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Measuring Inequality

What kind of inequality matters and what's the best way to measure it?

Bachelor Thesis

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Abstract

This thesis investigates what kind of inequality the world is concerned about today and compares traditional and new measures of inequality to see how these measures relate to current views on fairness and justice. The analysis is based on different theories of justice and measurement principles, and the relationship between each measure and the theory is investigated. Latin America and the Caribbean have been in the spotlight when developing the new measures because of the region's severe problems with inequality, and data from this region is used for exemplification in the analysis. As the world's concern about inequality seems to have increased in the last decades there's also been a shift from a focus on outcome inequality to a focus on equal opportunities. There's an extensive research showing that the world agrees that these issues should be a priority for policy makers. Inequalities caused by circumstances outside of the individual control are considered unjust and should be corrected, while other inequalities are considered fair or even good. This study finds that the traditional measures of inequality have become inappropriate as a tool since outcome inequality is no longer of interest. What policy makers need is a measure to determine the sources of inequality in society and how opportunities are distributed between its members. The new measures are definitely a step in the right direction, even if there might be comparability and measurement issues to work out before a wider implementation is possible.

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1. Introduction

1.1 Background

In the past decade, the world's concerns about social and economic inequality have increased and there seems to be an agreement that it is of importance for society and policy makers. Development economists agree that equity is an important factor for the development process based on the reasons: (1) Fairness, (2) Economic efficiency and (3) Social stability and solidarity. (Paes de Barros et al., 2009)(Todaro & Smith, 2006)

There's also been a shift when it comes to what kind of inequality matters, to a focus on equality of opportunity instead of equality in outcomes. This shift is present among economical theories of justice, as well as in the public sphere, and among international development organizations. (Paes de Barros et al., 2009)

Research has been made on the Latin American people's view on equality of opportunities. Results from a big survey made by Latinobarometro in 17 countries in the region were analyzed by Gaviria in 2006 (reviewed by Paes de Barros et al., 2009) and showed that 74% of the respondents believed that opportunities are not fairly distributed, while 64% think that poverty is attributable to factors different from effort and talent. The overall view is that effort is not paramount for socioeconomic advancement. (Paes de Barros et al., 2009) This shows the urgency of the issues of unequal opportunities in Latin America in particular, and in the world in general.

Latin America and the Caribbean have had a turbulent history with many political and economic challenges, and the region is known for strong polarization and persistent inequality as presented by UNDP (2010). In the past decades however, Latin America experienced faster growth and the poverty trend finally started to decrease. In spite of these developments, it has remained the world's most unequal region. In Latin America and the Caribbean, the Gini coefficient of income is 65% higher than in high income countries, 36% higher than in East Asian countries and 18% higher than Sub-Saharan African countries. (López-Calva & Lustig, 2010) cited by UNDP (2010). 10 of the world's 15 most unequal countries are in Latin America and the Caribbean. (UNU/WIDER, 2007; Gasparini et al., 2009a) cited by UNDP (2010)

Not only is it the region with highest inequality in the world, but also it's an inequality that is persistent and passes on from one generation to the next. The loss in human development due to inequality in income is larger in Latin America and the Caribbean than in any other region (39,3%). (UNDP, 2012) Since the politics targeted at poverty reduction in the region are finally starting to

give results, the focus has shifted towards inequality. This shift in focus and the notion of equality of opportunity has led to some of the new measures of inequality introduced in this paper and interesting policy attempts to solve the inequality puzzle. All in the efforts of answering the question: “How can policy makers help to break the inequality cycle and equal the playing field?” (UNDP, 2010)

There’s always been a discussion about difficulties in measuring inequality and what kind of measures should be used. There are a number of different measures of outcome inequality that are widely implemented, but not without problems. These new measures are trying to measure a different kind of inequality using other indicators and methods. Questions are if they succeed to capture the inequality in question and how difficult they are to implement.

1.2 Aim of Study, Method and Limitations

In this study I aim to analyze and compare the new measures of inequality with the more traditional ones and see how they correspond to current views on fairness and inequality. I try to answer the questions: What kind of inequality should matter for policy makers and why? Which measure of inequality is most suitable to trace the inequality that society’s interested in?

It’s a theoretical comparison of different measures of inequality based on economic theories of justice and measurement principles. As part of the analysis I look at empirical data from Latin America and the Caribbean from each of the measures that are being analyzed. This data serves as an exemplification of the theory concepts and help making it more graspable.

I’ve limited my research to Latin America and the Caribbean in particular, as this continent is the most unequal in the world. As I said in the background section above, the focus on inequality is very prominent in this area and there’s a lot of available data and research.

I’ve chosen the traditional measures of inequality that are most commonly used and that I thought were the most relevant to compare with the new measures.

1.3 Results

There are serious comparability issues in the empirical data, which means that any results from the material should be considered carefully. I still choose to include the data material, as it gives an indication of how the rankings differ between the measures and I believe that some general remarks can be made.

I find that the focus has shifted both in economical/ philosophical theories and in the public world from inequality of outcomes to a concern with equality of opportunity, as unequal opportunities is considered unfair on all sides of the political scale and in differing cultures and religions all over the world.

The traditional measures of inequality have become inadequate as they only measure outcome inequality. They don't show how the inequality came about and therefore can't define if the inequality is fair or not.

The Inequality adjusted HDI falls somewhere in-between as two of its dimensions are related to outcome inequality. It also differs from the other measures as it is partly based on aggregated national data, instead of actual distributions of the variables in question.

The HOI and the Top Down Approach focus on the processes instead of the outcomes, and are representative of the view that what matters is an equal playing field, not equal outcomes. They give a good idea of how unequal the opportunities are distributed in society and how much they affect total outcome inequality. However there are many questions on implementation and comparability for a universal use.

1.4 Disposition

The next section is a presentation of the theory used for the analysis in this study. The theory section begins with different perspectives and main theoretical contributions on fairness and equity. I divide them into three sections, based on welfare, freedom and virtue. Then I go through some general principles that are considered as desirable qualities for inequality measures, before I move on to a thorough explanation of the different measures. I divide the measures into two groups, traditional measures based on outcome and new measures based on different indicators.

After that I present my empirical data in a separate chapter relating to the tables of data in the appendixes. Then I have a chapter answering the question of how society view inequality and fairness today. From that I move on to analyzing the measures, first technically and then according to theories of fairness. In the first section I go through measuring problems and comparability issues and analyze the empirical data. In the second section I analyze the measures applying the justice theory and try to answer the main questions from the introduction. Finally there's a Conclusion chapter, a list of references and the appendix of tables.

2. Theory

2.1 Fairness and Equity

Inequality, and whether or not it should be accepted from a normative perspective, has for many years been a part of the debate among social scientists and political philosophers. There are different views on what kind of inequality matters, and whether it should be a concern to public policy makers or not. It all comes down to a discussion of what fairness and equity really is. (Paes de Barros et al., 2009)

I'm basing my partition of fairness theories on M.J. Sandel's way of categorizing different approaches to fair distributions. According to M.J. Sandel (2009) a fair or just society distributes the things that we value (wealth, income, duties, rights, opportunities, power and honor among other things) in the "right" way, so that each individual get what he or she deserves. He uses three different approaches to the distribution of goods: welfare, freedom and virtue. I'm going to present the main theoretic views within these three approaches, including the traditional welfare economic framework.

2.1.1 Welfare

The main theory of justice based on welfare is the utilitarian view. Utilitarianism was founded by Jeremy Bentham (1748-1832), and states that the highest principle of morality is to maximize happiness and minimize pain. Our feelings of pleasure and pain are our "sovereign masters" and govern everything that we do. Governments should do whatever will maximize happiness for the community as a whole according to this view, even if it requires a loss of utility for certain individuals or groups in society. What matters is the sum of utility for all citizens. Everything that makes us happy or happier, gives an increase in utility, and everything that makes us unhappy or produces pain induces a loss of utility. Utilitarian's usually support free markets on the basis that it maximizes general welfare through its Pareto optimal allocations¹. (Sandel, 2009)

Welfare Economics is the framework most commonly used by public finance specialists to assess the desirability of alternative economic states and government actions (Rosen & Gayer, 2010). It is closely linked to utilitarianism, as it is based on individual utility functions and trying to maximize utility and efficiency by finding Pareto optimal allocations.

¹ No one can be made better off without making any one worse off. (Hindriks & Myles, 2006)

The welfare economic framework starts with the First Theorem of Welfare Economics, saying that in a free market with perfect competition the allocation of goods will automatically end up in a Pareto Efficient allocation.

This implies that if we have well-functioning markets there should be no need for government intervention² in the market to achieve this desirable allocation. However, since there are many possible Pareto efficient allocations that could be the result from free market trade, the final allocation could yield very different results. The possible outcomes reach from extremes where one person has it all, to more equal distributions, all depending on the initial distribution of assets. (Rosen & Gayer, 2010)

The Second Theorem of Welfare Economics says: “With convex preferences, any Pareto Efficient allocation can be made a competitive equilibrium” (Hindriks & Myles, 2006).

It means that it is possible to make any Pareto efficient allocation a market equilibrium by simply changing the starting point through a redistribution of initial assets. So if society can decide which Pareto efficient allocation is desired, then the starting point can be changed through government action and the market can take care of the rest. (Hindriks & Myles, 2006) (Rosen & Gayer, 2010)

Traditional welfareistic theory assumes that total welfare in a society is an aggregation of the individual welfare levels, so that we get a **Social welfare function**:

$$W = F(U^1, U^2)$$

as some function (F) of each individual’s utility (U) and we assume that total welfare increases as U^1 or U^2 increases (Rosen & Gayer, 2010). From this function we can form society’s social indifference curves, where each curve has a constant level of welfare and show the willingness to trade off one consumer’s utility against the others’. By maximizing social welfare and at the same time satisfying the Pareto efficiency criterion we will reach the socially optimal allocation of resources given the preferences in the social welfare function. (Hindriks & Myles, 2006) (Rosen & Gayer, 2010)

² Government is still needed to provide society with rules, order and protection of property rights.

2.1.2 Freedom

The freedom approach defines justice as respecting freedom and individual rights. There are different views within the freedom approach, mainly the laissez-fair and the fairness views.

