INEQUALITY AND ITS IMPACT ON DEVELOPMENT

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Content

Introduction

Inequality is an economic phenomenon that has always existed in human history. The differences on wealth, opportunities and even rights are older than civilization itself. Alongside this, the explanations and justifications for inequality have varied through time (from divine rights of the elites to work meritocracy). Whatever the motives are, human societies rarely move towards a perfectly equal distribution of resources. In most of today's democracies, though, we find several attempts at redistribution and a strong interest in allowing universal opportunities for the entire population. Some people maintain that lowering inequality is good for a society. Others, on the contrary, are not eager to defend redistribution policies. This debate is the main inspiration of this paper.

As inequality is becoming one of the biggest social challenges for the future, it's useful to keep it present in social discussions around the world. Developed economies enjoy high income levels and more opportunities than developing nations, and more often than not they also have lower inequality levels. As developing countries strive to improve their living standards, they face challenges like concentration of wealth among very few groups, lack of quality education for the poor and weaker democratic institutions. Inequality does not only exist inside countries, but also between nations.

In this paper I analyse inequality in a worldwide scale, with the intention of discovering its dynamics and discerning if it impacts the growth and development of nations and people, answering the question: **Does inequality affect the development of nations?**

For doing this I examine the different ways to measure inequality, the road that led us where we are today, the causes, the current situation in different countries and continents across the globe, and the consequences that inequality can have in growth (GDP per capita) and human development (Human Development Index and Happiness).

Definitions

Usually, we define *Inequality* as the difference in wealth between individuals in a society. But it is important to note that there is more than one type of inequality. In Economics and other social sciences, we usually distinguish between two main classes: Economic Inequality and Inequality of Opportunities.

Economic inequality

This class is usually the easiest to analyze and it can be explained in three different forms, which appear similar but are not equivalent. These forms are measured calculating the difference in income, wealth or consumption amongst the community. (UNU-WIDER, 2015)

- Income Inequality

This is the extent to which income is distributed in an uneven manner. It is often the most analysed form of inequality and has the most available data. It is especially popular in industrialized countries and in Latin America.

- Wealth Inequality

This is the unequal distribution of accumulated assets minus liabilities. Wealth is interesting to observe because it can be inherited, unlike income. When wealth inequality is high it means that merely having the luck to be born in a rich environment becomes an important determinant of living standards. This can directly relate to inequalities in opportunities, which will be explained in the next section.

- Inequality of Consumption

This references the differences in ability to purchase goods and services. It is harder to measure than the previous two, but it can provide a better understanding of people's welfare. The empirical literature considers that consumption has a smoother behavior than income (it is less variable). This is especially true in developing, agricultural countries. It can also be problematic: it raises problems in definition and observation because of the necessity to specify values of durable goods. Another problem is the presence of diminishing marginal utility (poorer people will value a single unit of one good more than richer people). It is usually more popular in surveys from Asian and African countries than in western countries.

If we compare these three forms of economic inequality, inequality of consumption is generally the least acute, while inequality of wealth shows the most noticeable gaps of the three.
These forms of economic inequality are usually treated through redistribution policies, such as progressive taxing of income and wealth or lowering taxes for necessity goods, which form most of the consumption basket in poor households.

For this essay, my analysis of economic inequality will be mostly made through income differences.

Inequality of Opportunities

This class is harder to define than economic inequality because there isn't a universally accepted measuring unit, nor a precise idea of what constitutes an opportunity. In general terms, the World Bank describes "opportunities" as the potential people have to succeed in life. This success references various items such as having access to education, basic services (clean water, electricity, health services) and job opportunities. Here the focus is, as Roemer (1998) expressed, "more about inequalities in the opportunities to achieve a goal rather than in the final outcome".

Opportunities are affected by many characteristics, the most notable include the following:

- Gender

According to the UN, gender inequality remains a major barrier to human development. Usually men around the world earn more money than women, get more access to education and participate more in political life.

- Ethnicity

Discrimination based on ethnicity can involve high levels of prejudice. People of a certain ethnic group linked to prejudice in a society may find it harder to succeed as much as people from other groups, despite performing the same amount of effort.

- Geography

Depending on the geographical area, some individuals have access to more education, cheaper access to financing, a better quality job market, etc. On a global scale, the poorer countries in the world are located near the line of the equator, where life is more challenging because of the higher prevalence of diseases and difficulties in agriculture. Other geographical characteristics, such as being a landlocked country, is also related to poorer development.

- Economic circumstances

Poverty often involves a self-perpetuating cycle. Children from disadvantaged backgrounds are less likely to do well in school and are more likely to suffer health issues such as obesity or injuries. This is why, as mentioned previously, inherited wealth is a contributor for inequality; being born in a privileged household is a starting advantage over people with less wealthy families.

In contrast to economic inequality, this form is almost universally considered an issue where it's desirable to find a solution. In order to level the playfield, policy should ensure that opportunities are equal for everybody. In this perspective, inequalities due to circumstances beyond the control of the individual are considered to be socially unfair, while different outcomes due to different levels of effort or ability might be considered to be socially acceptable. (Juárez, 2013)

Finding the perfect policies to solve inequality of opportunities is, however, more complex, because it involves more than simply redistributing wealth. A usually proposed way to do it lies in promoting universal education and the formation of skills that will allow everyone in the population to get quality jobs and help their economic mobility in the long run. More education can, at the same time, become a positive factor for economic growth and development.

Another way to classify inequality is based on the geographical scope. We normally study:

- Inequality within a country, which considers the distribution differences found in the population of one country. It can be used, for example, to compare the economic power of the top 20% earners in contrast to the lowest 20%.

- Inequality between countries or "international inequality", which compares the average economic levels of different countries. It can be useful to contrast differences between developing and developed nations, for example.

- Global Inequality, considering all people in the world in the same analysis, mixing both of the previous scopes into one.

Measuring Inequality

There are various metrics for measuring economic inequality. While they differ in method, they generally share four characteristics that ensure they are valid for analysis. These are:

- The metric is independent of the population size. Which means smaller populations should not appear to be more equal than larger populations based on their size alone.

- The metric must be independent of the economic scale (the aggregate level of income). This means that a poorer population should not appear to be more equal than a richer one just for being poorer. For example, simultaneously doubling the income of every individual in an economy should not affect the value of the metric.

- Individuals are anonymous, so the metric only depends on the economic distribution, not on the characteristics of each individual. In other words, the metric does not measure fairness because it doesn't imply anyone in particular should deserve more than any other particular individual.

- It follows the Pigou-Dalton principle of transfer. According to it, in an income distribution, a regressive transfer (from a poorer individual to a richer one) will lead to increased inequality.

From all the inequality metrics that follow the previous criteria, the most used in literature are the following:

The Hoover Index

One of the simplest metrics, it is the proportion of the income that would need to be redistributed in order to achieve a perfect equality. This means measuring how much we would need to take from the richest part of the population to give to the poorest until everyone shares the average income. A value of 0 would be a perfectly equal world where no proportion would need to be redistributed, and a value of 1 would mean perfect inequality (the closer scenario to a value of 1

is when all income is received by just one household and almost all of this income would need to be redistributed).

Graphically, it can be represented in the Lorenz Curve as the longest vertical distance found between the line of perfect equality and the curve itself. We'll explain the Lorenz Curve with more detail at the end of this section.

The Gini Coefficient

The Gini coefficient can be considered a better measure than the Hoover index and it's possibly the most known measure of income inequality inside a country. Similar to the Hoover index, it scores 0 when everyone has identical incomes and 1 when all the income is concentrated in only one person.

By normalizing the cumulative share of income and also the cumulative population, the measure isn't very sensitive to how the income is distributed, but rather only on how incomes vary relative to the other members of a population.

One of its problems is that it cannot tell where in the distribution the inequality is stronger or weaker, which means that two very different distributions can share the same Gini coefficient.

The Theil Index

It measures Global Inequality. One of its advantages is that it allows us to decompose the observed inequality in order to analyze which part corresponds to differences between countries (international inequality) and which to differences inside each country.

It is an entropy measure. We find Maximum Entropy when individuals cannot be distinguished when observing their resources (perfect equality). 0 means perfect equality, and 1 means that the distribution is close to an 82:18 partition.

We will use the Theil Index for analyzing the historical trend of inequality later.

Division by Quantiles

By dividing the total population in quantiles ordered by economic distribution, we can decompose the distribution in parts and see where the inequality lies. This is a convenience shared with the Theil Index, but something Gini lacks.

We can choose any q-quantile if we want to analyze inequality, but it's convenient to decompose in quintiles, because it is easy to comprehend and look at graphically, as it gives us a simple but effective "low, middle-low, middle, middle-high and high" groups distribution. Deciles and percentiles are also used often, especially when we want to observe the situation of the top 10% or 1%, respectively.

Observing the distribution of income by quintiles is how the Lorenz Curves in this paper have been drawn.

