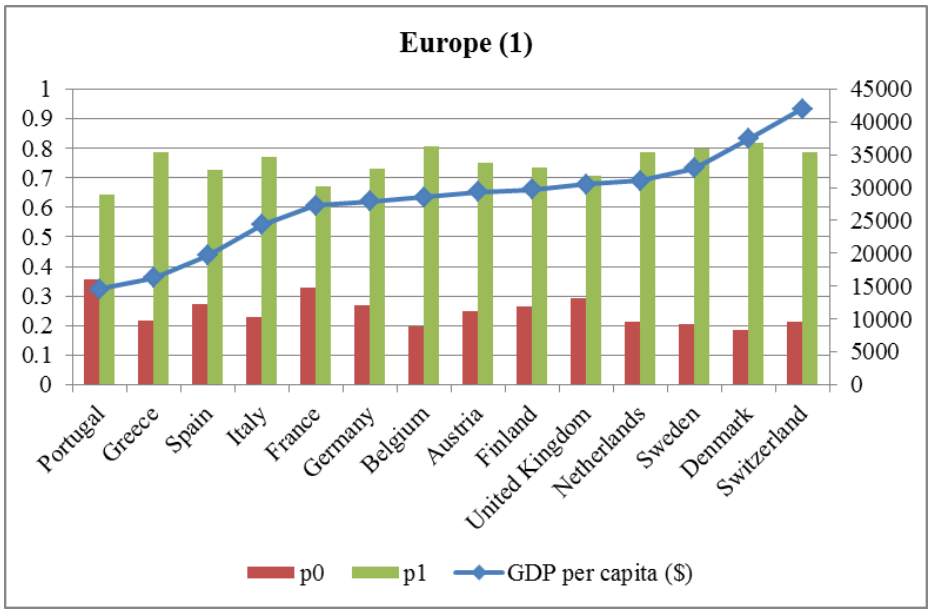

Figure 25 - Europe (2) two-level scale graph

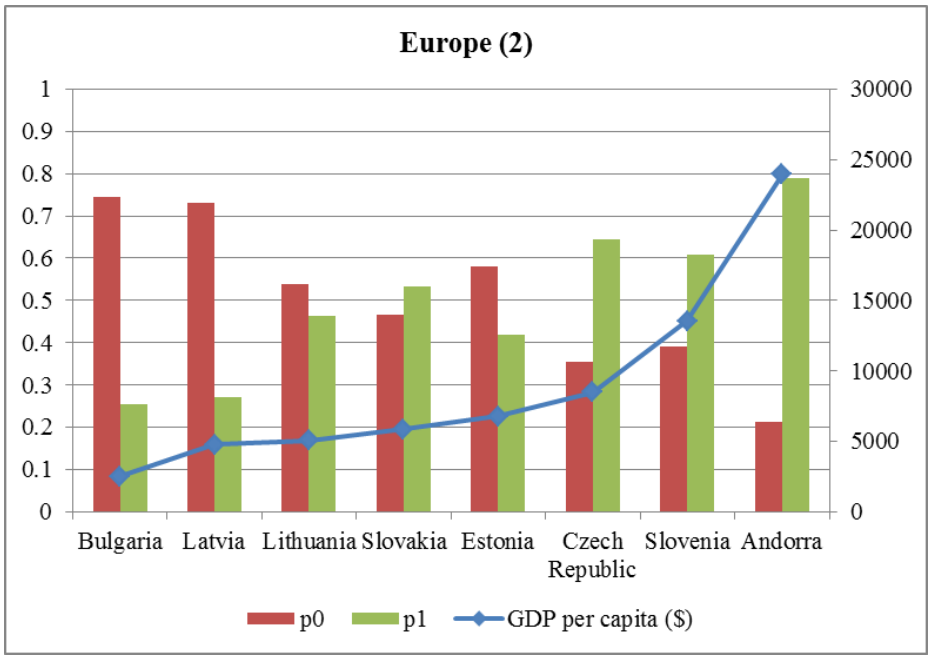

Figure 26 - LAC two-level scale graph

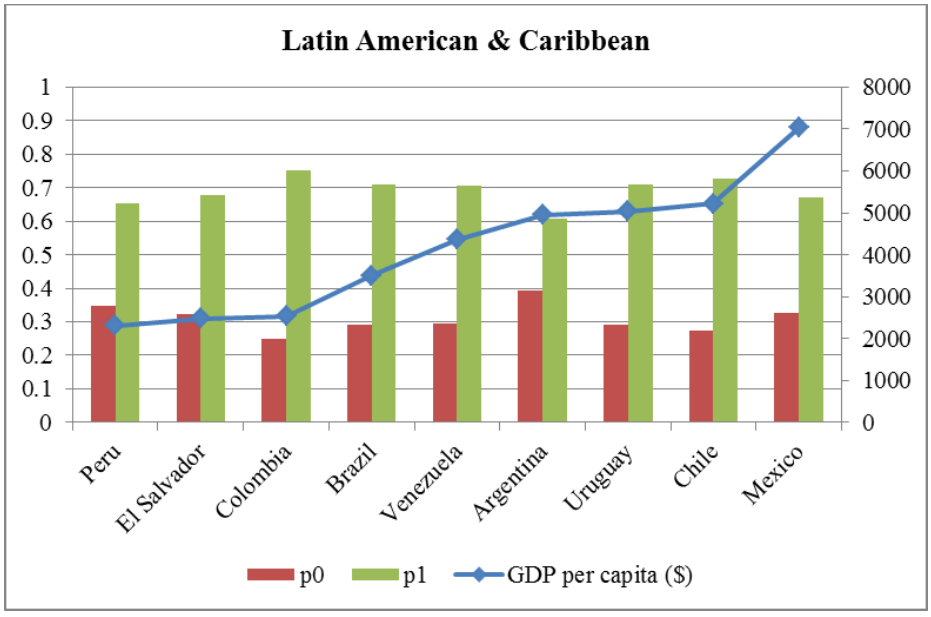

Figure 27 - NAAN two-level scale graph