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Research Paper:

The effect of Poverty on Inequality

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Table of Contents

I. Introduction

a.) Research Question

In this paper, I will explore whether a change in the number of poor people causes a change in the income distribution of a population. I have the impression that poverty and inequality are often used as synonyms, when it comes to relevant debates. Thus, I want to examine poverty and inequality indicators separately in my paper. I expect that a decline in poverty leads to a worsening of the income distribution. The reason is that economic growth might result in limited trickle-downs to the poor and thus a to a reduction of absolute poverty. But as it is often popularly perceived, the 'rich become richer and the poor poorer', as result of economic growth. Thus, I believe that absolute poverty is partly replaced by growing inequality.

At first, I will give a short survey on how poverty and inequality are measured. However, in order to establish the framework for the empirical analysis, I will restrict this overview to money-metric indicators, mainly to the headcount ratio and existing poverty lines, and the Gini coefficient. Although comprehensive indexes encapsulating both poverty and inequality within one formula, as the Sen Index,[1] exist, I will not discuss such indexes. The reason is that I want to determine whether a change in poverty causes a change in inequality. Thus, poverty and inequality indicators have to regarded upon separately, and an index comprising both within one formula is not suitable for my paper.

[1] See Sen (1976: especially 227). He suggests an index, comprising of the headcount ratio, the income-gap ratio, the Gini coefficient, "ratio of mean income of the poor to the poverty-line income level". This paper of Sen was widely discussed among academics and can be seen as a starting point to see the question of poverty measurement more critically. Sen's paper indeed is a successful attempt to integrate poverty and inequality within one single index, although he himself today has reservations about the integrity of his own index (Sen 1992: 105). See also Sen (1979).

After this overview, the empirical section of my paper will begin. At first, I will try to determine whether there is some correlation between poverty and inequality. After this, the next step will finally be to see whether a change in poverty causes a change in inequality. For this, I am using a data sample of the World Bank with 23 countries.[2] Although there might be a small indication that a reduction in poverty leads, as opposed to my own hypothesis, to a reduction in inequality, I realized that the data I used is not robust and comprehensive enough. There is a requirement for different data, based on national and not international poverty standards. However, the data has to be standardized in some point to make cross-country comparisons possible, without being charged of fallacy. Maybe, we should refrain from global poverty surveys, but need to analyze poverty and inequality on the micro level. With this paper, I hope to stimulate further research in this topic, and in particular want to motivate researchers to rethink current poverty lines and rethink the quality of data they use.

As a matter of irony, I have myself used data, which was available from the World Bank and which is completely money-metric, and maybe also biased and fallacious in its very nature.[3] However, I was in the need for consistent data, while my own resources are limited. I am not able to define my own poverty lines and use alternative indicators, while knowing that the data might not be available in consistent time rows. I still hope that I can contribute to the debate in a productive manner and at least set the stage for my own or other people's thorough future research in these questions. Attempting a general law without doing case-to-case work has often been criticized. And indeed, one of the lessons I have learnt with the work of cross-country

[2] More on the nature of the data and the problems I had to encounter is in the next section of this paper.
[3] See Reddy and Pogge's (2005) excellent paper on this subject matter.

data is that a general law might not be possible without a usual set of exceptions that mitigate the explanatory force of this law. It is better to have this conclusion than to not even try. I also wonder whether we it is helpful at all to talk about these questions in a global perspective and make global surveys of poverty, because this factors out any anthropological attempt and ignores many subaltern vernacular narratives on poverty, which might help us to understand poverty much better and which might help to define poverty lines in a different manner.

b.) A Note on the Data I used

I cannot submit this paper without putting a note on the problems I encountered with the data. It should help to understand my selection of samples better and should also be imperative in interpreting my conclusions.