The Lorenz Curve

The Lorenz Curve is a graphical representation for the distribution of income and wealth, so it can offer a good visualization of where in the population inequality lies.

On the X axis we put the cumulative share of people from lowest to highest incomes, and on the Y axis we put the cumulative share of income earned or wealth. The curve always starts at (0,0) and ends at (1,1), which is the 100% of both cumulative shares. We compare this curve with the "perfect equality" curve, a 45º straight line which starts and ends touching the Lorenz Curve. We can calculate the Gini coefficient from it, as the ratio of the area between the line of perfect equality and the Lorenz Curve to the area between the line of perfect equality and the line of perfect inequality.

Kuznets Ratio

The Kuznets ratio tells us how many times higher the income of one of the top quantiles is in relation to one of the lowest. Usually, we take the share of total income received by the richest 20% of the population and divide it by the share of total income received by the poorest 40% of the population. These percentages can be different, though, as many variations of the Kuznets ratio exist, such as dividing by the income of the lowest 20% instead. Another popular variation is the Palma Ratio, which considers the highest 10% and divides it by the income of the lowest 40%. The Palma ratio is often used in countries were inequality is especially driven by the top 10% earners.

Historical Trend

How has inequality evolved through time and what are the elements that push it? Observing its evolution can give us insight into its dynamics and explanation, as well as its general tendency. Data shows that global inequality has been increasing for centuries, as the gap between rich and poor widens. But this evolution has not been the same in between countries and within countries comparisons.

Ancient Inequality

Analysis of inequality for pre-industrial societies is problematic, because the limited existing data is likely to be biased and incorrectly measured (Roser, 2016). Some studies that have tried to address it extracting data from "social tables" have, however, concluded limited information, saying that ancient pre-industrial societies had similar inequality levels to pre-industrial countries today on average, although with a higher variance than today (Milanovic et al., 2008). For this reason, we could, with the reasonable caution, extrapolate that the behavior in today's more agricultural nations can more or less reflect inequality levels similar to those of ancient societies. Another finding of Milanovic et al. implies that the potential economic power of the ancient elites was above their actual economic power. Technically this meant having a higher "extraction ratio" than societies today (they usually didn't take full advantage of their political power to maximize their possible wealth). This implies that some kind of social control had to exist to prevent the top earners from obtaining their full profits potential. It can be theorized that this was driven by social sustainability needs (possible to prevent revolutions), maintaining their wealth at a maximized sustainable equilibrium.

Increasing gap since the Industrial Revolution

On an international scale (comparing between countries), the biggest explosion of inequality started with the First Industrial Revolution, around the XVIII century. This is today called the "Great Divergence" by economic historians. During this time some countries, starting with Great Britain and followed by countries like Belgium, Germany, Sweden, the United States and Japan; were pushed forward onto a path of notably higher incomes while others stayed where they had always been. Simon Kuznets defined this as the starting point of "modern economic growth", which was characterized by achieving growth rates of GDP per capita like never before in human history, by changing the productive system from being agriculture-based to industrial-based.
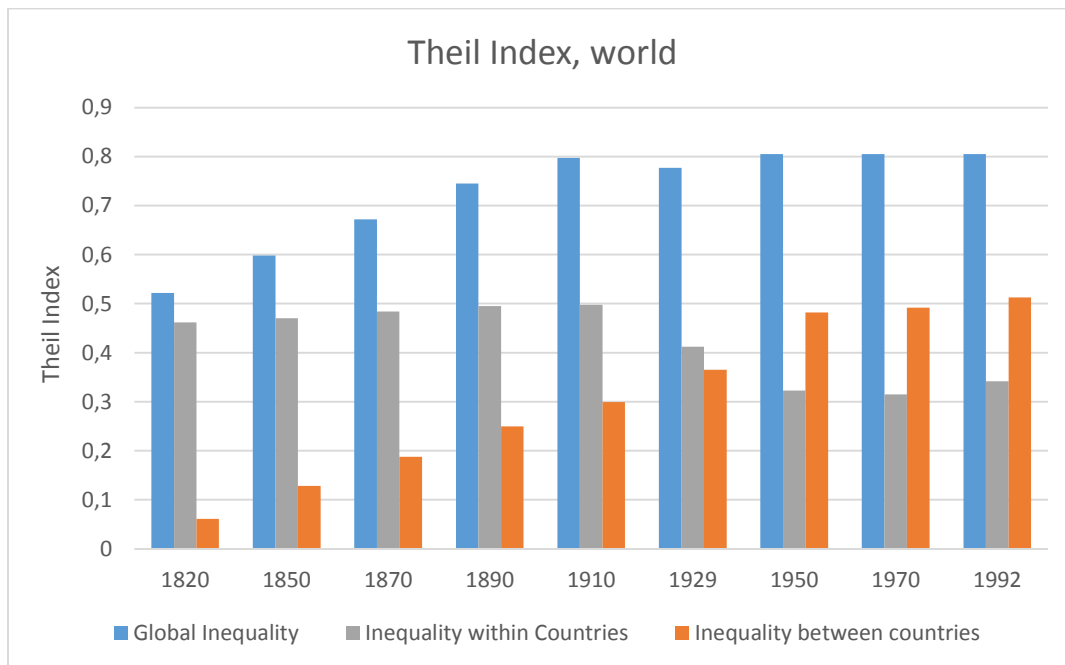

Figure 1

The positive trend of international inequality has continued ever since, as many developing countries today still base their economy on agriculture and are left even more behind. This can be seen in Figure 1 above, where the international component (between countries) of the Theil Index shows an upward evolution. However, inequality within countries experienced a decline from the Great Depression to the decade of the 70's, when it started to raise again. During this time some poor nations have approached the path of development, and their poverty has greatly decreased, especially in Asia and parts of Latin America (Thirlwall, 2013). So while the global trend is positive, it's been mainly caused by international differences.

The trend also varies depending on the country and period of time. For example, in contrast to the Great Divergence, we find the concept of "Great Compression", an event that happened between the decades of 1930 and 1940, when the income levels of countries in Europe and the United States showed convergence due to the post World War policies.

The recent years

During the 80's we could observe that inequality within countries began to raise again, continuing until today. The global elites are now making more money than ever before while incomes of the middle classes appear to stagnate. Economic growth has been, again, disproportionally benefiting higher income groups, leaving behind the low-income population. Since the crisis started, this did not change: disparities kept increasing. The effects of the 2008 Recession affected everyone, rich and poor, but the poor suffered it more. This is different to what happened during the Great Depression of the 1930's in which inequality briefly decayed.

If we look at the OECD countries, inequality is today at its highest recorded point in history. In some emerging economies, especially in Latin America, income inequality has managed to decrease since the 90's, but the gaps are still notably bigger than in developed countries. The main causes for inequality increase in the developed world are considered to be higher unemployment and a decrease in taxes revenues and redistribution.

The countries more affected by the Great Recession saw important income stagnation from 2007 to 2011. In Greece, for example, the real net income fell more than 8% annually. In Spain, annual losses were around 3.5%. But the poorest 10% of Spaniards suffered a drop of almost 13% a year, while the 10% richest declined in only 1.5%.

If we analyze only the countries where average incomes continued to grow, the top 10% did, again, better than the bottom 10%. As we can appreciate in Figure 2 below, the recession impacted all income groups in the OECD, but the bottom 10% suffered more, going back to pre-2000 levels.
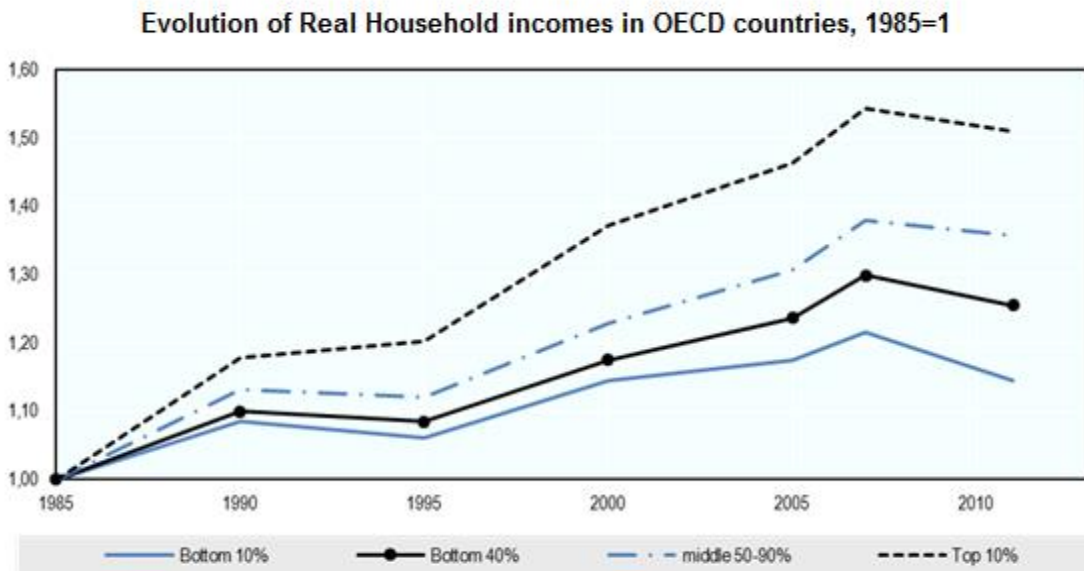

Figure 2

The crisis also generated increasing "anchored poverty". This is calculated fixing real low-income benchmarks to pre-crisis levels (the bench-mark doesn't evolve with time). This anchored poverty almost doubled in Spain, reaching 18%. In Greece, it more than doubled and reached 27%. It's also interesting to note that he younger generation just replaced the elderly as the group with more risk of poverty. (OECD, 2015)

As a trend the increasing gap is happening almost everywhere, not only in OECD countries. Poor countries, in fact, experience it more. This is notably true when corruption and bad policies allow the wealthiest to accumulate without control. Poor countries tend to have institutions with less quality than those found in high-income countries. Often, institutions like these don't proactively try to help new entrepreneurs nor maintain a safe legal framework from which to start projects, further securing the existing powers and decreasing competition and mobility, strengthening the inequality of opportunities and income.