The Libertarians are the main proponents for the laissez-fair train of thought. According to them, taxing the rich is unjust as it violates their liberty to do with their money whatever they choose. The Libertarian view is based on fundamental individual rights to do whatever we want with our own property, including ourselves, as long as we respect others right to do the same. They argue for a free market economy with minimal government intervention. We should only have a minimal state that enforces contracts, protects property rights and keeps the peace. Any laws that interfere with the free market violate the individual liberty to engage in voluntary exchanges. (Sandel, 2009)

Robert Nozick (1974) is a main defender of the libertarian view (Sandel, 2009), and his theory of justice is based on two main principles, “Justice in acquisition” and “Justice in transfer”. According to Nozick a distribution is just as long as everyone is entitled to his or her holdings. This is the case when following rules are fulfilled; (1) the holdings are acquired in accordance with the justice in acquisition-principle. (2) The holdings are acquired in accordance with the justice in transfer-principle from someone who was entitled to the holding. (3) No one is entitled to a holding in any other way then by repeating (1) and (2). (Roemer -96) Society has to agree on how to define the two justice principles, and as long as everyone agrees to the rules of society, the resulting distribution must be just. There’s no justification for income redistribution, since society doesn’t own income, only people do. (Rosen & Gayer, 2010) Past wrongs however, can be corrected by compensation in the present. In other words, redistributions to correct an initial unfair allocation in society, that didn’t happen in accordance to the justice principles, are justified. (Roemer, 1996)

The fairness camp has a more egalitarian view, and question the role of markets and whether or not they are actually free and just. They think justice requires more political intervention to correct social and economic disadvantages and give everyone the same opportunities for success. (Sandel, 2009)

The most influential voice for the fairness freedom approach to justice is John Rawls (1971). His theory of justice is based on a social contract, inspired by Immanuel Kant (1724-1804)³ but Rawls

³ Kant was a big defender of the libertarian approach to freedom, and a strong opponent of utilitarianism. His view is based on humans being rational beings worthy of dignity and respect. Morality to him is not about maximizing happiness but it’s about respecting individuals as ends in

is more specific as to how the contract is conceived and what it contains. We have to think about what principles we would agree to in an initial situation of equality. Suppose we make the social contract under a “veil of ignorance”, not knowing who we are, what preferences or social status we have. We would choose from an original position of equality and the agreement we’d reach would be just. As rational, self-interested people we would reach two principles of justice; First principle: equal basic liberties for all citizens, such as freedom of speech and religion. Second principle: the difference principle. A principle of social and economic equality that doesn’t imply equal distribution of income and wealth, but inequalities are only permitted as long as they work to the advantage of the least well off members of society. Rawls believes that people in the original position would be risk averse, as they don’t know if they will end up in the worst off group in society. That’s why the contract would never be based on utilitarian principles, as a minority group may very well be oppressed for the sake of maximizing general welfare according to it. The first principle of basic liberties would always have first priority in Rawls world. The second principle can be seen as insurance, so that if we end up among the least well off, any inequalities that exist would help improve our situation. (Sandel, 2009)

Rawls also talks about “primary social goods” that everyone needs, and justice implies maximizing the amount of primary social goods for the group who receives the least of them. (Roemer, 1996)

Amartya Sen (1985) developed the theory of “Equality of Capabilities” based on Rawls theory. Instead of maximizing the amount of primary social goods, Sen talks about maximizing capabilities. According to Sen it’s not the goods that show the level of welfare, but what the individuals can do with the goods. Access to goods enables people to function in different ways. The set of “functionings” available to a person is what he calls a person’s “capability”. Sen also puts emphasis on the freedom of choice that comes with the number of functionings available in people’s capabilities, which has a value of it’s own. Sen’s theories have had a mayor influence on world politics and views on development and equality. The Human Development Index, which has become a globally used measure of development and prosperity for a country, was developed by the

themselves. As human beings we are capable of acting and choosing freely, but we also respond to our senses and feelings. Kant believes that we are our own sovereign masters and reason can be sovereign to our feelings. Freedom then means acting autonomously, according to laws I give myself, not acting according to nature, desires or social convention. It is not about choosing the best way to a given end, it is to choose the end itself. Just because something makes people happy doesn’t make it right according to Kant. Kant’s views on government are based on an original contract. An imaginary act of collective consent is the base for a legitimate government, a social contract. The social contract defines justice and rights in society. (Sandel, 2009)

UNDP with Sen's functionings in mind. (Roemer, 1996)

John E. Roemer emphasize on personal responsibility in his theory about equality of opportunity. Final outcomes are the results of both the opportunities a person encounters, and what the person makes of those opportunities. Outcome inequality represents any social outcome of interest (wealth, income, status, educational achievement etc) and Roemer defines outcomes as an "advantage" and two groups of determinants that give rise to the advantage. "Efforts" that depend on individual choices, such as how hard to work, where to work and live, whom to marry and how many kids to have, and "Circumstances", such as race, gender, socioeconomic group, place of birth and innate talents and characteristics, that are factors outside the individual's control. Circumstances lead people to face different opportunity sets. When the advantage is independent of circumstances, we would have equality of opportunity according to Roemer. (Paes de Barros et al., 2009)

2.1.3 Virtue

The third approach bases a just society on certain virtues and conceptions of the right way to live. There are civic obligations that must be fulfilled for the common good (such as military service or jury duty, to serve your country). The civic obligations are part of democratic citizenship. Aristotle's theory of justice is closely linked to this approach. For him justice is teleological, and defining rights requires us to figure out the purpose (telos) of the social practice in question. Justice is also honorific, meaning that the purpose of a practice is related to what virtues it should honor and reward. To Aristotle questions of fairness and rights are unavoidably linked to honor, virtue and the nature of the good life. This approach is also typical for societies that are closely intertwined with its religious institutions. (Sandel, 2009)

2.2 Measures of Inequality

There are different measures that relate to equity in an economy, and the measures reflect the degree of inequality in the distribution of a population (be it income, consumption or opportunities e.g.) and pins it down to a single number for each level. Having these kinds of exact measures makes it possible to compare the level of inequality between different countries and to measure the differences over time. To get a single number that represent inequality in a distribution, we have to use some form of statistical measure. (Hindriks & Myles, 2006)

So how do we evaluate if a measure is good? There are five basic principles and axioms that are generally seen as desirable characteristics for inequality measures. (Cowell, 1998) (Litchfield, 1999)

1. **Anonymity** (also referred to as symmetry) requires that the inequality measure is independent of any characteristic other than the welfare indicator whose distribution is being measured (income, consumption etc...) It shouldn't matter in what order the incomes are being measured. (Litchfield, 1999)
2. **The Pigou-Dalton Transfer Principle**, states that any transfer from a poor household to a rich one must increase inequality, while any transfer from a richer household to a poorer one must create a fall in inequality, regardless of where in the distribution they are located. Then the measure is sensitive to transfers. (Hindriks & Myles, 2006)
3. **The Principle of Population** (Population Size Independence) requires the inequality measure to be invariant to replications of the population, meaning that the size of the population shouldn't make any difference, when the distribution is the same. If you add two identical populations, then the distribution should stay unchanged and so should inequality. (Litchfield, 1999)
4. **Income Scale Independence** (or Scale Invariance) requires the measure to be invariant when each individual's income changes by the same proportion. This means that if all the incomes are doubled then the inequality measure still stays the same. (Litchfield, 1999)
5. **Decomposability** requires overall inequality to be consistent with parts of the distribution, like population sub-groups. If inequality is rising in each sub-group, then overall inequality must be rising too. (Litchfield, 1999)

2.2.1 Traditional Measures

All traditional measures relate to the distribution of some sort of outcome indicator⁴ related to welfare and the most commonly used is income. We define the income of each household in the

⁴ The welfare indicator could be consumption, income, wealth etc.

economy as M_h , and there are H households in the economy. We order the incomes from lowest income to highest and then we have to form a function $I(M_1, M_2, \dots, M_h)$ that gives us the measure of inequality of the distribution. (Hindriks & Myles, 2006)

2.2.1.1 The Gini Coefficient

The most commonly used inequality measure is the Gini⁵. It's constructed by selecting the minimum income level out of all possible pairs of incomes (M) and then summing the minimum income levels and normalizing by dividing the sum by $H^2\mu$, where H is the number of households and μ is the mean income. Each level of income is compared to all other income levels and to itself. The Gini takes on values between 0 and 1, where 0 means perfect equality, and 1 equals perfect inequality. (Hindriks & Myles, 2006)

$$G = 1 - \frac{1}{H^2\mu} \sum_{i=1}^H \sum_{j=1}^H \min\{M^i, M^j\} \quad (\text{Hindriks \& Myles, 2006, p.419})$$

2.2.1.2 The Generalized Entropy Class

The generalized entropy class of measures is taken from information theory and adapted to inequality measurement by Theil (1967). The entropy class measures the average information content of a system of information based on the probabilities of the occurrence of each event. Theil replaced the event-probabilities with income shares, and introduced perfect inequality as a comparison distribution. (Cowell, 1998) This generalized entropy class introduces a different form of sensibility to inequality measures as it depends on the relative incomes of the households involved in a transfer (Hindriks & Myles, 2006). The general formula for the general entropy class of measures is:

$$GE(\alpha) = \frac{1}{\alpha^2 - \alpha} \left[\frac{1}{H} \sum_{i=1}^H \left(\frac{y_i}{\mu} \right)^\alpha - 1 \right] \quad (\text{Litchfield, 1999, p.3})$$

⁵ A reason for it's popularity is that the Gini is related to the Lorenz Curve, which is a graphical representation of an income distribution, showing the proportion of population on the x-axis, and the proportion of income on the y-axis. A diagonal line from (0,0) to (1,1) shows zero inequality. The Gini is equal to the area between the Lorenz Curve and the equality line times two, and can therefore be used to rank distributions when the Lorenz curves cross, since the relevant area is always well defined. (Hindriks and Myles, 2006)

where H is the number of individuals (Households) in the sample, y is the income of the individual, i , and μ is the mean of the income distribution. α Represents the weight given to the distance between incomes in parts of the distribution. A low value gives more weight to changes in the lower tails of the distribution, while a higher value makes the measure more sensitive to the upper tail differences. The most common values on α are 0, 1 and 2, where 1 gives equal weights to all parts of the distribution. The value of the GE index can be from 0 to ∞ , where 0 represents a distribution with complete equality, and a higher value means more inequality.