I used two different databases from the World Bank, namely the World Development Indicators of 2005[4] for the first part of the analysis, and the database PovcalNet[5] for the second part. The reasons for using two, and not one single database, are as following. I could not find another report of the World Bank from the far past containing the World Development Indicators, which I have used for the first part of this paper, as comprehensive as they are in the World Development Indicators of 2005. I could have used the second database for the entire paper. But the second database did not contain any information on national poverty lines, which I needed for the first part of the analysis. Rightly, I could have used another data source to complement older World Development Indicators with indicators, like the Gini coefficient. Or I could have

[4] http://devdata.worldbank.org/wdi2005/cover.htm.
[5] http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp.

complemented the data of the second database with data on national poverty lines, again from another source. But I decided against this. I am strictly against intertwining different data sources, due to the imminent inconsistencies when it comes to how the data is surveyed, aggregated and regressed. I will give one example. The Deininger & Squire database,[6] published by the World Institute for Development Economics Research, contains an impressive list of Gini coefficients for all countries of the World, separated by time and source. I first wanted to use that database to complement some of my data. But one single look in that database reveals how big the differences are according to source. So I decided to adhere strictly to World Bank Data, albeit from two databases. Ironically, the data of the two aforementioned World Bank databases is inconsistent itself, but the divergences are probably within the area of the normal standard error.

Both of the databases contain a large number of cases from allover the World and are mostly confined to developing and transforming economies (especially the former communist states). My initial idea was to use all of the data, and I decided against sampling, be it random or controlled sampling. I also decided against aggregate figures in order to locate special cases and prevent that the data of some countries (like China and India in Asia) makes other data look less significant. But I realized that I had to filter the data of both databases significantly in order to have computable data. At first, if we use the international US$1 and US$2 poverty lines, as suggested by the World Bank for some research questions, we would end up of having a big proportion of data in a graph with poverty as independent variable centered at the Y-axis, because according to this standard many transforming nations of Eastern Europe and the Former Soviet Republics do not have any poverty. Hence, I omitted all data from both databases with a poverty headcount

[6] http://www.wider.unu.edu/wiid/wiid.htm

ratio below 2 %. Then, especially in the first database, data was incomplete in some cases (for instance Argentina and Costa Rica). I have omitted all rows with incomplete data, no matter whether the data on national or international poverty lines was missing. So, I was left with 37 cases for the first database.

With the second database, I did a similar operation as with the first one. But now I was looking at a change over time. And here it became apparent that many nations did not survey or submit data to the World Bank over a long time span. Since I wanted to detect some change, I decided to take a minimum of ten years between the 1st and the 2nd national census I used. Thus, again I had to delete data, which left me with 23 cases for this database. As one can see, my decision to use a data sample as opposed to all data is not a controlled selection on the dependent variable, and not a random selection. In other words, I used all data that I have identified as usable, in accordance with the criteria I had outlined.

I am well aware that this selection of cases could be subject to criticism, but my resources are limited. Thus, I decided to proceed as suggested. The next problem was the nature of computing the data. I am bound to the use of MS Excel and thus had to rely on this program, when it comes to my graphs and tables. MS Excel has a lot of limits and cannot be compared with an econometrics program. I still hope that the results I have obtained with a lot of effort do shed some light on my research question. But it was as important for me to mention these problems and maybe the limits of my paper, so that the results can be interpreted accordingly. The next part now deals with the paper itself.

II. Poverty and Inequality Measurement

> "Poverty means one thing to an American wage-earner; it means quite a different thing to the beggar in the streets of Calcutta. How can we measure in quantitative terms the degree of poverty existing in the underdeveloped countries of the modern world?" (Gill 1967: 81).

In the citation above, Gill points out the relative nature of poverty across the world. In each setting, poverty is perceived differently by the respective citizens. But how can we attain a better picture of the level of global poverty in the world? There exists an overwhelming volume of literature as to how to measure poverty. General theories range from the basic needs approach to poverty (for instance Streeten 1979) to the non money-metric and capability-based approach from Sen (2003). Approaches last from welfare-based approaches, using monetary indicators like income or consumption, to social indicators, using calories, life expectancy, literacy, inter alia, to estimate the worldwide poverty level.