Causes of the trend

Simon Kuznets analysed data from the first decades after World War II. Using new technical methods at the time, he observed a behaviour in the developed world: after some time of increasing inequality caused by industrial activity, the development process helped inequality decline due to the reallocation of the labour force from low productivity sectors (agriculture) to higher productivity sectors (industry). In other words, mature economies would see inequality stabilizing and then falling. This is called the Kuznets curve (shaped as an inverted-U) and it has been used to defend inequality in poor countries as just a transitional stage that would eventually reverse itself.

Later research and new data has been used to criticize this theory. In the long term, inequality has been increasing almost everywhere, and Thomas Piketty (2014) has shown through a more comprehensive analysis, the time period studied by Kuznets looks like an exception to the rule. Piketty considers that the reason for modern wealth inequality (not income), is found in the equation $r > g$ in which r represents the net rate of return to capital and g is the growth rate of output. This growth rate of output will stay low in a world after the Industrial Revolution, because population growth and economic growth decline to lower rates in the long term. By seeing the trend through history, Piketty predicts that inequalities will keep increasing in the future.

There have been critics to Piketty's conclusions as well, but rising inequality is undoubtedly a reality that is inspiring an increasing debate in many countries. The attention is usually directed at the top 1% of earners (and more recently, the top 0.1%), whose extraordinarily high incomes allow them to live apart from the rest of the population. One of the main themes of concern is the high possibility that these elites could involve into "rent-seeking" and economic or political "capture" through corruption, distorting the performance of the democratic system.

The United States are one of the extreme examples for this. Here, the average pre-tax income of the top 1% rose by 1% yearly in the period between mid-1970s and the Great Recession of 2008. The growth of the remaining 99% was just 0.6%. If we only focus in the 40% at the lower end of the distribution, we will notice that they have barely even benefited from economic growth at all.

And the lowest of all earners have even experienced a fall in their real incomes. In other words, the increasing gap is not caused only because of the explosive earnings of the rich, but also because of the declining situation of low-income households. There has been an explosive rise of the top 1% and a decline of the lowest 40%.

Other explanations mention how labor markets around the world have suffered remarkable transformations during the past decades, and income distribution has changed accordingly. Important transformations that have affected inequality are:

- Great degree of globalization: economies with a comparative advantage in extraction of raw materials tend to not develop big industries, generating lower quality jobs in their societies and lower incomes than in industrialized nations.

- Regulatory reforms: changes in the tax systems have reduced marginal tax rates for the highest earners.

- Technological improvements that have altered the production process. Workers in sectors with high demand have seen great income rises. Workers with low-skilled jobs have stagnated, and even suffered more severe unemployment due to modern automaton.

Some structural reforms that seek to increment economic growth and create jobs adding flexibility to the job markets have been found to widen economic disparities. By sustaining these reforms through the years, the effectiveness of tax and benefit redistribution systems is reduced. (OECD, 2011)

Inequality around the world

As it's been said, inequality within countries varies remarkably depending on the nation observed. For example, the Gini of OECD countries stands at an average of 0.315, lower than the world average. But inside the OECD itself, the average Gini is exceeded to 0.4 in the USA and Turkey and around 0.5 in Chile and Mexico. By observing the world, we notice that the main emerging economies show higher inequality, a behavior that would be explained by the Kuznets Curve of economic development.

For this section, I will present within country comparisons, graphically showing income distributions through Lorenz Curves in different regions of the world, and commenting the Kuznets ratios for consistency with the quintiles analysis that formed the graphics.

Continental differences

Despite the fact that all countries have different levels of inequality, we can identify certain patterns in groups of geographical regions. The region with the most unequal distribution of income is composed by the Southern African countries, while the most equal distribution is found in the Nordic European countries. The Lorenz Curves of both of these extreme regions can be seen in Figures 4 and 5 in the appendix for comparison.

Europe is the most equal of all continents. With a 20/40 Kuznets ratio of 1.88 on continental average. Inside of Europe, the Nordic countries all share the lowest inequality of all regions in the world, with their 20/40 Kuznets ratio averaging only 1.57. For comparison's sake, Spain's ratio is 2.36, the second highest in Europe, only surpassed by Greece's 2.46.

In contrast, the other extreme is found at Southern African countries, the most unequal region in the world, with a 20/40 Kuznets ratio of 7.82. As a whole, Africa is not the most unequal continent, though. The African continent's Kuznets ratio is 3.46, while the Americas (considering North, Central, Caribbean and South America) average a ratio of 4.39, being Central America and the Caribbean the most unequal region in the new world, with a ratio of 5.41. This means that the Americas are more consistently unequal, but we must be cautious because many African countries did not have data available, so the comparison could be missing valuable information.

The reasons for the high inequality levels in America and Africa are usually attributed to their colonial history and the elitist structural society formed during that period, forming social privileges that have not completely disappeared with time.

Nordics	1,57	North America	3,02	East Asia	2,70	North Africa	2,34	Australia and New Zealand	2,23
Central Europe	1,81	Central America/Caribbean	5,41	Central Asia	1,59	West Africa	2,85	Micro Islands	2,46
East Europe	1,82	South America	4,17	South East Asia	2,55	Central Africa	2,81		
Southern Europe	2,35			South Asia	2,18	East Africa	3,45		
				Near East	2,47	Southern Africa	7,82		
EUROPE	**1,88**	**AMERICA**	**4,39**	**ASIA**	**2,39**	**AFRICA**	**3,46**	**OCEANIA**	**2,34**

Figure 3

The total, continental Lorenz Curves can be seen in Figure 6 in the appendix. A distribution comparison of incomes in selected countries from the most equal and unequal continents can be seen in Figure 7, including South Africa as well for being a world extreme.

Education and convergence in opportunities

As we've mentioned earlier, education is considered a key aspect for reducing inequality of opportunities and also for increasing economic growth. According to findings by the Global Partnership for Education, if all students in low-income countries left school knowing basic reading skills it could translate into around 171 million people escaping poverty (12% of global poverty). This would lead to a more competitive work force, more consumption and, in general, GDP growth. The UN holds that each additional year of schooling raises average annual gross domestic product growth by 0.37%.

On a similar note, the Global Partnership for Education, the World Bank, the GPE and UNICEF state that increasing education indeed reduces inequality of opportunities, which at the same time builds social cohesion and strengthens sustainable peace. We can expect that this would lead to a "Peace Dividend" that would, again, boost economic growth. GPE data says that if the enrolment rate for secondary schooling was 10% higher than average, the risk of war would be reduced by around 3%. Education is therefore useful for the development of peace.

Other positive effect that increasing education opportunities have in economic growth include combating HIV and AIDS, saving children's lives, raising crop yields and allowing women to enter the job market.

Having mentioned the positive effects education, we should now analyze its current evolution. Data says it's been improving in the last decades. And the gap between men and women for its access is also decreasing. As we can see in Figure 8 in the appendix, low-income countries are converging with high incomes in primary education enrolment. We could ponder that the quality of education may not be at the same level in these two groups of countries, but this convergence can still be considered a major step for reducing world inequality. In the same graphic the gender levels are included, in which we can see how females are converging with males, especially in low-income countries. In high-income countries females have, as a matter of fact, had a slightly higher enrolment ratio than males since the year 2001.

Theories regarding the impact on growth

Economic theory has argued both against and in favor of economic inequality. On the one hand, it can be seen as positive. This is because a marked gap between rich and poor people can become an incentive for the poor to do whatever they can to become rich, including:

- Working harder (which increases productivity)

- Studying (which would rise the human capital level of a nation)

- Specializing in their strengths (which favours the division of labour and with it, the efficiency of a nation)

- Taking risks and engaging into entrepreneurship (boosting innovation and competition)

All of these initiatives can lead to more economic growth for all of society.