When α is set to 0, we get the *Mean Logarithmic Deviation*;

$$GE(0) = \frac{1}{H} \sum_{i=1}^H \log \frac{\mu}{y_i} \quad (\text{Litchfield, 1999, p.3})$$

When α is set to 1, we get *The Theil Index*;

$$GE(1) = \frac{1}{H} \sum_{i=1}^H \frac{y_i}{\mu} \log \frac{y_i}{\mu} \quad (\text{Litchfield, 1999, p.3})$$

2.2.1.3 The Atkinson Class of Measures

The general formula for the Atkinson measure is;

$$A = 1 - \left[\frac{1}{H} \sum_{i=1}^H \left[\frac{y_i}{\mu} \right]^{1-\varepsilon} \right]^{\frac{1}{(1-\varepsilon)}} \quad (\text{Litchfield, 1999, p.4})$$

where ε represents the aversion to inequality, by changing the concavity of the Utility function. Higher value on ε , gives more concavity and higher relative importance to low incomes, which gives more importance to inequality. Common values used for ε are 0.5, 1 and 2, but any value from 0 to ∞ is possible. The Atkinson Index can take values between 0 and 1, where 0 represents total equality and 1 represents total inequality. (Litchfield, 1999)

2.2.2 New Measures

The new measures of inequality are all based on some form of traditional statistical measure. However, they try to give a bigger picture of inequality by including different dimensions. The ranking of distributions is not depending solely on outcome indicators.

2.2.2.1 The Inequality-adjusted Human Development Index (IHDI)

The Inequality-adjusted Human Development Index (IHDI) is based on the HDI, which is an index used worldwide to measure the development process of a country in the three dimensions: health, education and income. The IHDI shows the level of human development that is equally distributed, by discounting inequalities from the HDI. In other words, in the case of perfect equality the IHDI and HDI would be equal and the difference between the two indexes can be seen as the loss in potential human development due to inequality. (UNDP, 2010)

Since the HDI is a national average on human development, it hides disparities in development across the country and between groups of the population, and the IHDI takes these differences into account, as it discounts the average of each dimension with its level of inequality using the Atkinson Index ($\epsilon=1$). This gives the following inequality measure:

$$A = 1 - \frac{g}{\mu} = 1 - \frac{\sqrt[n]{x_1 \dots x_n}}{\mu} \quad (\text{UNDP, 2011, p.170})$$

where g , is the geometric mean⁶, and μ is the arithmetic mean⁷ of the distribution. The distributions are based on aggregated life table data, for the health indicator, and micro-data from household surveys for the education and income indicators. The indicators used to calculate each dimension for the IHDI are, life expectancy at birth, mean years of schooling among adults and GNI per capita. The IHDI index is calculated as the geometric mean of the three inequality adjusted indices, with equal weights for each dimension. (UNDP, 2011)

2.2.2.2 The Human Opportunity Index (HOI)

This index measures inequality of opportunity, instead of inequality of an outcome indicator, such as income. It's been developed by Paes de Barros et al. in the World Bank report "Measuring Inequality of Opportunity in Latin America and the Caribbean" from 2009. All information in this sub-chapter and the next one about the Top-Down Approach are from the same report, so I'm not going to specify the references for every paragraph.

⁶ $g = \sqrt[n]{x_1 x_2 \dots x_n}$

⁷ $a = \frac{x_1 + x_2 + \dots + x_n}{n}$

The index focuses on inequality of opportunity among children, by measuring the access to basic services that are thought to be critical for future advancement in life. Five specific opportunities are measured and tracked in discrete indicators; completing sixth grade on time, attending school at ages 10-14, access to water, sanitation and electricity.

The HOI is created by combining a dissimilarity index (D-index, widely used in sociology) comparing different circumstance groups probabilities for access to opportunities, and the absolute level of basic opportunities in society, into a synthetic measure. This way the index shows progress in two complementary objectives of the development process, overall coverage of opportunities and equal distribution of those opportunities.

The first two opportunity indicators are related to opportunity of education, and they are measured by computing the probability of having ended sixth grade on time for all children ages 12-16, and by measuring the gross school attendance rate for children ages 10-14. The other three opportunities are all indicators for children's access to adequate housing conditions. All children ages 0-16 are included in the sample and the percentage of children who live in a household with access to the utility is measured⁸.

The circumstance-groups used to categorize the children in the D-index are defined by variables common to all surveys: 1) gender, 2) child's area of residence, 3) the number of years of schooling of the family head, 4) per capita family income, 5) either single-parent or two-parent household, and 6) the number of siblings ages 0-16.

The D-index is calculated by summing the access probability gaps, which are the absolute differences between group-specific access rates (p_i) and the overall average access rate (\bar{p}), and then weighting them according to the population shares of each circumstance group⁹. The value on the D-index will be 0 when there's perfect equality of opportunity and 100 (%) when there's total inequality.

The overall measure of opportunity (O) combines the average access rate of opportunities with the D-index, like this:

⁸ Each indicator takes the value 1, if the household has access from the public water network inside the home or property, if the household is connected to a public sewerage system or to a septic tank, and when the house is connected to any source of electricity, respectively.

⁹ For a more complete explanation see Barros, Molinas and Saavedra (2008)

$$O = \frac{r}{N} = \frac{H}{N}(1 - D) = \bar{p}(1 - D) \quad (\text{Paes de Barros et al., 2009, p.72})$$

where $O \leq \bar{p} \leq 1$ and $O \leq D \leq 1$. \bar{p} , is the average access rate, H is the total number of opportunities available, N is the number of opportunities needed to ensure access for all, r is available opportunities allocated according to the principle of equal opportunity, and D is inequality of opportunities.

This gives an Opportunity Index with values from 0 to 100 (in percentage terms), where 100, means that there is full coverage of opportunities and they are equally distributed. Higher inequality lowers the Index value, and so does lower access rates.

2.2.2.3 The Top-Down approach

This measure estimates the share of economic inequality resulting from inequality of opportunity among adults. This is done by decomposing unequal economic outcomes into two portions: one portion containing inequality resulting from circumstances that lie beyond the individual's control, and the other is a residual component that contains reward to effort, choices and luck (including talent). The first portion can then be seen as the opportunity share of overall inequality and it includes both direct and indirect effects on outcomes.

The decomposition is done using the mean logarithmic deviation (GE(0)), on population groups defined by circumstances. It's applied to the following three outcome indicators: household income per capita, household consumption expenditure per capita, and labor earnings.

Six variables related to circumstances exogenous to the individual are used to partition the sample into "cells", such that all individuals in one cell have exactly the same combination of circumstances. These cells are then compared and differences in outcomes between cells can be attributed to inequality of opportunity, while differences within cells can be seen as the result of effort, choices and luck. The six variables used for partitioning are: gender, race or ethnicity, birthplace, the educational attainment of the mother, the educational attainment of the father, and the main occupation of the father.

The decomposition generates two different kinds of output; the absolute level of inequality of opportunity, as well as the share of total inequality that is due to inequality of opportunity.

3. Data

In this chapter I will introduce data for each of the measures explained in the theory chapter. It gives an empirical example of how they are implemented in practice. All the data is presented in Table 1.1 and 1.2 in the appendix. I also present the ranking of countries with each of the measures in Table 2, although the comparison shouldn't be taken too seriously as the differences in data material leads to serious comparability issues, which I will explain in more detail in the analysis. Table 3 shows the ranking for the 5 countries that are represented in all the measures only.

Table 1.1 includes the traditional measures, the Gini, the Mean Logarithmic deviation, the Atkinson Index and the Theil Index, for 17 Latin American and Caribbean countries at three different times. The data comes from SEDLAC, which is a socio-economic database for Latin America and the Caribbean (LAC) constructed from household surveys and developed by CEDLAS (Universidad Nacional de La Plata) and The World Bank's LAC poverty group. I've restricted my selection to the 17 countries that coincide with the 19 countries that I have data on from the other measures. SEDLAC includes statistics for 25 countries, but Guatemala and Panama are not included.

SEDLAC changes their way of processing the data and presenting statistics over time, as more efficient ways of doing so emerge. This may lead to some comparability issues over time. The household surveys that are the origin of the statistics also change over time, as governments improve their surveys, changing coverage and questionnaires. These surveys also differ significantly in coverage and questionnaires across countries. However, all possible efforts are made to make the statistics comparable by using similar definitions of variables in each country/year, and by processing the data with consistent methods. The household surveys are generally nationally representative, with a few exceptions, and the sample represent more than 97% of LAC's total population. (CEDLAS & The World Bank, 2012)

I've decided to use the indices computed based on the income/consumption variable used for poverty estimates with national lines. The reason I've chosen this variable is that I believe it's the most accurate variable for inequality. Methodologies differ across countries and some use expenditures as their welfare indicator, others use incomes, and some use a mix of incomes and expenditures.

I've included values for 1995, 2005 and 2010, which makes it possible to see the changes over time. Not all countries have data for these specific years, and in this case I've used the year before or after

when possible. A lot of countries are missing data for 2010, but I've still chosen to include it in my table to have at least some indication of more recent developments. For more specific country information on the data see the notes in the appendix.

Table 1.2 shows data from the three new measures of inequality for 19 countries, the 17 from before plus Guatemala and Panama. The data for the first two measures come from the same report that developed these measures from the World Bank (Paes de Barros et al., 2009). The first measure is the Human Opportunity Index based on 35 nationally representative household surveys from the 19 countries. These numbers represent nearly 200 million children ages 0-16 from 1995 to 2005. All countries are not included in 1995, but in 2005 they are, so I only include the data from 2005 in the ranking in Table 2.

The next measure in Table 1.2 is The Top Down Approach, which only includes data for 7 countries based on seven nationally representative household surveys with a sample of individuals aged 30-49. The data is however representative of more than half of the Latin American population (Paes de Barros et al., 2009). The surveys are from different years in different countries, between 1996 and 2006, which makes this measure more difficult to compare with the other measures, and also compromises the comparability between countries.

I've chosen to show the mean logarithmic deviation ($GE(0)$) value before the decomposition for this measure as well, that way we can compare the ranking from this data, with the mean logarithmic deviation values from SEDLAC's data.