The question remains whether there is at all a quantitative indicator for giving an apposite account on 'how many people are poor in the world'. It is all a matter of definition who is considered to be poor and who is considered to be wealthy. The following section should give a short overview about some mainstream poverty measurement scholars, international donors, inter alia, use in their analysis. In order to create the framework for the next part of the paper, namely the data analysis on the relationship of poverty and inequality, I will limit this part to monetary indicators and will not talk about social indicators,[7] although

> "[o]f course, the benefits of growth may be measured in other ways: by attainment of such basic needs as nutrition, by physical quality of life indicators, by health statistics, by educational levels, as well as by economic measures other than income." (Fields 1980: 13).

[7] It is remarkable that most standard textbooks on development economics solely talk about welfare-based indicators of poverty and omit the human dimension, i.e. social indicators.

a.) The Poverty Headcount, National and International Poverty Lines

The logic of the headcount ratio, which is used by many national agencies and international donors, is quite straightforward. After defining a poverty line, every person with an income below this line is classified as poor. The traditional data source is, as Ravallion (1996: 1338) points out, the single-household survey.

Defining the poverty line itself is a problematic exercise. As Foster and Shorrocks (1988: 173) say, it "has always been one of the principal methodological issues in the analysis of poverty", as "a feature common to all proposed methods is a significant degree of arbitrariness in the value assigned to the poverty standard." Thus, determining the poverty line has to be done thoroughly, as it has crucial influence on the outcome how many people in a given setting are classified as poor.

As the "welfarist approach of mainstream economics" (Aturupane, Glewwe et al. 1994: 244) mainly relies on income and consumption as indicator for well-being, the World Bank is one of the main proponents of the headcount ratio in order to determine the level of poverty within a given group and/or region. Poverty lines can be defined homogenously within an international context. The World Bank uses US$1 and US$2 poverty lines, respectively, in order to give a comprehensive image on the status of global poverty.[8] The world population that has to live with less than US$1 per day suffers immediate poverty ("the poorest of the poor"), while everyone who earns less than US$2 per is classified as poor. In order to prevent the exchange rate fluctuations, this absolute poverty line is weighted with purchasing power parity (PPP) exchanges rates.

[8] http://ddp-ext.worldbank.org/ext/GMIS/gdmis.do?siteId=2&contentId=Content_t1a&menuId=LNAV01HOME1 [April 28th, 2007].

Poverty lines can also be defined in a national context, in different manners. Living under x% of the median income is one example (Blackburn 1994: 372). Other examples include, inter alia, the income that is needed to purchase a basket of certain goods that are seen as imperative for the survival.

Let us make a short comparison of international and national poverty lines. Graph 1[9] shows how national and international poverty lines can diverge in practice. Using a sample of 37 countries from the 2005 World Development Indicators (published by the World Bank) and comparing the national poverty line against the US$1 international poverty line by the World Bank, graph 1 and table 1 indicate that these lines often lie quite remote from each other.[10]

The two most extreme cases are Colombia and Brazil. According to the national poverty line, there exists 55.8 % points and 48.3 % points more poverty in these countries, respectively, as estimated by the US$1 international poverty line. In total, one can see that there is quite considerable divergence between these lines. The average deviation is about 20 % points, while the median deviation is 17.4 % points. Only in six cases (China, The Gambia, India, Nigeria, Uganda and Zimbabwe), the international poverty line sees the level of poverty higher than the national poverty line. And in the cases of Burkina Faso, Cambodia, The Gambia, Ghana and Nicaragua are the estimates of the national and international poverty line reasonably close (deviation of about 5 % points).