Furthermore, it's considered that individual saving rates rise with the level of income. This would indicate that redistribution from rich to poor would lower the aggregate rate of saving and investment. In this case, reducing inequality of income would again be detrimental for economic growth.

On the other hand, literature also states that inequality has negative effects, as the richer are better able to take advantages of economic opportunities that others cannot enjoy. This is what we have previously defined as inequality of opportunities; poor families find it more difficult to keep their children at school, giving them the needed resources to success, affording high-quality education or borrowing to invest in new projects. These effects slower economic growth and disproportionately benefit the richer population. (OECD, 2015)

Several studies have defended that economic inequality can indeed lower long term growth. Castells-Quintana and Royuela (2012), analyzing the 2008 crisis, directly relate inequality as a consequence of the scarcity of opportunities. Inequality and, especially, its interaction with

unemployment would be a cause for deterioration in the long-run growth. This harmful effect is also noted to be greater in countries with high urbanization levels.

These results contrast with Banerjee and Duflo's (2000). They show that the economic growth rate follows an inverted U-shaped form as inequality changes. Any change in inequality (increase or decrease) is associated with reduced growth in the next period. This non-linearity explains contradicting evidence from several previous studies in which the relationship between inequality and growth rarely gave similar results, sparking confusion. Banerjee and Duflo present two classes of arguments that suggest causal relation between inequality and growth. First, they identify "Political Economy" arguments, in which it's explained how inequality leads to redistribution and can hurt growth (a simple model based on "hold up" behavior with two classes). Secondly, "Wealth Effect" arguments affirm that the richer population can easily invest their money, while the poor under-invest.

Robert J. Barro (1999) had found that higher inequality retards growth in poor countries but encourages it in richer countries, giving empiric arguments for the Kuznets Curve (after many studies that had been pointing out the weakening of this relation). His results, however, do not explain all variations of inequality across countries or over time.

Inequity Aversion and socio-political unrest

Areas in experimental economics tell us about "Inequity Aversion". The Ultimatum Game is a clear example: In a two-player game, one of the subjects chooses how a reward should be split between the two. If he acted in pure self-interest, the split would consist of 0% for the partner and the full amount for himself. But the second player can decide to veto the deal completely so that none of them receives anything. It has been shown that the player with the veto option often chooses it if the first player acts on self-interest. In other words, people show aversion for inequity and are willing to sabotage the increase in wellbeing of others if it feels unfair for them, even if they don't directly experience any loss from their original situation.

This has been neurological studies trying to find links between wealth and happiness have found that our satisfaction depends more on the relative comparison with others in our environment than the absolute purchasing power we have as individuals, stating that people in the west have not become happier with their wealth in the last 50 years despite it increasing enormously on average (Broyce, Brown, & Moore, 2010). This type of social comparison for happiness has also been found in other animals, such as monkeys, indicating that elements of social fairness are necessary for complex social groups. (Brosnan & Waal, 2003)

Can the sabotage mentioned before be applied to entire societies? According to analysts in the UN, there is strong evidence that horizontal inequalities are important drivers of violent conflict (Henk-Jan Brinkman, 2013) performed by groups who don't feel comfortable in the system. Barro (1999) already said that inequality "motivates the poor to engage in crime, riots, and other disruptive activities", which he also considers a "direct waste of resources because the time and energy of the criminals are not devoted to productive efforts". Defensive behaviour by potential victims and threats to property rights are also linked to this kind of unrest. By decreasing

inequality, we can expect less social unrest and conflict inside countries. This can work similar to a peace dividend, which is helpful for growth.

Impact on development: models

Impact of Inequality in GDP growth

To identify the effect inequality has on economic development, I design a multiple regression model including all countries in which one of the independent variables measures inequality. It is a cross-sectional study, with each variable being the average for the last 15 years (since 1990).

The dependent variable for this first model is the logarithm of GDP per capita converted to international dollars based on purchasing power parity (PPP). From now on, I'll refer to it simply as GDP, and in the model as *lngdp*.

The regressors used to explain economic growth come from growth theory literature, the variables finally chosen are: unemployment as percentage of labour force (unemp), inflation in logarithm (lninfl), the total population of the country in logarithm (lnpop), its percentage of urban population (urbpop), general government's final expenditure as percentage of GDP (govexp), the international country risk guide index which is a mean of corruption, law and order and bureaucratic quality (icrg), the percentage of GDP dedicated to Research and Development in logarithm (lnrdexp), life expectancy in logarithm (lnlifexp), the fertility rate in logarithm (lnfert), gross enrolment primary education rate for both sexes in logarithm (lnenresec) and the Gini coefficient to measure inequality (gini)

Before deciding on this final model, and in order to choose the best possible inequality metric, the Gini Index and several Kuznets ratios were tested in separate models to find which gives a better explanation, maintaining other variables unaltered. Although changes in R^2 were barely noticeable for each of these models (which tells us we could use any of these metrics for the analysis), the Gini coefficient contributed to a better model. Gini is also the metric with the most normal distribution across the globe (its distribution can be seen in figure 9 in the appendix) and we can see in Gini a more linear relation with GDP than the Kuznets ratio. The scatterplots are in figures 10 and 11.

Similarly, in order to identify the best measure for education, different models were created. Each one had a different educative variable considering three levels of enrolment and three of education attained by the labour force: enrolment in primary education, enrolment in secondary education, enrolment in tertiary education, percentage of labour force with primary education, with secondary education and with tertiary education. Enrolment in secondary education is the best education variable, making the model more explanatory of GDP growth. In terms of labour force, analysing the working population with primary education explained a better model than with secondary and tertiary.

The Quality of government metric chosen is the ICRG index. It has been chosen because many other popular indexes have been changing their formulas through the years, making time comparisons and averages impossible.

The final model can be written like this:

$$lngdp = \beta_0 + \beta_1 unemp + \beta_2 \, lninfl + \beta_3 \, lnpop + \beta_4 urbpop + \beta_5 \, govexp + \beta_6 \, icrg \\ + \beta_7 \, lnrdexp + \beta_8 \, lnlifexp + \beta_9 \, lnfert + \beta_{10} \, lnenrsec + \beta_{11} gini$$

As we can observe in the results in the coefficients table from Model 1 in the appendix, the effect of inequality (gini) does not look significant. We cannot confirm that a higher Gini index affects GDP negatively or positively. Enrolment in secondary education, however, looks significant. We can say that increasing the enrolment in secondary education of a country in 1% will, on average, increase GDP in 0.61%, ceteris paribus. This means there is a relation between raising opportunities and increasing GDP, in line with what the UN stated. Other important variables that explain growth are a high percentage of urban population (not heavily agricultural countries), low fertility rate, low inflation levels and good quality of institutions.

We can see, looking at the scatterplots in Figures 12, 13 and 14 that secondary education has a more linear relation with GDP than the other levels. Also we see how the majority of the world has already adopted primary education.

Impact on the Human Development, the HDI

In order to identify the effect of inequality in a form of development that is not restricted to production levels, I analyze another model in which the Human Development Index is the dependent variable, certain independent variables are eliminated because they are part of the calculation of the HDI. Life expectancy disappears from the model and so does education enrolment. The final model is:

$$hdi = \beta_0 + \beta_1 unemp + \beta_2 \, lninfl + \beta_3 \, lnpop + \beta_4 urbpop + \beta_5 \, govexp + \beta_6 \, icrg \\ + \beta_7 \, lnrdexp + \beta_8 \, lnfert + \beta_9 gini$$

As it can be seen in Model 2 in the appendix, inequality measured with the Gini index is, once again, not significant for development. Being employed and a high life expectancy are more important for self-reported happiness than the distribution of income.

Impact on happiness

For this model, the dependent variable is "life ladder", extracted from the Happiness Report developed by the United Nations Sustainable Development Solutions Network. It is the national average response to a question of life evaluation. People are asked the following: "Imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?". This model can give insight into the psychological effects of inequality, testing inequity aversion.

We add GDP as explanatory variable. The model is:

$$Life\_ladder = \beta_0 + \beta_1 unemp + \beta_2 \, lninfl + \beta_3 \, lnpop + \beta_4 urbpop + \beta_5 \, govexp + \beta_6 \, icrg + \beta_7 \, lnrdexp + \beta_8 \, lnlifexp + \beta_9 \, lnfert + \beta_{10} \, lnenrsec + \beta_{11} gini + \beta_{12} \, lngdp$$

Looking at the results of Model 3 in the appendix, we see that Gini is more significant here than in previous models, but it is still not significant enough to draw conclusions. It is also interesting to note that secondary education enrolment is also not significant for explaining happiness.

The general results we can get from these models is that we cannot assert if inequality is directly bad or good for economic or human development. Other variables, such as a high percentage of urban population, good quality of institutions or low inflation levels are more clearly important for development. But it is interesting to note, looking at the correlations matrix (Figure 15 in the appendix), how Gini is correlated with negative performance in almost every variable (negatively correlated with GDP, life expectancy, quality of government, expenditure in R&D, etc. while positively with unemployment, inflation and fertility rate) to varying degrees.