Next measure in my table is the IHDI and the HDI. I've taken the data from the Human Development Reports webpage. They have interactive tools where you can choose the indexes, countries and years that you are interested in. I choose to include both indexes even if the HDI doesn't measure inequality at all. Since the IHDI equals HDI when inequality is zero, I still think it's valuable to include both indices too make the differences due to inequality more visible.

The indexes are based on data from leading data agencies and the IHDI uses the indicators that refer to the 2011 HDI. The measures of inequality are based on household surveys from 2000 to 2009 for income and years of schooling. Life expectancy at birth is based on abbreviated life table data that refer to the period 2010-2015, and reflects current inequality in mortality patterns.

4. The Current View on Fairness

The first question I aim to answer in this paper is: What kind of inequality should matter for policy makers and why? Policy makers are supposed to make decisions in the interest of society as a whole. So to answer this question we need to know what the current view on fairness and inequality is in today's society.

As we've seen in the theory chapter, there are many different views on the questions about equity and fairness, and these are generally considered to be normative questions, which imply that there's no correct answer. Most of the current policies and political agendas towards inequality are based on some theory of justice. To the right end of the political scale you usually find a more libertarian view, while on the left end of the scale you usually find a more egalitarian view. (Paes de Barros et al., 2009)

The World Values Survey, performed on representative samples of 69 countries worldwide, asked among other questions, "Should We Have More or Less Inequality?" The answers were on a scale from 1-10, with 1 representing the view "Incomes should be made more equal" and 10 saying "We need larger income differences as incentives for individual effort". The Median response was 6, but the most popular replies were 1 and 10, with 20% each of the replies. (Inglehart and others, 2004) reviewed by the World Bank (2006).

The answers show that most of the respondents have strong and polarized opinions on the matter of inequality, since the most popular responses are at the extreme ends of the scale. The fact that the answer in the questionnaire is being related to effort may however imply that the differences in tastes are related to the source of inequality rather than to their view on inequality as such. If this is the case then the question of whether inequality is good or bad becomes irrelevant. The debate should be about equity, meaning equal opportunities for all, not about equality, as in equal rewards for all, according to Paes de Barros et al. (2009). Inequality, caused by differences in effort and choices may be acceptable, or even considered good, as they give incentives to work harder or develop personal skills. While unequal opportunities, caused by circumstances outside the individual control are viewed as unfair by most people across the political spectrum (Paes de Barros et al., 2009). Paes de Barros et al. are not alone in this statement.

The World Development Report from 2006 present different research showing that most people agree that unequal opportunity is unfair. They show that people's concern for equity spans over

different cultures and all over the world, as it is reflected in religious and philosophical traditions, and it's a fundamental doctrine in modern legal institutions. The report also presents evidence from experiments on human behavior, through a variation of ultimatum games, showing individual's preferences for fairness. The experiments show that many people are willing to give up real money gains if they feel the process is unfair, and they even want to punish unfair behavior. They conclude in the report that the concern with equity is so pervasive that a fundamental preference for fairness is deeply rooted in human beings. (World Bank, 2006)

The UN Millennium Development Goals show us that the world agrees that certain opportunities need to be equally supplied to all children in the world, and that this is an urgent matter. It's not only about combating poverty and hunger, but about making education universally available, about improving health care, child health specifically, and about making opportunities gender equal. Most people and countries in the world agree to make these issues a priority. (UN webpage, 2012)

The UN Declaration of Human Rights already talked about these things in 1948. Article 25 talks about everybody's right to health and well-being including food, clothes, housing, medical care and social services when incapable of making a living due to circumstances beyond own control. The same article puts children in focus, when specifying that they be entitled to special care and equal protection. (UN webpage, 2012)

Bruoni and Peragine (2011) introduces their work with the fact that in the field of normative economics and political philosophy the last decades, there's an underlining of the fact that inequalities that originate from individual responsibility are ethically acceptable, while inequalities originating from circumstances beyond personal control are not.

Todaro and Smith (2006) claim that most people in today's world would vote for a more equal society than we have today. They say that most would even vote for almost perfect equality, except for the degree of inequality needed to create incentives for work and innovation.

Even if you want to argue about inequality per se, and whether it is good or bad, there's a strong indication that most people consider extreme outcome inequality bad as well. Some of the results from the World Development Report also express this view, as does the input from Todaro and Smith. The World Development Report shows research indicating that inequality is economically inefficient (World Bank, 2006). They mention that inequality can lead to lower aggregate levels of human capital and savings than would be socially optimal, due to potentially good business projects

remaining unfunded and talented and able children not getting access to the best education.

Todaro and Smith (2006) agree that inequality is bad for the credits and loans market, business expansion and human capital investments. It's also bad for the level of savings in a country as the middle class usually have a higher marginal savings rate than the rich, who rather invest money abroad and spend more money on travel and luxury consumption. Higher inequality usually implies a smaller middleclass. They also point out that high inequality lead to an inefficient allocation of assets as it usually leads to an overemphasis on higher education at the expense of the quality of the universal primary education.

Extreme inequalities also lead to social instability and undermine solidarity. According to Todaro and Smith the rich people get a stronger political power as they have more bargaining power. This leads to rent seeking among politicians, lobbying, bribery and corruption. It also undermines the trust of the general public (especially the ones without bribing-power) for their institutions, politicians and democratic society. Research by You and Khagram (2004) find positive correlations between corruption and inequality (Rosen & Gayer, 2010). Inequality also leads to social instability in the sense that the risk for riots, revolts and criminality increases as the unfairness bothers people so much.

Michael J. Sandel (2009) says that the great gap between rich and poor undermines the solidarity and sense of community that democratic citizenship requires. As inequality deepens, rich and poor live increasingly separate lives, as the rich stop using public places and services, while the poor can't choose anything else. This leads to public services deteriorating as the people who no longer use them are less willing to support them through their taxes. A second effect from this is that public institutions (schools, parks and playgrounds) no longer are places where citizens from different backgrounds encounter one another. "Institutions that once served as informal schools of civic virtue become few and far between." (Sandel, 2009, p267)

As we can see there's an extensive amount of research showing that inequality bothers people and should be a concern for policy makers, no matter which side on the political spectrum they represent. Even if there can be differing views on what kind of inequality matters, there's an agreement by most people that inequalities due to circumstances outside of the individual control are bad and undesirable.

5. Evaluating the Measures

Now let's move on to evaluating the measures of inequality. As we've seen the inequality measures are constructed differently and they represent inequality in different dimensions. So, it's not surprising that we get different rankings of distributions with different measures.

In Table 3, we can see clearly that there is a difference between how traditional measures and new measures rank the inequality distributions of the five countries in the material. The Gini, the Mean Logarithmic Deviation, the Theil Index and the Atkinson Index all give the exact same ranking in this table, which is quite natural as they all measure inequality of outcome, and they are all based on the same data sources, from the same time.

The new measures give quite different rankings from the traditional ones, and the differences are also big between the new measures. This is not surprising as they measure quite different things compared to the traditional measures as well as to each other.

5.1 Technical Analysis of Measures and Data

5.1.1 Traditional Measures

A surprising result in Table 3, is that The Mean Logarithmic deviation based on SEDLAC's calculations give completely different rankings than the same measure based on the World Bank's report in their Top-Down Approach measurements. This can be explained by some general measurement problems related to traditional measures of outcome inequality, such as defining and deciding the outcome indicator, the time period, and the unit of observation.

There are many definitions on income and consumption, which yield very different results when it comes to ranking distributions and levels of inequality. This makes it difficult to compare data on inequality even when the same measure and indicator is used. (Rosen & Gayer, 2010)

When Income is used, you have to decide what it consists of. Does it include transfers in-kind? Should it include unexpected income like gifts and lottery wins? Should it include capital gains, Social Security payments and implicit rents for home owners? Another issue with Income as indicator is that it's often measured before distributional effects of income taxes and other taxes, which leads to an overestimation of inequality. (Rosen & Gayer, 2010)

Many argue that outcome is a better indicator of welfare, as the possibilities for consumption is what gives people utility while income is just a means to an end. Sometimes people can maintain a certain consumption level without income, thanks to savings, loans or money transfers from family members or others. None of this will show when using Income as an indicator. On the other hand someone could have a lot of income and choose to save most of it, which would yield opportunities to consume in the future as well as capital gains, but none of that would show in their level of consumption. (Rosen & Gayer)

SEDLAC bring up three reasons why consumption is a better measure of wellbeing than income (CEDLAS & The World Bank, 2012). They say that current consumption is closer to permanent income than current income, which might not exist for certain periods. Secondly they say that it is more common with under-reporting of income than it is for consumption. The last reason is that consumption is made after taxes and transfers while incomes are frequently measured before these redistributive actions.

The time period over which income or consumption is measured is also of great importance and can give very different effects. Income varies a lot over an individual's life and sometimes even from one month to another or from year to year. Census income is measured annually, which may lead to larger inequalities, since it doesn't take into account differences in life situations from year to year, such as retirement, educational years, and peaks on the labor market. Current income varies even more from one month to the other, and can be very misleading. Some argue that lifetime income would be better, but this can be very difficult to measure for practical reasons. (Rosen & Gayer, 2010)

Last but not least we have the problem of how to define the unit of observation, when collecting the data. A certain amount of money can give different levels of welfare depending on how many people live in a household, and how many of them are adults or children. There is a variation of commonly used equivalence scales to correct for these differences, the problem is that there's no agreement on which ones to use. (Rosen & Gayer, 2010)

If we go back then to SEDLAC and the World Bank and their different rankings using the same mean logarithmic deviation measure, let's see how they define their variables. In Table 3 both SEDLAC and the World Bank uses income as their welfare indicator¹⁰, even though SEDLAC

¹⁰ I've chosen to include only the income column from the Top-Down Approach in the ranking tables as it makes the results more comparable between measures.

believe that consumption is a more accurate variable to use, and the World Bank have three indicators in the original data.

SEDLAC defines income as an addition of all income sources, including implicit rents of house owners, and income of capital and transfers. Non-current items and extraordinary items such as sale of assets, gifts or gambling are not included in their definition. The World Bank's income data includes all labor earnings, plus any other income from sources such as assets, pensions and transfers. There's no information about extraordinary items or imputed rents on their part.