[9] Graphs and tables can be found in the appendix and are enumerated accordingly.
[10] For these graphs and tables, I have used the data from the World Development Indicators 2005 from the World Bank (http://devdata.worldbank.org/wdi2005/Cover.htm). Please read the general note on the data in Section I.b of this paper.

Doing the same comparison but using the US$2 international poverty line standard (graph 2) instead does not really change the picture. But it inverts the picture to some extent. Here in all except of seven cases (Armenia, Azerbaijan, Bolivia, Colombia, Guatemala, Honduras and Peru), the international poverty line identifies a larger number of poor people than the national poverty line. In the cases of India, Nigeria and Uganda, the difference is larger than 50 % points. The average deviation between these lines is 26.1 % points, and the mean deviation is 25.7 % points, even larger as compared to the US$ 1 standard.

Thus, as we can see, there is a huge difference on how we estimate poor people in the world. From the view of the monetary approach, setting the proper poverty standard is a crucial exercise, and maybe there is a need for a better synthesis between international and national poverty lines if we do international poverty comparisons. Cross-country comparisons of these national poverty lines remain complicated. Such "poverty comparisons can be very sensitive to how poverty lines are made comparable across countries" (Blackburn 1994: 371). Hence, poverty lines *might* give an adequate account on the level of poverty within a state, but international comparisons need to be appreciated very carefully.

Although the headcount ratio has many weaknesses, it at least enables us to give a clear numeric account on the number of people that live in poverty in a country and around the globe. The expressiveness of the headcount ratio is very limited though. As we have learnt, the number of poor people that is determined to be poor depends hardly on how the poverty line has been defined prior to the evaluation and aggregation of the household surveys. It often only gives an arbitrary number of people that are allegedly

poor. It does not say anything about the extent of poverty and suffering and nothing about the 'distribution of poverty' among the poor and in relation to the non-poor. Moreover, it has to be questioned whether money-metric indicators – be it income or consumption – are sufficient to determine poverty. Martin Ravallion (1996: 1329, emphasis as in original) from the World Bank summarizes aptly and underlines that the degree of simplicity is the main reason why mainstream economists rely on both national poverty lines and headcount ratios, as well as on the international US$1 and US2 poverty standard:

> "One might wonder why the headcount index has remained so popular, despite the trenchant critiques of Sen (1976) and others, in a long list of papers in *Econometrica* and elsewhere. Its simplicity is clearly the main reason; for something of such wide public interest as poverty measure, the seemingly esoteric rationales and formulae of other measures can be difficult to digest"

As we can see, simplicity is one of the main reasons why the headcount ratio is still used in international comparisons with regard to poverty evaluations, and that despite its shortcomings. There exist, inter alia, two other popular monetary indicators for determining absolute poverty besides the head count ratio, which also rely on the determination of poverty lines. The first is called the poverty gap index (PGI) and is the "amount needed to raise the incomes of the poor to the poverty standard" (Fields 1980: 26). But only if taken together with the headcount ratio, we know the number of people the poverty gap applies to. Hence, the poverty gap alone is far from ideal as an indicator to give an apposite picture of poverty within a society. A third index is the severity of poverty index (SPI), which gives a clearer picture about the extent of poverty among the poor,

> "because by taking squares of the poverty lines, larger weights in aggregation are assigned to people under severe poverty whose standards of living are further away from the poverty line than those under moderate poverty located close to the poverty line." (Hayami and Godo 2005: 198).

These three money-metric indices have a different explanatory force and can be used in dependence of the research question. The World Bank says in reference to the PGI and SPI:

> "Depth and severity might be particularly important for the evaluation of programs and policies. A program might be very effective at reducing the number of poor (the incidence of poverty) but might do so only by lifting those who were those closest to the poverty line out of poverty (low impact on the poverty gap). Other interventions might better address the situation of the very poor but have a low impact on the overall incidence (if it brings the very poor closer to the poverty line but not above it)."[11]