Conclusions

Observation of data shows that economic inequality is indeed rising, and that it's not only caused by increasing earnings of the richest, but also from decaying earnings from the poorest. This historical trend is heavily linked to how industry and markets shape modern societies.

The effect that this inequality may have in terms of economic performance is not clear, because the models do not identify a significant explanation of inequality and GDP growth. We could attribute this to the Kuznets Curve of development, since developing countries and regions, which are not fully agricultural but still not developed, show higher levels of inequality. Inequality is especially high in continents with a colonial past, whose development is driven by small elites and high levels of poverty.

The results for opportunities are different. We first found that education is one of the best reflections of opportunities in a country. Then we saw education enrolment has a significant and positive effect on GDP growth. Regarding the future of world development, we can be reasonably optimist in the education area, because we observed that education enrolment is increasing in the developing world and the gender gap is also decreasing. And as it was explained, these improvements in education finally do lead to economic growth because it can be considered as human capital investment, boosting specialization and productivity.

Another subtler relation between inequality and growth is about social unrest. We saw that a country with high levels of inequality should expect higher inside conflicts. In this way, lowering economic differences can work similar to increasing a peace dividend, which increases growth. This idea can be strengthened by the findings of inequality in pre-industrial societies, if we consider the possible mechanisms that maintained the elites in power by not acquiring all their potential wealth. So while we cannot find a linear causality between economic inequality and

growth, we could say that extreme inequality could make a social system unsustainable in the long term.

By analyzing discontent through the life ladder index of happiness we couldn't, however, infer that inequality is significant enough for happiness. A more basic economic element, being employed, is more important for self-reported satisfaction than the distribution of income. As we saw in the literature, it was precisely inequality accompanied by unemployment what harmed long-term growth. It is, again, the lack of opportunities, more clearly than the lack of economic power, what hurts the development of societies and people.

Appendix
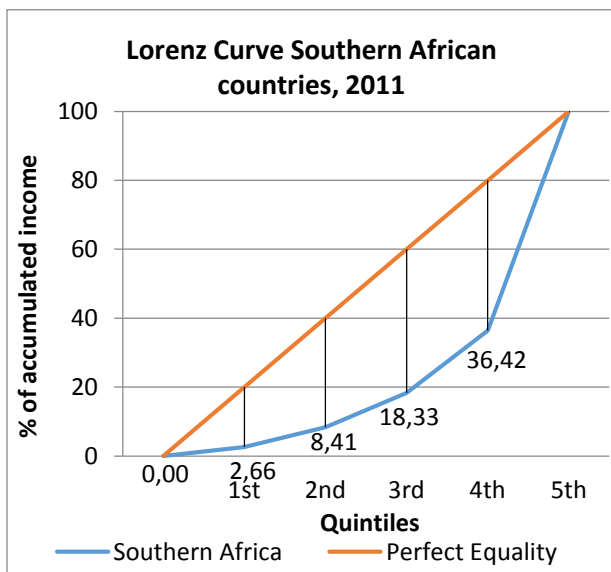
Figure 4
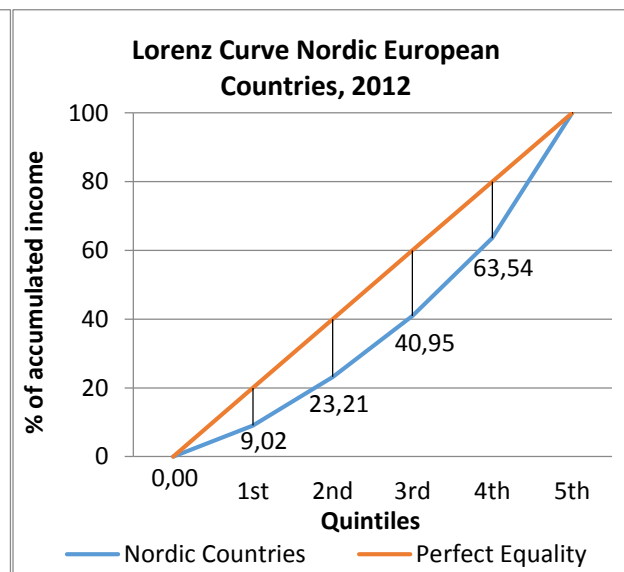
Figure 5
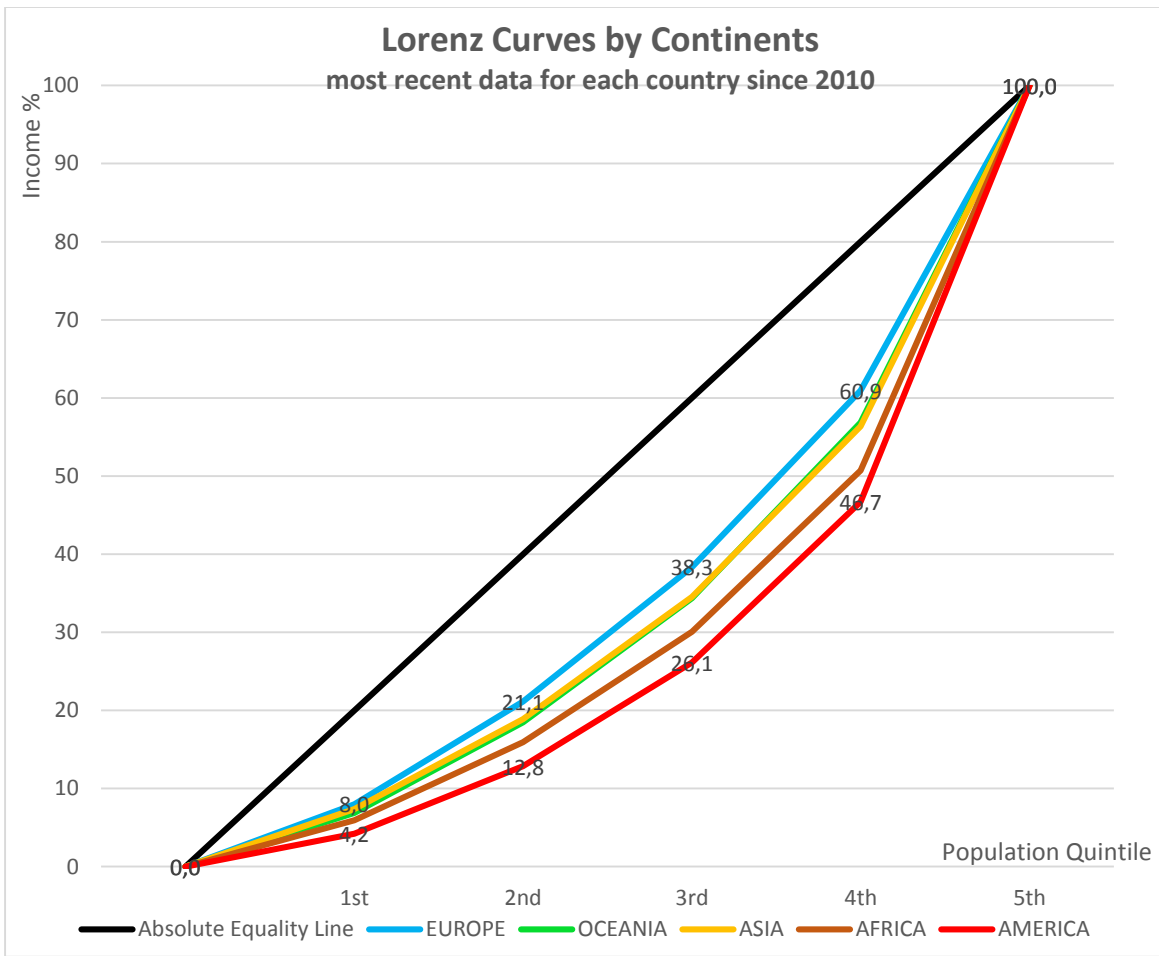
Figure 6