Both sources use a monthly timeframe, but with different reservations on both sides.¹¹ Both sources have adjusted incomes for differences in local living costs, but not necessarily using the same method. Both sources use household income per capita, but only SEDLAC adjust these for equivalence scales.

Even if both sources use similar definitions in all problem areas there are slight differences and question marks that clouds the comparability between the two. As we see it doesn't take much for the comparisons with outcome measures to suffer from comparability issues. To add more injury to the matter, the time when the information was collected is not the same for the two sources, as SEDLAC's data is based on surveys from 2005, while the surveys used by the World Bank is from different years in different countries, varying from 1996 to 2006. This makes the differences even bigger between the two measurements, but it also compromises the ranking altogether for the World Bank data.

As I said before the traditional measures all use the same indicator, definitions and sources in my material, and yes the ranking is identical in Table 3. But if we look at Table 2, which includes 17 countries, there are some differences also between the traditional inequality measures.

The Gini, satisfies the first four axioms that are desirable when measuring inequality. Anonymity, The Pigou-Dalton Transfer Principle, The Principle of Population, and Income Scale Independence. However it is not completely decomposable, it only satisfies the Decomposability principle when the partitions are not overlapping, and it is not consistent for all subgroups. (Litchfield, 1999)

¹¹ SEDLAC explains that any incomes reported for other time periods are transformed into monthly values, but sometimes information about income frequency is scarce. The World Bank reports that for other incomes than labor income, there might be other reference periods used in some countries.

The GE class of measures satisfies all the axioms and it's the only measure that can easily be decomposed where the subgroups inequality sums up to the total inequality of the index, as shown by Litchfield (1999): $I_{\text{total}} = I_{\text{within}} + I_{\text{between}}$

The Atkinson class of measures can also be decomposed, but within-group inequality and between-group inequality doesn't sum up to total inequality. The measure satisfies the other axioms, and can be ordinally equivalent to the GE class of measures, when $\alpha = 1 - \epsilon$, and $\alpha < 1$. (Litchfield, 1999)

Even when all the measures satisfies the same axioms, they can still give different ordering to the same distributions, because of their different emphasize to parts of the distributions. We can see that the Mean Logarithmic Deviation, which give more weight to changes in the lower parts of the distribution, and the Atkinson Index ($\epsilon=1$), give identical ordering of distributions, which confirms that the two measures can be ordinally equivalent as Litchfield points out. The Theil Index give equal weights to all parts in the distribution and it changes the ranking slightly between certain countries. The ranking of the Gini (which also give equal weights to all parts) is closer to the Theil Index than to the other two, but lay somewhere in between. Differences between the four measures are remarkably small considering that they are calculated in such different ways. The top 5 countries are the same for all the measures with some differences in ranking between second and forth place. The bottom 6 countries are also the same, with small differences in the first 4 out of the bottom six. It makes sense that the differences are marginal as they all measure the same kind of inequality in the same countries using the same data and at the same time. This consistency in ranking of distributions between different measures is one of the main advantages of the traditional measures of inequality.

Another advantage of the traditional measures is that they are easy to implement since you only need one indicator to measure inequality, which leaves little room for local adaptation and variation of the measurement. This makes the results relatively easy to compare across countries and time. There is also plenty of available data on outcome indicators in most countries today.

5.1.2 New Measures

As it is difficult to see any obvious connection between the different rankings using the new measures, apart from the fact that they all differ from the traditional ones, I'm going to analyze them one by one in the same order that I presented them in the theory section.

The Inequality Human Development Index as we know is based on the HDI, which is not an inequality measure at all, but a measure of development. Therefore it's not strange that the HDI and the IHDI gives a different ranking of countries than the other measures. Since one third of the index is based on income, there's a definite relation to the discussion about measuring problems above.

The HDI Income indicator is calculated as GNI per capita, which is an aggregated indicator consisting of: the sum of net output by all resident producers in the country, plus any product taxes not included (minus subsidies), plus net receipts of primary income from abroad, all divided by the countries population. The value of Income is expressed in PPP¹² US Dollars, to adjust for price differences between countries. These are national aggregated data reflecting national mean income for each country. The inequality calculations for the IHDI are however based on micro-data from different household surveys, but some countries are using income while others are using consumption, which leads to obvious comparability problems, as consumption always shows a lower level of inequality than income. Different surveys may use different income definitions and there's no specification on these. The final Index is still based on GNI per capita, which is the average for the whole year, and it's been discounted with the average inequality value given by the Atkinson calculations on micro-data.

The inequality for the life expectancy at birth is based completely on aggregated data from life tables, and reflects current inequality in mortality patterns. One can question if this really is a good indicator of health in a country. Even if you live a relatively long life, you may suffer from several health problems and malnutrition. This indicator says nothing about the quality of life during those lived years.

When it comes to the education indicator, the HDI uses two indicators in their index, while the inequality calculations are based only on one. Distribution of years of schooling in the adult population is used, based on micro-data from national surveys. A comparability issue with this dimension is that different countries have different school systems. The number of years for high-level education varies a lot between countries. Primary and secondary school is however more standardized, and the Atkinson measure is less sensitive to differences in the upper part of the distribution, so the importance of these differences is diminished. This indicator also fails to measure differences in quality though. Even if individuals have the same amount of years in school, the quality of their education may differ in substantial ways.

¹² Purchasing Power Parity

Since the Index is based on the geometric mean of normalized indices it does not allow for zero values. To adjust for this fact, UNDP added one year to all valid observations to the mean years of schooling value. The income distribution was adjusted to reduce the influence of extremely high incomes, while zero and negative incomes were replaced with a minimum value of the bottom 0.5% of the distribution. (UNDP, 2011)

The inequality calculations for this measure satisfy all the axioms since it is based on the Atkinson Index. This method was chosen by the UNDP mainly because of the characteristics of decomposability and path independence¹³, even if it doesn't capture overlapping inequalities due to the fact that the data comes from different sources.

In Table 3, the HDI and the IHDI rank the 5 countries in the exact same way. The inequality dimension doesn't affect the ranking, even though it lowers the values of all countries involved with between 0,168 and 0,231 points. The country that loses the most due to inequality is Colombia. Looking at Table 2 however, the rankings definitely change when inequality is taken into account. Uruguay passes Argentina and Chile, and comes up to the first place in Human Development among the 19 countries. Jamaica moves up from position 8 to number 4, and Colombia drops from number 12 to 15, just to give some examples. The IHDI definitely adds another dimension to the Human Development Index, and the difference between the two says something about the inequality levels in the countries compared and how it affects development.

The Human Opportunity Index is a forward-looking measure based on children's opportunities instead of outcome indicators and the methodology differs totally from the others. This gives a completely different ranking.

Since this is not a traditional inequality measure nor based on any of the statistical methods, I'm not sure how to evaluate it according to the axioms of inequality measurement. Part of the measure is a D-index, which shows that the measure is decomposable. It is calculated using probability gaps, using overall access gap as a comparison variable, which is similar to the General Entropy class of measures. An increase in opportunity for any group will give an increase in the total index as well. Any transfer of opportunities that increases or decreases the inequality in the distribution also affects the index, which means that it complies with the Pigou-Dalton Transfer Principle. Since opportunities available are divided by opportunities needed for the whole population, it should also

¹³ It doesn't matter in which order the groups are aggregated, across groups or across dimensions, the calculations will yield the same results.

be Population Size Independent. The measure is not Scale invariant as a doubling of opportunities available increases the index even when the distribution stays the same, this is however one of the main intentions when constructing this measure. The index is more sensitive for the lower tail of the distribution, and it gives a complete ordering of distributions.

In Table 3 we see that Peru has gone from the top of the table when it comes to outcome inequality, to the bottom of the table when it comes to opportunities. Colombia has moved from a last place in Human Development to a shared second place in human opportunities. This gives an indication of how different the measure is. In Table 2 we can see that Chile is on 91%, which is remarkable, while Nicaragua only reaches 46%. The dispersion in the region is huge, though it's important to remember that it is not only due to inequality, but also to the absolute level of opportunities in the country, in other words due to lack of coverage.

Since the index is a complete measure of opportunities in different dimensions and coverage, it hides big disparities between different opportunities as well as between coverage and inequality. In the report you can see the indexes for each opportunity and the ranking of countries changes depending on the opportunity in question. To achieve a high ranking in overall opportunities it requires good performance in all dimensions of the index and a combination of expanded coverage and equal allocation of opportunities. (Paes de Barros et al., 2009)

The main issue with this measure is that it only includes five opportunities. Are the five opportunities accounted for really representative of what a child needs to succeed in life? Are there other opportunities that are of vital importance and not taken into account? What about the effect of effort and choice?

The focus on children gives the advantage that all observed inequality related to circumstance is inequality of opportunity so there's no need to disentangle inequality derived from individual choice. Access to basic goods and services defines opportunity for children since they cannot be expected to make these basic opportunities accessible by themselves. (Paes de Barros et al., 2009)

Only opportunities in two dimensions are covered, education and adequate housing conditions. The index says nothing about opportunities when it comes to immunization or nutrition, social inclusion in society, or access to information technology, which plays an increasing role when it comes to success in higher education or on the labor market. The idea of the World Bank is to include more opportunities in the future, and the restriction to these five is due to data limitations. (Paes de Barros

et al., 2009)

Are the indicators of completing sixth grade on time and school attendance between age 10-14 good proxies for equal opportunity of education? Completing sixth grade on time requires uninterrupted access to school, which reflects opportunity of education. If children are needed for housework or labor, or if the nearest school is too far away, this would be hard to achieve. On the other hand it doesn't say anything about the quality of the education, or the demands for passing to the next grade. In some countries if you don't reach a certain level you have to repeat the school year, while in other countries they you automatically pass from one year to the next. This leads to comparability issues between educational systems. The gross school attendance rate again shows that children have the opportunity to go to school and participate during the critical years. However it doesn't show how the children acquire the information, the grades achieved or the courses passed. Inequalities in learning ability or attention given in the school to each child can still be hidden with these measures. Hopes are however to include some form of quality indicator in future calculations, when more data is collected. (Paes de Barros et al., 2009)

When it comes to housing conditions access to water, electricity and sanitation are used as indicators. These are all indicators that are proven to be of great importance for the possibilities for success for children. Access to water and sanitation in the home environment are important prerequisites for public health, and studies have found strong relationships between these indicators and children's mortality rates. (WHO 2002,1 cited to by (Paes de Barros et al., 2009)) Electricity is found to improve quality of life, through improved conditions for cooking, studying in the evenings, information access through radio/television/internet, and improved health from replacing kerosene lamps. The indicators used for these variables don't say anything about the quality of the service though. Some households may have access to electricity and so on, but the service may be interrupted continuously or of bad quality. (Paes de Barros et al., 2009)

What about the circumstances used to categorize children? In this case too, are the variables defined in accordance to data access. Gender, area of residence (urban or rural), educational level of the family head, per capita family income, single- or two-parent household and number of siblings ages 0-16. These are all circumstances that seem to have a correlation with outcomes. Other interesting variables would be ethnicity and race that are often causes for discrimination, or more specific area location, as in neighborhood or municipality. These are also mentioned in the report as desirable variables for future measurements or local applications. This is an additional aspect of the measure, as it can show the correlation between social status, according to the circumstance-groups, and

access to opportunities.