If all three indices are used together, one can receive a more nuanced picture about both the amount and extent of poverty within a given society. However, it remains doubtful whether income, consumption etc. are adequate indicators when it comes to the poverty question. Despite my reservations, I will use the headcount ratio in the empirical section of the paper in order to determine the relationship of poverty and inequality. But before, we should have some thoughts on how inequality is measured.

b.) Measuring Inequality: The Gini Coefficient

> "In studies of distribution and development, it is customary to present data on growth of national income and change in relative social inequality. Ordinarily, the judgment is made that *social welfare (W)* depends positively on the *level* of national income *(Y)* and negatively on the *inequality* in the distribution of that income *(I)*. For example, taking the share of income of the poorest 40% of the population *(S)* as an index of equality, and the Gini coefficient *(G)* as an index of inequality, these studies would hold that *W* is positively related to *Y* and *S* and negatively related to *G*. In the usual terminology, a falling *S* or a rising *G* is given the nonneutral term "worsening of the income distribution," and it is generally thought to be a bad thing when rising measured inequality is encountered." (Fields 1980: 18, emphasis as in original)

As we can infer from this statement, development can have undesired side-effects. Although the national income could grow, social welfare as a whole could decline, if the distribution of income becomes more unequal, as result of the uncontrolled market forces or wrong policies. Within mainstream economics, certain indicators of inequality exist.

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[11] http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20242881~menuPK:435055~pagePK:148956~piPK:216618~theSitePK:430367,00.html

The probably most widely used indicator is the Gini coefficient, which I will shortly introduce in the following.[12]

The Gini coefficient is an index for determining how equal a society is with regard of the populations' share of the national income. If the percentage of the population is placed on the x-axis, and the percentage of the national income on the y-axis, the graph will ideally have a 45º angle – should the distribution of wealth be absolutely equal. However, as this is never the case,[13] we can draw a Lorenz curve in accordance with the distribution of income – that is below the 45º line. The area between the 45º line and the Lorenz curve is divided by the area below the Lorenz curve. Logically, the more equal a society is, the more close the ratio will approach a value of 0, and the more unequal it is, it will approach a value towards 1.

As we can see, the Gini coefficient gives a comprehensive picture of inequality of the entire population, and not of segments like the poor only! In other words, if one wants to check the income distribution among the poor, one needs to apply the formula in defining the poor as the entire population and their cumulated income of them as the full income and draw a new Lorenz curve of this population and divide the two aforementioned areas. The Gini coefficient alone does not say anything where the inequalities are distributed within the population. For this, it is necessary to break up the analysis in small intervals of percentiles for locating the detailed income distribution and, if desired and for convenience purposes, draw a Lorenz curve to graphically locate the

[12] Virtually every standard textbook on development economics and every publication dealing with inequality has an explanation about the Gini coefficient, as this index is probably most widely used for determining the degree of inequality in a society – so my text will remain rather short.

[13] As Hagen (1980: 39) claims correctly: "In fact, however, the curve of income distribution in any country […] sags below the 45º line."

inequalities. Also, it needs to be mentioned that the Gini coefficient varies significantly according to the source, which raises doubt about the integrity of the coefficient.[14]

For the purpose of the paper, which intends to check the causal relationship of the change of poverty to the change in inequality for a national population, the Gini coefficient per se serves its purpose. The next section will deal with data sets on poverty and inequality at two different point of times for a selected group of countries. I will rely on the PovcalNet database of the World Bank when I select the Gini coefficient and the headcount ratio for the main analysis.[15] We will marginally see in how far poverty could be combated. But the focus is on the question how a change in the number of poor people affects the income distribution.