Income Distribution by Quintiles. Most recent data

Figure 7

Primary education enrolment rate as % of the population
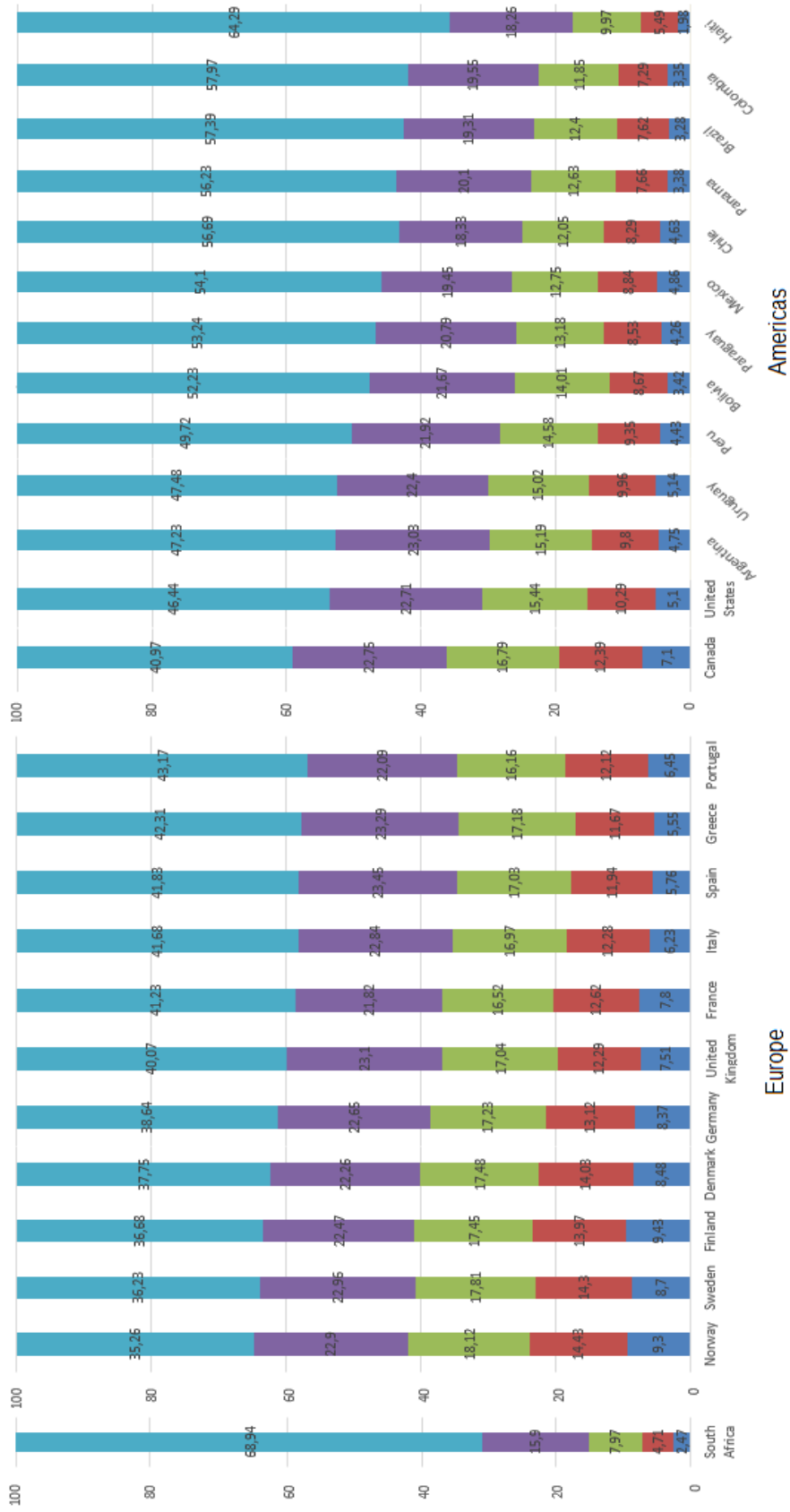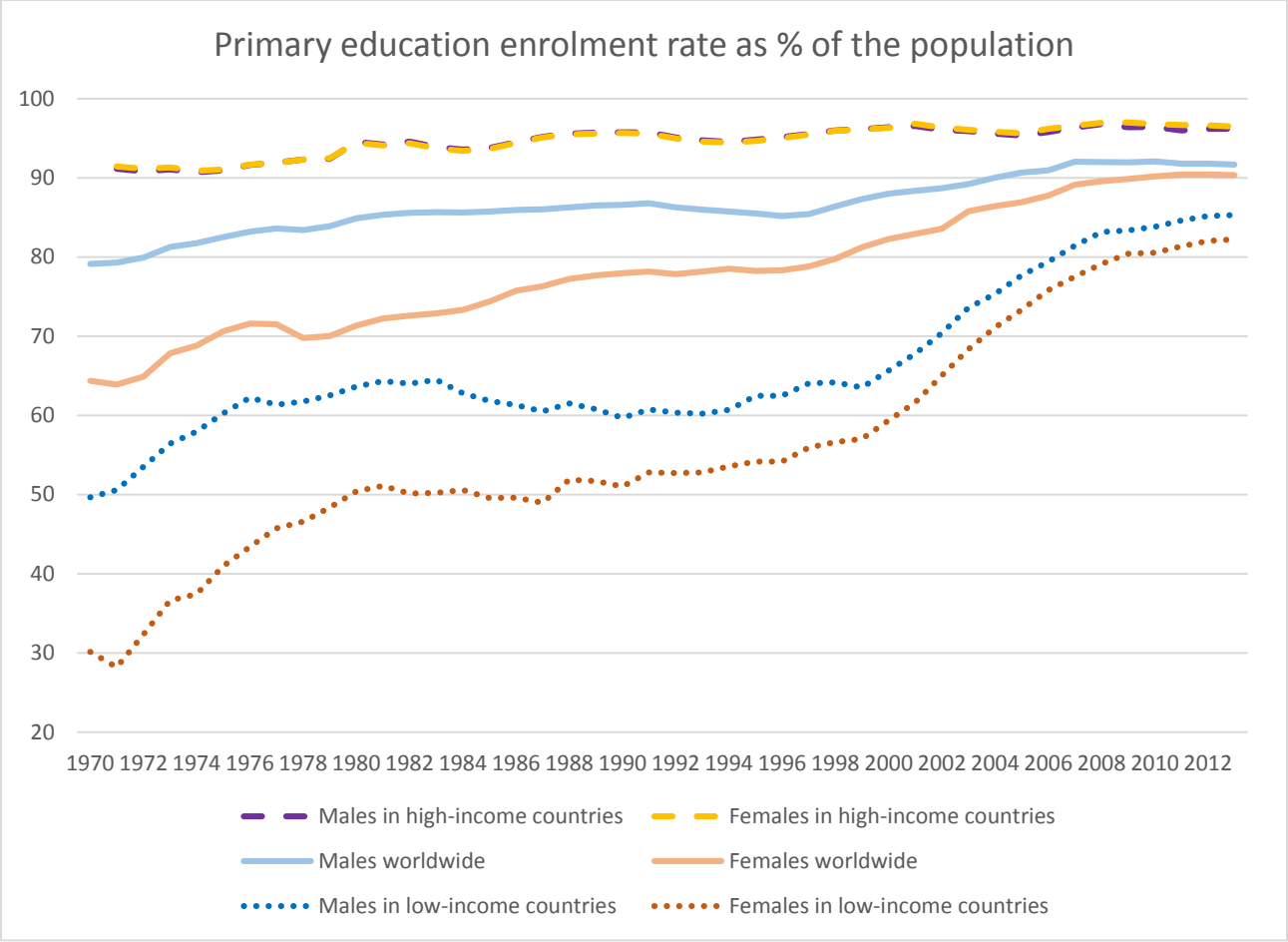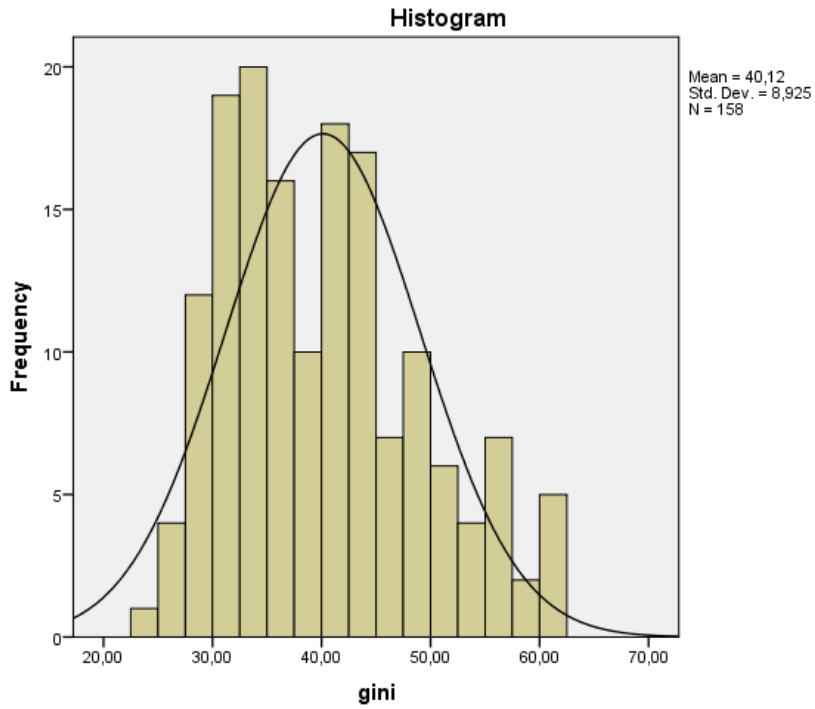
Figure 8