A problem with this measure is its level of complexity. It is difficult to achieve comparable data on all desirable opportunity indicators and circumstance variables. It is expensive and requires a lot of work to collect all the needed information, and to standardize it globally. On the other hand the World Bank has already started the process of collecting more extensive information and expanding existing household surveys.

The Top-Down approach that's developed by the World Bank in the same report as the HOI is, just like the name implies made to show the other side of inequalities of opportunities. If the HOI shows the initial inequalities of opportunities among children, this measure shows the resulting inequalities due to inequality of opportunity among adults.

The Top Down Approach is based on the Mean Logarithmic Deviation measure. This means that it automatically complies with the axioms from the theory chapter. The generalized entropy class of measures was chosen, as it's the only measure that is decomposable and path-independent¹⁴, where the value of the total index is equal to the sum of the values of the indexes within types and across types. The Mean logarithmic deviation in particular gives more importance to inequalities in the lower part of the distribution.

In this case the decomposition is applied only to indicators of economic outcomes. The three variables used are defined as follows (Paes de Barros et al., 2009):

Labor earnings are calculated individually and include all occupations including in-kind payments. The reference period is one month, but the time period for self-employed workers varies between countries from a month to a year.

Income data includes all labor earnings on a monthly basis, plus any other income from assets, pensions and transfers (including in-kind). The reference period for other incomes may differ between countries. Income is based on household income per capita, and in most data sets incomes are adjusted for differences in local living costs.

Consumption is measured using per capita aggregate household consumption, with a year as

¹⁴ The decomposition is invariant on whether within-group inequality is eliminated first and the between-group component computed second, or the reverse. (Paes de Barros et al. 2009)

reference period, except for Brazil, where there's no consumption data available. Some surveys include imputed rents for house-owners, while some don't and again the data sets are mostly adjusted for differences in living costs.

Since we have the same calculation using three different outcome indicators, this is a perfect opportunity to see the differences that arise from the outcome indicators chosen. One thing we can see in Table 1.2 is that inequality of consumption for all countries is clearly lower than inequality of income and labor earnings, using the mean logarithmic deviation. This gives support to the assumption that current incomes tend to increase inequality, due to temporary or lifetime situations that are usually non-circumstance related. The share of total inequality is also higher when using consumption than with the income or labor earnings indicators.

A problem with this measure is that the circumstance groups that are the base of this decomposition of inequality might not be completely waterproof. It's hard to tell if all circumstances are covered and if some of the inequality could still depend on other factors. There may be other relevant variables that are not observed. For the measure to really show all inequality of opportunity, it would require using all relevant circumstance variables to partition the population into types. The empirical estimates are therefore considered as lower-bound estimates of the degree of inequality of opportunity in society. (Paes de Barros et al., 2009)

Despite comparability issues from the outcome indicators, there's a clear difference between the rankings for outcome inequality and inequality of opportunity. Inequality accounts for between one-fifth and one-third of overall economic inequality as a lower-bound measure according to these calculations. (Paes de Barros et al., 2009)

5.2 How Do the Measures Relate to Fairness?

I'm going to start analyzing the traditional measures of inequality all at once, since they all measure the same sort of inequality, based on final economical outcomes. Then I'll move on to the other measures one by one.

For the welfare and utilitarian economists these measures became a solution to finding the desirable final allocation in society and thereby making it possible to correct initial endowments. The main problem with individual utility functions and Pareto optimality is comparability, which leads to difficulties in determining the social welfare function. Without a social welfare function the optimal final allocation can't be found. With the traditional measures of inequality however, it's possible to

rank final distributions and find the optimal one, according to the implicit values of the measure that is used. One can then move backwards and define the social welfare function. Depending on the measure used you put more or less emphasize on the lower part of a distribution and on the importance that you give to inequality. (Hindriks and Myles) This has been one of the main defenses for using the outcome based inequality measures.

On the other hand if we look at the welfare theorems, that are the base of welfare economics, all they really say is that in a *perfect market*, if the *initial* distributions are *fair*, then we will get to the desired Pareto optimal allocation. What this says is really that the initial positions on the free market must be fair, as well as the processes on the market that lead to the final outcome. The market must be perfect, in the sense that there's perfect competition, no market powers, and no market failures, so that everyone is treated the same by the market. The second welfare theorem also says that we have to assign the initial endowments so that the market can find a fair Pareto optimal allocation. So if the initial endowments and the process of getting to the outcomes are fair, then the final allocation will be fair as well. Sounds like fairness according to the Second Welfare Theorem is all about the initial allocations and not about outcomes at all. Then what's the point of measuring outcome inequality? What the state needs to do is correct initial inequalities, and make sure that the markets function in a fair way for everyone.

According to the Libertarian view any property is the owner's to use however he chooses. Even if there's inequality and it's viewed as unfair, the state has no right to take what's not theirs and redistribute it. Any exchanges have to happen voluntarily on the free market. Robert Nozick defends this view, but at the same time he admits that sometimes the initial allocations are unfair, or the processes leading to the outcomes are unfair and must be corrected. If the process and initial allocation is just, then so are the outcomes no matter how unequal. (Roemer -96) This sounds a lot like the welfare theory implications. This implies that there's no point in measuring outcome inequality, since it doesn't say anything about the process or the initial allocations. And according to this view there's nothing wrong with outcome inequality per se.

The fairness view on freedom is more egalitarian. First of all they all question whether the market is really fair, and believe that more government intervention is needed on the market to correct for disadvantages and failures. Rawls difference principle states that inequalities are only allowed when they are in the interest of the worst off members in society. He argues that people who have special talents, should be given incentives to develop these, as long as they agree to share some of the rewards with the less fortunate to compensate for their bad luck in the birth lottery. (Sandel, 2009)

Even from his point of view, the focus lay on the initial inequalities, and fair rules in society. Sen developed a clear focus on equalizing the initial access to goods and capabilities. Outcome inequality plays no role in this theory, since they're only the effect of unequal starting positions, and unequal development possibilities. Roemer made inequality of opportunity the main concept of his theory. He clearly defines two determinants for outcome inequality, whereof one should be corrected for and not the other. Outcome measures tell us nothing about where the inequalities came from, and how much of them should be corrected for. The traditional measures play no role in the fairness view either.

For the virtue approach to fairness, it's all about the good and right way to live. If society believes that inequality is a bad thing, then yes, it should be corrected for according to this view. As pointed out by the World Development Report, most religions and cultures in the world have strong opinions about fairness, and they believe inequality, and poverty is undesirable. Religious institutions often have programs and charities to help the less fortunate ones, and make society a better place. From this point of view, the traditional measures of inequality could still be adequate, to combat inequality of all kinds. But if most societies of the world agrees that it's the inequality of opportunity that matters and not all inequality, then once again these measures become obsolete.

Now what about the Inequality adjusted HDI? How does it relate to the different theories of justice? The IHDI doesn't measure either outcomes or opportunities. It measures the loss in Human Development for a country due to unequal distribution of education, health and income, based on mean years of schooling, mean expected life length, and mean income/consumption level for the whole population.

Welfare Theory and Utilitarianism is all about maximizing utility and welfare for society as a whole, and not about comparing individual utilities. The IHDI gives an indication of how much society is losing in utility and how much could be gained by changing these inequalities. It gives a better idea of welfare distribution as it includes three dimensions instead of only one. There's nothing that says utilities should only represent income. There are many things in life that give people utility and welfare. This measure gives a clear picture of the welfare loss due to inequality, and from that follows that it should be corrected.

The IHDI is still related to outcomes however, so it doesn't say much about the fairness of any initial distribution of welfare, which is what should be corrected according to the welfare theorems.

For the Libertarians it's important to maximize the returns on the market, and promote free voluntary exchange. The IHDI shows that everyone in society could gain by diminishing inequality. It shows that the free market is not working efficiently and that the market processes have to be corrected to reach Pareto optimal allocations, and make everyone better off. The focus of the IHDI on aggregate levels of education, life length and incomes, may however imply that changes should be made through government involvement. If the policy implications are expansion of the public sector in terms of public schools, public healthcare or tax-redistribution of income, then Libertarians are all against it. Government should stay far away, and leave the market alone.

For the fairness view this measure is an improvement as it focuses on three dimensions, instead of only economic outcome. The human development index was evolved with Sen's theory in mind. However the measure shows final inequalities when it comes to years of schooling, and final outcomes of income, and expected life length for the cohorts of newborns. It doesn't say much about inequalities in access to quality education, health care, or the labor market or about the distribution of opportunities to succeed. Inequalities in mean years of schooling include unequal outcomes due to individual choices of continuing to higher education, even if the differences in lower education get more weight in the total value. The measure doesn't show anything about the health level of the years of life or the quality of the education received. These are aspects that play a major role for the equality in society.

For the virtue approach this measure takes into account three of the most important indicators for wellbeing in today's society. As I mentioned earlier the UN declarations of Rights emphasized equal rights to education, healthcare and welfare already in the 1950's. It is often part of the declarations of citizen rights as well, so these are an important foundation of most societies today. The measure reflects something of importance for society. But since the focus from society is shifting toward equal opportunities, this measure doesn't really make it all the way. The focus needs to be on initial inequalities, not outcomes, that could be related to so many different things.