Figure 9

Gini vs Kuznets 20/40 ratio's relations with GDP PPP per capita:
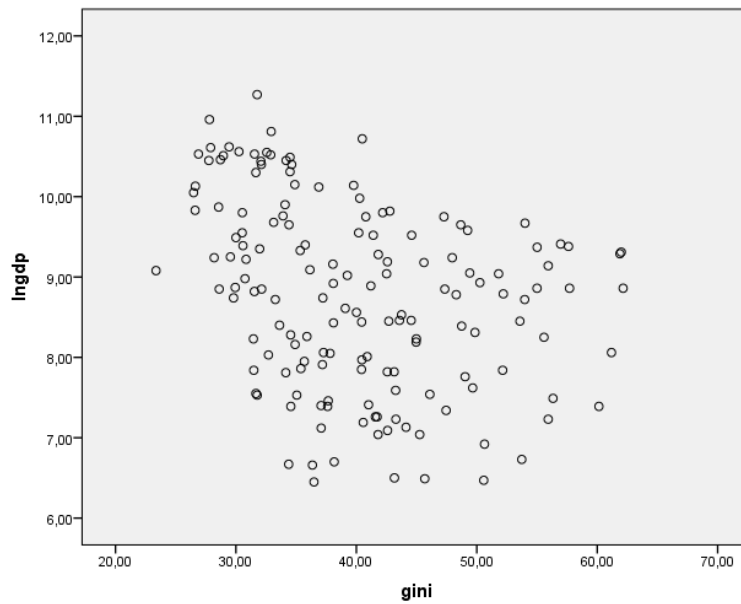
Figure 10, the Gini coefficient and the log of GDP PPP per capita
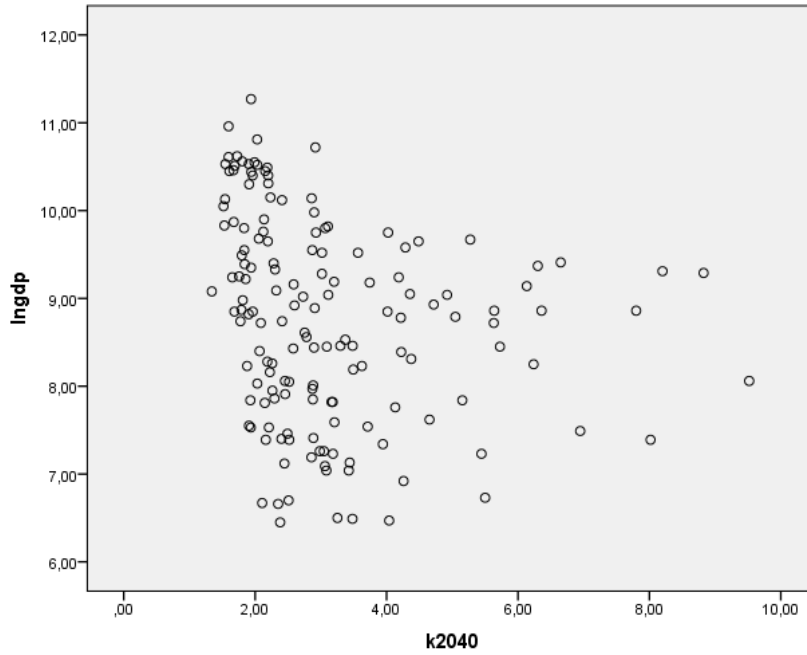
Figure 11, the Kuznets ratio and the log of GDP PPP per capita

Labor Force with Primary, Secondary and Tertiary education and their relation with GDP PPP per capita:
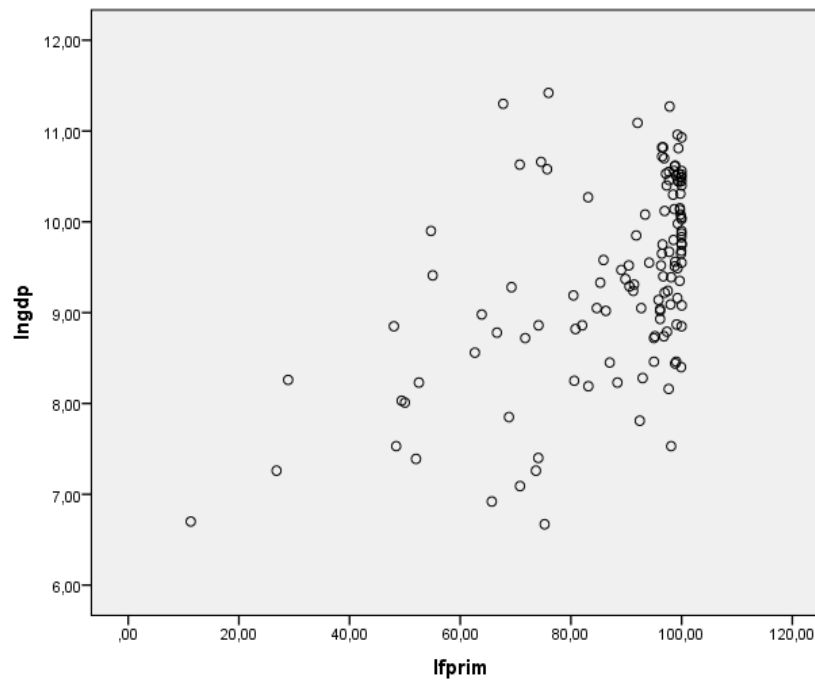
Figure 12, labour force with primary education and the log of GDP PPP per capita
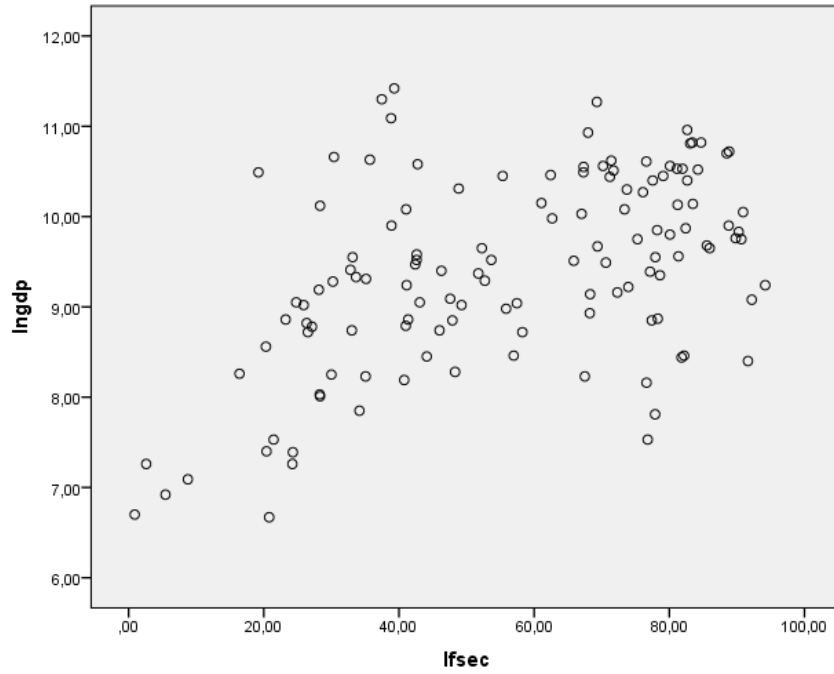
Figure 13, labour force with secondary education and the log of GDP PPP per capita
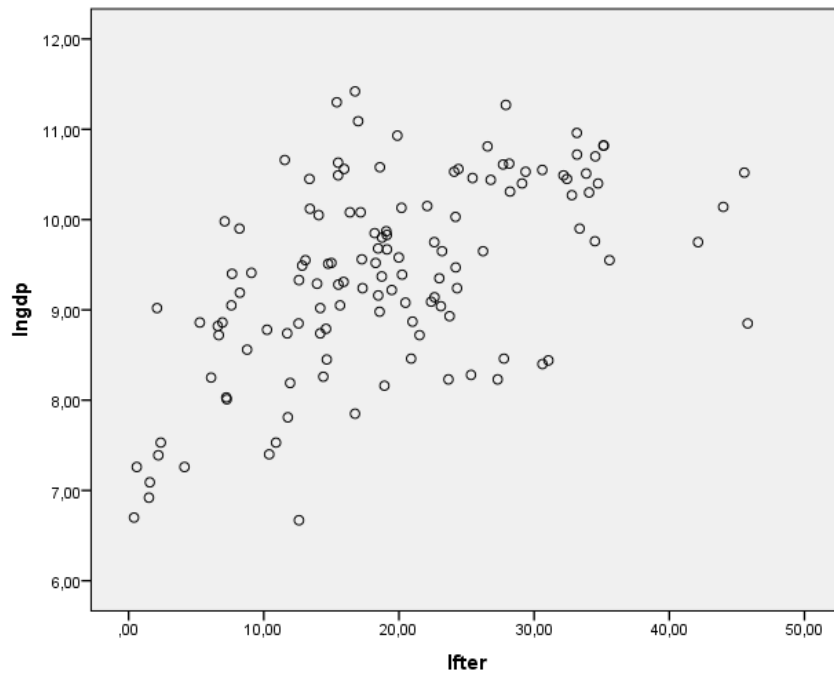
Figure 14, labour force with tertiary education and the log of GDP PPP per capita

Model 1: GDP

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Inenrsec, unemp, Ininfl, Inpop, gini, govexp, urbpop, icrg, Inrdexp, Infert, Inlifexp[b]	.	Enter

a. Dependent Variable: Ingdp

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,931[a]	,867	,850	,42616

a. Predictors: (Constant), Inenrsec, unemp, Ininfl, Inpop, gini, govexp, urbpop, icrg, Inrdexp, Infert, Inlifexp

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	98,675	11	8,970	49,392	,000[b]
	Residual	15,074	83	,182		
	Total	113,749	94			

a. Dependent Variable: Ingdp

b. Predictors: (Constant), Inenrsec, unemp, Ininfl, Inpop, gini, govexp, urbpop, icrg, Inrdexp, Infert, Inlifexp

Coefficients

| Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,135	3,895		1,319	,191
	Inpop	-,016	,034	-,023	-,487	,628
	icrg	,772	,405	,144	1,904	,060
	Inlifexp	,326	,913	,040	,357	,722
	govexp	-,004	,016	-,018	-,279	,781
	urbpop	,015	,004	,279	3,767	,000
	Inrdexp	-,022	,085	-,023	-,258	,797

		-,529	,233	-,238	-2,270	,026
	Infert	-,529	,233	-,238	-2,270	,026
	lninfl	-,158	,048	-,208	-3,319	,001
	unemp	,005	,010	,024	,504	,616
	gini	-,003	,007	-,022	-,410	,683
	lnenrsec	,611	,199	,298	3,071	,003

a. Dependent Variable: lngdp

Model 2: HDI

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	gini, lnpop, lninfl, urbpop, unemp, govexp, Infert, icrg, lnrdexp[b]	.	Enter

a. Dependent Variable: hdi

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,960[a]	,922	,914	,04332

a. Predictors: (Constant), gini, lnpop, lninfl, urbpop, unemp, govexp,

Infert, icrg, lnrdexp

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,942	9	,216	114,999	,000[b]
	Residual	,163	87	,002		
	Total	2,105	96			

a. Dependent Variable: hdi

b. Predictors: (Constant), gini, lnpop, lninfl, urbpop, unemp, govexp, Infert, icrg, lnrdexp

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,705	,084		8,414	,000
	lnpop	-,004	,003	-,039	-1,098	,275
	icrg	,170	,040	,233	4,242	,000
	govexp	-,001	,002	-,034	-,736	,464
	urbpop	,003	,000	,345	8,124	,000
	lnrdexp	-,012	,008	-,089	-1,534	,129
	lnfert	-,179	,013	-,592	-13,480	,000
	lninfl	-,010	,004	-,099	-2,436	,017
	unemp	,000	,001	-,012	-,356	,723
	gini	-3,533E-5	,001	-,002	-,058	,954

a. Dependent Variable: hdi

Model 3: Happiness Score (life ladder)

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	lngdp, unemp, lnpop, gini, lninfl, govexp, urbpop, icrg, lnfert, lnrdexp, lnenrsec, lnlifexp^b	.	Enter

a. Dependent Variable: Life_ladder

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,838ª	,703	,659	,63299

a. Predictors: (Constant), lngdp, unemp, lnpop, gini, lninfl, govexp,

urbpop, icrg, lnfert, lnrdexp, lnenrsec, lnlifexp

ANOVAª

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76,830	12	6,403	15,979	,000ᵇ
	Residual	32,455	81	,401		
	Total	109,285	93			

a. Dependent Variable: Life_ladder

b. Predictors: (Constant), lngdp, unemp, lnpop, gini, lninfl, govexp, urbpop, icrg, lnfert, lnrdexp,

lnenrsec, lnlifexp

Coefficientsª

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10,920	5,901		-1,850	,068
	lnpop	,020	,050	,028	,396	,693
	icrg	,825	,616	,157	1,339	,184
	govexp	,017	,024	,068	,700	,486
	urbpop	,004	,007	,068	,556	,580
	lnrdexp	-,011	,127	-,011	-,084	,933
	lnfert	,498	,360	,226	1,380	,171
	lninfl	,039	,076	,052	,509	,612
	unemp	-,052	,015	-,244	-3,380	,001
	gini	,009	,010	,074	,899	,371
	lnenrsec	-,046	,312	-,023	-,147	,884
	lnlifexp	2,304	1,366	,288	1,687	,096
	lngdp	,576	,163	,586	3,533	,001

a. Dependent Variable: Life_ladder

Correlations

		gini	lngdp	lnpop	icrg	lnlifexp	govexp	urbpop	lnrdexp	lnfert	lninfl	unemp	lnenrsec
gini	Pearson Correlation	1	-,332**	-,130	-,434**	-,381**	-,106	-,223**	-,430**	,438**	,093	,088	-,323**
	Sig. (2-tailed)		,000	,104	,000	,000	,191	,005	,000	,000	,251	,287	,000
	N	158	156	158	117	158	155	157	114	158	154	148	154
lngdp	Pearson Correlation	-,332**	1	-,123	,708**	,801**	,075	,781**	,462**	-,770**	-,330**	-,008	,772**
	Sig. (2-tailed)	,000		,088	,000	,000	,312	,000	,000	,000	,000	,917	,000
	N	156	193	193	131	191	185	192	131	191	180	170	184
lnpop	Pearson Correlation	-,130	-,123	1	-,182*	-,193**	-,278**	-,140*	,206*	,098	,270**	-,152*	-,211**
	Sig. (2-tailed)	,104	,088		,033	,005	,000	,041	,016	,160	,000	,044	,003
	N	158	193	215	138	208	191	213	136	208	184	175	195
icrg	Pearson Correlation	-,434**	,708**	-,182*	1	,649**	,425**	,552**	,635**	-,618**	-,540**	-,120	,605**
	Sig. (2-tailed)	,000	,000	,033		,000	,000	,000	,000	,000	,000	,165	,000
	N	117	131	138	138	138	135	138	110	138	133	136	133
lnlifexp	Pearson Correlation	-,381**	,801**	-,193**	,649**	1	,082	,649**	,427**	-,831**	-,311**	,006	,841**
	Sig. (2-tailed)	,000	,000	,005	,000		,257	,000	,000	,000	,000	,937	,000
	N	158	191	208	138	208	191	206	135	207	184	175	192
govexp	Pearson Correlation	-,106	,075	-,278**	,425**	,082	1	,043	,310**	-,045	-,126	,157*	,170*
	Sig. (2-tailed)	,191	,312	,000	,000	,257		,552	,000	,534	,092	,039	,022
	N	155	185	191	135	191	191	190	133	190	180	173	182
urbpop	Pearson Correlation	-,223**	,781**	-,140*	,552**	,649**	,043	1	,394**	-,589**	-,161*	,013	,612**
	Sig. (2-tailed)	,005	,000	,041	,000	,000	,552		,000	,000	,029	,861	,000
	N	157	192	213	138	206	190	213	136	206	183	175	195
lnrdexp	Pearson Correlation	-,430**	,462**	,206*	,635**	,427**	,310**	,394**	1	-,521**	-,272**	-,085	,427**
	Sig. (2-tailed)	,000	,000	,016	,000	,000	,000	,000		,000	,002	,338	,000
	N	114	131	136	110	135	133	136	136	134	130	129	130
lnfert	Pearson Correlation	,438**	-,770**	,098	-,618**	-,831**	-,045	-,589**	-,521**	1	,153*	-,047	-,796**
	Sig. (2-tailed)	,000	,000	,160	,000	,000	,534	,000	,000		,039	,533	,000
	N	158	191	208	138	207	190	206	134	208	184	175	192
lninfl	Pearson Correlation	,093	-,330**	,270**	-,540**	-,311**	-,126	-,161*	-,272**	,153*	1	,090	-,168*
	Sig. (2-tailed)	,251	,000	,000	,000	,000	,092	,029	,002	,039		,248	,025
	N	154	180	184	133	184	180	183	130	184	184	168	178
unemp	Pearson Correlation	,088	-,008	-,152*	-,120	,006	,157*	,013	-,085	-,047	,090	1	,104
	Sig. (2-tailed)	,287	,917	,044	,165	,937	,039	,861	,338	,533	,248		,177
	N	148	170	175	136	175	173	175	129	175	168	175	169
lnenrsec	Pearson Correlation	-,323**	,772**	-,211**	,605**	,841**	,170*	,612**	,427**	-,796**	-,168*	,104	1
	Sig. (2-tailed)	,000	,000	,003	,000	,000	,022	,000	,000	,000	,025	,177	
	N	154	184	195	133	192	182	195	130	192	178	169	195

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Figure 15: Correlations matrix

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UNSDSN (United Nations Sustainable Development Solutions Network), Happiness Report

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