The Human Opportunity Index measures inequalities in opportunities for children, when it comes to completing sixth grade on time, school attendance, water, sanitation and electricity.

According to the welfare theorems, society has to adjust initial allocations to ensure a fair distribution. Most people consider the variables accounted for by this measure of vital importance for future advancement in life. In a society where these opportunities are not available to all it definitely has an impact on final outcomes. The question is if these are the only opportunities that

have an effect on final outcomes. There are probably many other things that must be equally distributed to ensure fair final outcomes. The fact that the circumstance-groups are defined by area of residence, parent's level of education and family income among other things, also give some indication about if the less fortunate in access to the basic opportunities also suffer from social disadvantages for the future. For this view the measure starts in the right angle, but all initial allocations that affect final distributions must be accounted for. This might be difficult to achieve due to lack of data-material and measuring difficulties.

If opportunities in these dimensions are due to some initial injustice, then it should be corrected, according to Nozick. If the inequalities are because of circumstances that are unfair, such as discrimination against certain ethnicities, or discrimination against the poor, than it should be corrected for. This measure could capture the reason behind the inequality, and make it possible to see if the final outcomes are fair or not.

For the fairness approach this measure is the only one that really focuses on what's important. It starts from the bottom and up, looking at unequal opportunities based on circumstances outside of the individual control. This measure shows how unequally distributed the basic opportunities are, and also if the inequalities are related to circumstances at birth, such as which family and what area you were born in.

For the virtue approach to fairness, this measure is good, as it represents what today's society is primarily concerned about. What matters for society are equal opportunities, and that's the inequality that should be in focus. That means that this is a good measure with relevant information according to this view.

The last measure is the Top Down Approach. It divides the inequality of outcome into a portion resulting from circumstances unrelated to individual responsibility, and one portion resulting from other things, such as effort, choice and luck.

According to the utilitarian and welfare views, what matters is deciding the just initial distribution, which will give an optimal final allocation. This measure doesn't measure final outcomes, but it also doesn't measure initial allocations of assets or how they are distributed. It does however show how initial factors that are not in the individual's control have an effect on final outcomes, which indicates if the initial distribution of assets is fair.

For Libertarians this measure also gives an indication of initial inadequate distributions, and most of all it gives an indication of whether or not the process of acquiring assets is fair or not. A main concern for this view is whether the process of getting to the final outcomes is fair. Does everyone have the same possibilities of succeeding in the free market? This measure helps to answer that question.

For Fairness proponents this Top-Down Approach also provides valuable information, as it differentiates between the two types of outcome determinants that they propose. It provides them with a tool for analyzing how unjust society is or has been when it comes to the inequalities that are unfair, and how much of the current inequalities that should be corrected. For Rawls however, this measure doesn't specify the two circumstance groups quite enough. He believes that all arbitrary factors should be accounted for, including talent, which in this case is a part of the circumstance group that is due to individual effort and choice.

According to the justice view of virtue inequalities that are considered unjust by society should be corrected. And this measure also falls under the category useful measures that reflect today's view on inequality. This measure shows how much of the outcome inequality has to be dealt with, to have a fair society.

6. Conclusions

The main conclusion when it comes to the first question of this study is that policy makers should be concerned about inequalities resulting from unequal opportunities due to circumstances unrelated to personal responsibility. Why? Because it's a major concern for most people, philosophers, fairness economists, religions, cultures and societies in today's world.

The picture is clear on how important inequality is for today's society. The question about if fairness matters or not is not a normative question, but a fact of humanity, as the Development Report from 2006 put's it. There are however different views on what kind of inequality matters. Some believe that all inequality is bad and should be eliminated, while most people agree that inequality resulting from effort is good or acceptable and inequality due to exogenous circumstances is bad and unacceptable.

We can see a general shift of focus, both in modern theories of distributive justice, and in the public world to a concern about equity instead of equality. Roemer, Sen and Rawls are all drivers of this shift. The shift of focus should facilitate a consensus on policy level and international politics targeted at inequality, as unequal opportunities are considered unfair on all sides of the political scale.

So what's the final verdict for the different measures of inequality? As we've seen they all have their share of measurement and comparability issues, and they all have different implications on fairness. So which measure is most suitable to trace the inequality that society is interested in today?

The traditional measures all have issues related to defining and deciding the indicator of welfare, the time period of study, the unit of observation and how much weight to give to different part of the distributions. The main advantage of the measures is the fact that there is plenty of data on outcome indicators from household surveys worldwide. They are relatively easy to implement and since they've been used for quite some time, the methods of implementation are somewhat standardized over international borders.

From a fairness and policy perspective however, the traditional measures have become obsolete. They tell us nothing about how the inequality came about and whether society is fair or not. Since outcome inequality is no longer our main concern, the traditional inequality measures become inappropriate as an indicator of inequality.

The welfare view value the traditional measures as a substitute for social welfare functions, but at the same time the welfare theorems points to the importance of correcting initial endowments, and processes and letting the market take care of the rest. For the libertarians unequal outcomes are the way they are, and cannot be corrected in retrospect. If anything the initial allocations could be corrected but the focus should be on the processes of society and markets. Rawls, Sen and Roemer all think that final outcomes or welfare is the wrong starting point to judge the fairness of a given allocation, since they all see the importance of individual responsibility and effort in moving from resources to final outcomes. They all prefer some combination of the set of liberties and resources available to individuals as the base for any judgment on fairness in society. And according to the virtue approach what matters is how society values certain ways of succeeding, which seems to be related to rewards for effort and hard work in today's world.

All the approaches to fairness agree that equal possibilities to succeed matters. If everyone starts off with the same possibilities of ending up in a final position and the way to get there is open for everyone equally, then the outcome will be fair, no matter how unequal the allocation is.

The IHDI measures aggregated human development in society and discount the loss of development due to inequality. This measure suffers from some of the same measurement problems as the traditional measures since it in part measures outcome indicators of income/consumption and mean years of education. It's a measure that is easy to implement on national level since it is made up in part from aggregate national data, and it measures the mean achievements in the country. This makes it easy to use as a tool for policy makers. When it comes to fairness however, this measure doesn't quite measure what society is concerned about. In the income and education dimensions it measures outcome inequality, and predicted life-length says very little about the quality of life and health-level one can expect and how these factors are distributed.

The HOI measures exactly the kind of inequality everyone is concerned about. It focuses on children's opportunities that have nothing to do with their own choices or responsibility. Nobody can help where they are born, or what kind of circumstances they encounter. This measure is spot-on what society cares about, and also what the fairness theories are enquiring. It focuses on the initial positions and distributions. It also measures whether or not society is fair, in the allocation of opportunities, or if children are judged and get different treatment depending on circumstances of family status or area of residence.

The main problem with this measure is the implementation. It's been implemented already on data from 19 countries but to make this a universal measure of inequality requires an extensive investment in data collection and adjustment of household surveys worldwide. To make it a complete measure of inequality of opportunities more indicators need to be added, and agreed on internationally and the circumstance groups could be complemented too. This is a new measure and hopes are that it should evolve in these areas and also be adjusted and used for local policy implementations, or decision-making on different levels.

The last measure is also developed with Roemer's theory of opportunities in mind. This measure also complies with the general notion of what kind of inequality matters, even if it is based on outcomes. It divides outcome inequality into a portion of sources, that are considered unfair, and a portion relating to everything else, supposedly representing effort and choices made. This way it can track how much of the inequality levels are due to unfair circumstances, even if we start from the final allocations.

The main problem with this measure is that it is difficult to account for all the circumstances that are outside of the individual control that influence outcomes. Therefore this measure only shows a lower-bound level of inequality of opportunity. Since we're dealing with outcome indicators again, we have all the usual compatibility issues on top of that. A plus for this measure though is that it includes three variables to try and correct for these problems.

The HOI and the Top Down approach were developed together and are meant to complement each other. With the two measures together you get a complete picture of inequality of opportunity in a distribution. The HOI is a bottom-up measure and the Top-Down measure covers from the other side. Together you cover both direct and indirect sources of inequality of opportunity. These measures are very new so there's a lot of comparability issues to be discovered and dealt with, I'm sure. These measures do answer to the public view on what kind of inequality we really want to measure and do something about, so hopefully they can be improved and expanded for future policy use. If data becomes available more universally and if more opportunities can be defined, then these measures could really be a revolution for inequality measurement and correcting policies.

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8. Appendix

8.1 Table 1.1

Country	The Gini			The Mean Logarithmic Deviation (GE(0))			The Atkinson Index ($\epsilon=1$)			The Theil Index (GE(1))		
	1995	2005	2010	1995	2005	2010	1995	2005	2010	1995	2005	2010
Argentina	0,479	0,480	0,433	0,407	0,423	0,337	0,335	0,345	0,286	0,427	0,434	0,330
Bolivia (-97)	0,578	0,584	-	0,704	0,732	-	0,505	0,519	-	0,691	0,693	-
Brazil	0,586	0,563	-	0,643	0,586	-	0,474	0,444	-	0,696	0,643	-
Chile (-96/-06)	0,541	0,519	-	0,520	0,474	-	0,405	0,377	-	0,607	0,566	-
Colombia (-96/-00)	0,508	0,524	-	0,482	0,520	-	0,383	0,406	-	0,598	0,546	-
Costa Rica	0,435	0,462	0,494	0,346	0,382	0,442	0,292	0,318	0,357	0,345	0,397	0,474
Dominican Republic (-96)	0,480	0,506	0,479	0,411	0,453	0,396	0,337	0,364	0,327	0,434	0,510	0,426
Ecuador	0,425	0,549	0,505	0,305	0,561	0,460	0,262	0,429	0,369	0,322	0,603	0,512
El Salvador	0,460	0,472	0,421	0,390	0,401	0,307	0,323	0,330	0,265	0,418	0,424	0,319
Guatemala	-	-	-	-	-	-	-	-	-	-	-	-
Honduras	0,531	0,538	0,550	0,507	0,583	2,121	0,398	0,442	0,880	0,590	0,558	0,559
Jamaica (-96/-02)	0,430	0,421	-	0,311	0,299	-	0,267	0,258	-	0,351	0,338	-
Mexico (-96)	0,494	0,482	0,453	0,423	0,410	0,357	0,345	0,336	0,301	0,497	0,502	0,400
Nicaragua (-93)	0,494	0,405	-	0,427	0,272	-	0,347	0,238	-	0,516	0,301	-
Panama	-	-	-	-	-	-	-	-	-	-	-	-
Paraguay	0,579	0,501	0,512	0,626	0,450	0,476	0,465	0,362	0,379	1,000	0,538	0,650
Peru (-97)	0,401	0,373	0,345	0,274	0,232	0,197	0,240	0,207	0,179	0,293	0,256	0,209
Uruguay	0,393	0,420	0,390	0,271	0,310	0,260	0,237	0,266	0,229	0,270	0,313	0,278
Venezuela	0,460	0,480	0,392	0,377	0,450	0,274	0,314	0,362	0,240	0,408	0,464	0,269

Additional Country Specific Information:

For Argentina the surveys only cover the urban population, but this still represents more than 85% of the total population. After 2003 the questionnaires and timing for the surveys in Argentina changed and non-response income was also taken into account.

For Bolivia the surveys are nationally representative after 1999, and in 2003-2004 the survey changed

income period from monthly to yearly, which leads to serious comparability problems with previous years.

In Brazil some rural areas were added to the sample from 2004.

In Chile the surveys are made every two years and the data is adjusted for non-response and missing income values.

For Colombia the survey was significantly changed in 2000 when it comes to frequency, overage and questionnaires.

For Costa Rica some changes in the sample weights were made after 2000, and in 2010 a new survey replaced the old one all together.

For Dominican Republic there were also significant changes in 2000.

For Ecuador the data for 1995 is equal to living standard measurement survey, the others are not comparable.

El Salvador deepened their surveys and expanded the coverage after 1997.

Honduras included non-monetary and non-labor income in 1996.

For Jamaica there's a serious problem with zero income reporting.

There are only for surveys conducted in Nicaragua.

In Peru the survey was enlarged and changed in 2000.

For Uruguay surveys also covers only urban population until 2005, but this still covered 80% of the total population. (Socio-Economic Database for Latin America and the Caribbean 05-05-2012)

Table 1.2

Country	HOI		Top-Down Approach – Decomposition using The mean logarithmic deviation GE(0)									IHDI	HDI
	1995	2005	Labor earnings			Income Per cap			Consumption			2011 (UNDP) $\epsilon=1$	2011 (UNDP)
			GE(0)	Level of IOp	Share of IOp	GE(0)	Level of IOp	Share of IOp	GE(0)	Level of IOp	Share of IOp		
Argentina	-	88	-	-	-	-	-	-	-	-	-	0,641	0,797
Bolivia	-	62	-	-	-	-	-	-	-	-	-	0,437	0,663
Brazil	59	72	0,617	0,215	0,349	0,695	0,228	0,329	-	-	-	0,519	0,718
Chile	83	91	-	-	-	-	-	-	-	-	-	0,652	0,805
Colombia	67	74	0,608	0,123	0,203	0,559	0,140	0,250	0,449	0,119	0,265	0,479	0,710
Costa Rica	76	86	-	-	-	-	-	-	-	-	-	0,591	0,744
Dominican Republic	-	71	-	-	-	-	-	-	-	-	-	0,510	0,689
Ecuador	64	74	0,638	0,164	0,256	0,417	0,121	0,290	0,354	0,122	0,344	0,535	0,720
El Salvador	47	55	-	-	-	-	-	-	-	-	-	0,495	0,674
Guatemala	43	50	0,786	0,230	0,293	0,619	0,231	0,373	0,409	0,214	0,524	0,393	0,574
Honduras	-	53	-	-	-	-	-	-	-	-	-	0,427	0,625
Jamaica	72	73	-	-	-	-	-	-	-	-	-	0,610	0,727
Mexico	70	82	0,756	0,177	0,234	0,711	0,148	0,208	0,635	0,170	0,267	0,589	0,770
Nicaragua	40	46	-	-	-	-	-	-	-	-	-	0,427	0,589
Panama	65	69	0,572	0,140	0,245	0,630	0,218	0,346	0,381	0,159	0,417	0,579	0,768
Paraguay	58	67	-	-	-	-	-	-	-	-	-	0,505	0,665
Peru	55	66	0,675	0,143	0,212	0,557	0,163	0,292	0,351	0,122	0,348	0,557	0,725
Uruguay	-	85	-	-	-	-	-	-	-	-	-	0,654	0,783
Venezuela	82	86	-	-	-	-	-	-	-	-	-	0,540	0,735

8.2 Table 2

Ranking	The Gini (2005)	Atkinson Index ($\epsilon=1$) (2005)	The Mean Logarithmic Deviation GE(0) (2005)	The Theil Index GE(1) (2005)	HOI (2005)	Top Down Approach (Income as welfare measure)			IHDI	HDI
						GE(0)	Level of IOp	Share of IOp		
1	Peru (0,373)	Peru (0,207)	Peru (0,232)	Peru (0,256)	Chile (91)	Ecuador (0,417)	Ecuador (0,121)	Mexico (20,8%)	Uruguay (0,654)	Chile (805)
2	Nicaragua (0,405)	Nicaragua (0,238)	Nicaragua (0,272)	Nicaragua (0,301)	Argentina (88)	Peru (0,557)	Colombia (0,140)	Colombia (25%)	Chile (0,652)	Argentina (797)
3	Uruguay (0,420)	Jamaica (0,258)	Jamaica (0,299)	Uruguay (0,313)	Costa Rica /Venezuela (86)	Colombia (0,559)	Mexico (0,148)	Ecuador (29%)	Argentina (0,641)	Uruguay (783)
4	Jamaica (0,421)	Uruguay (0,266)	Uruguay (0,310)	Jamaica (0,338)	-	Guatemala (0,619)	Peru (0,163)	Peru (29,2%)	Jamaica (0,610)	Mexico (770)
5	Costa Rica (0,462)	Costa Rica (0,318)	Costa Rica (0,382)	Costa Rica (0,397)	Uruguay (85)	Panama (0,630)	Panama (0,218)	Brazil (32,9%)	Costa Rica (0,591)	Panama (768)
6	El Salvador (0,472)	El Salvador (0,330)	El Salvador (0,401)	El Salvador (0,424)	Mexico (82)	Brazil (0,695)	Brazil (0,228)	Panama (34,6%)	Mexico (0,589)	Costa Rica (744)
7	Argentina / Venezuela (0,480)	Mexico (0,336)	Mexico (0,410)	Argentina (0,434)	Colombia / Ecuador (74)	Mexico (0,711)	Guatemala (0,231)	Guatemala (37,3%)	Panama (0,579)	Venezuela (735)
8	-	Argentina (0,345)	Argentina (0,423)	Venezuela (0,464)	-	-	-	-	Peru (0,557)	Jamaica (727)
9	Mexico (0,482)	Paraguay / Venezuela (0,362)	Paraguay / Venezuela (0,450)	Mexico (0,502)	Jamaica (73)	-	-	-	Venezuela (0,540)	Peru (0,725)
10	Paraguay (0,501)	-	-	Dominican Rep. (0,510)	Brazil (72)	-	-	-	Ecuador (0,535)	Ecuador (0,720)
11	Dominican Rep. (0,506)	Dominican Rep. (0,364)	Dominican Rep. (0,453)	Paraguay (0,538)	Dominican Republic (71)	-	-	-	Brazil (0,519)	Brazil (0,718)
12	Chile (0,519)	Chile (0,377)	Chile (0,474)	Colombia (0,546)	Panama (69)	-	-	-	Dominican Rep. (0,510)	Colombia (0,710)
13	Colombia (0,524)	Colombia (0,406)	Colombia (0,520)	Honduras (0,558)	Paraguay (67)	-	-	-	Paraguay (0,505)	Dominican Rep. (0,689)
14	Honduras (0,538)	Ecuador (0,429)	Ecuador (0,561)	Chile (0,566)	Peru (66)	-	-	-	El Salvador (0,495)	El Salvador (0,674)
15	Ecuador (0,549)	Honduras (0,442)	Honduras (0,583)	Ecuador (0,603)	Bolivia (62)	-	-	-	Colombia (0,479)	Paraguay (0,665)
16	Brazil (0,563)	Brazil (0,444)	Brazil (0,586)	Brazil (0,643)	El Salvador (55)	-	-	-	Bolivia (0,437)	Bolivia (0,663)
17	Bolivia (0,584)	Bolivia (0,519)	Bolivia (0,732)	Bolivia (0,693)	Honduras (53)	-	-	-	Honduras / Nicaragua (0,427)	Honduras (0,625)
18	-	-	-	-	Guatemala (50)	-	-	-	-	Nicaragua (0,589)
19	-	-	-	-	Nicaragua (46)	-	-	-	Guatemala (0,393)	Guatemala (0,574)

8.3 Table 3

Ranking	Gini (2005)	The mean logarithmic deviation GE(0) (2005)	The Theil Index GE(1) (2005)	Atkinson Index ($\epsilon=1$) (2005)	HOI (2005)	Top Down Approach (Income as welfare measure)			IHDl	HDI
						GE(0)	Level of IOp	Share of IOp		
1	Peru (0,373)	Peru (0,232)	Peru (0,256)	Peru (0,207)	Mexico (82)	Ecuador (0,417)	Ecuador (0,121)	Mexico (20,8%)	Mexico (0,589)	Mexico (0,770)
2	Mexico (0,482)	Mexico (0,410)	Mexico (0,502)	Mexico (0,336)	Colombia/Ecuador (74)	Peru (0,557)	Colombia (0,140)	Colombia (25%)	Peru (0,557)	Peru (0,725)
3	Colombia (0,524)	Colombia (0,520)	Colombia (0,546)	Colombia (0,406)	-	Colombia (0,559)	Mexico (0,148)	Ecuador (29%)	Ecuador (0,535)	Ecuador (0,720)
4	Ecuador (0,549)	Ecuador (0,561)	Ecuador (0,603)	Ecuador (0,429)	Brazil (72)	Brazil (0,695)	Peru (0,163)	Peru (29,2%)	Brazil (0,519)	Brazil (0,718)
5	Brazil (0,563)	Brazil (0,732)	Brazil (0,643)	Brazil (0,444)	Peru (66)	Mexico (0,711)	Brazil (0,228)	Brazil (32,9%)	Colombia (0,479)	Colombia (0,710)