III. The Effect of Poverty on the Income Distribution

Before I start with the analysis whether or not a change in poverty results in a change in inequality, I want to have a brief look whether there is possibly any correlation between these two variables. For that purpose, we should at first have a look on graphs 3 and 5, which rely on the same data of the preceding chapter. The first of these graphs (3) uses the national poverty lines, while the next two (graphs 4 and 5) use the international poverty lines of US$1 and US$2, respectively, all against the Gini coefficient. Although the first graph could contain a light positive correlation between poverty (measured against national poverty lines) and inequality, I have my doubts whether there is a correlation at all. Although the correlation is 0.38 ($p \leq 0.01$), the other graphs stand almost

[14] We have an impressive table of different Gini coefficients at different points of time of almost all countries of the world in the Deininger & Squire database on the webpage of the World Institute for Development Economics Research (http://www.wider.unu.edu/wiid/wiid.htm). The discrepancy is stunning.

[15] http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp

in contradiction to this result. As we can see, the results, if we take the US$1 international poverty line as standard, are scattered further apart from each other (correlation of 0.19, $p \leq 0.11$). And if we even take the US$2 standard as a poverty line, we even have a negative correlation of -0.13 (with $p \leq 0.22$). Hence, not only a quick look on these three graphs reveals that a general correlation between poverty and inequality might not exist from this sample. But also from the rough correlation analysis one can infer that a more thorough exercise, possibly using a multivariate approach in order to exclude third variables, is needed to determine whether or not there is a significant correlation. From all three graphs, one can conclude that it is not the extreme cases that lead to this appraisal, but rather the sequestered nature of the scatterplot per se. One would probably need a bigger sample for determining a clearer relationship. Apart from that, one might opt for alternative poverty lines, maybe in terms of social or public health indicators like calorie intake, literacy etc. If we take the entire population, meaning all countries in the world, and adhere to the US$1 or US$2 poverty line, then the industrialized nations and many of the transforming economies would be scattered around 0 on the poverty axis, while on the inequality axis, they would be concentrated around 0.25 to 0.40. Thus, even here a correlation is doubtful. If we take national poverty lines for all nations, however, the results might imply a higher correlation – as it also did here at the example of graph 3, as compared to graphs 4 and 5. The appraisal here is: we do not know whether there is a correlation between poverty and inequality. And we will not know until we have unambiguous national poverty lines, which can be used for cross-country comparisons. And as we know, this task alone is a very responsible matter that cannot be discussed in this paper. Rather, I want to turn now to the question whether we

can observe any change in equality as a result of changes in the level of poverty, over the course of time. It should be noted that I am looking for a change in inequality as a result of changes in poverty, and not vice versa, as direct interventions in the context of the United Nation Millennium Development Goals mostly happen in the quest to combat immediate poverty, and not really for improving income equality. The fight against poverty has been put on the top on the agenda, and not the fight against inequality. Thus, I will assume that – if there is any relationship between poverty and inequality – poverty caused inequality to change, and not the other way round. In other words, poverty is the explanatory, and inequality the dependent variable.

The data I had used before does not serve its purpose, because I could not attain reliable data on the Gini coefficient for the analysis of two time points. Hence, I will now the PovcalNet data, which is also published by the World Bank. Now, I have data from a set of countries from two different points of time when the household surveys were taken. There are several problems, however, that need to be mentioned. The data is not consistently collected by the countries. That means that some countries only published their data from 1990 onwards, while others have been collecting data at earlier points of time. I could not find any data, also in old World Development Reports, which has been surveyed before 1980 and contains both calculations of the headcount ratio weighted against the US$1 international poverty standard, along with the Gini coefficient. Hence, the earlier data points are mostly from the 1980s. Also, the data is collected at irregular intervals. In order to determine whether there has been a change of poverty and inequality in the nations, I only took nations that have submitted data intervals with a minimum of ten years in between. Otherwise, any change is not as easy to determine. It was not

possible to find data from two clearly selected years for all nations (for instance 1980 and 2004). In accordance with the stages of development theory, I do not see any problem for selecting data, let us say, from country A from 1985 and 2000, and from country B from 1992 and 2003, as long as the minimum of ten years interval exists. For measuring change,[16] the absolute years are not important, but the difference in years. This overall filtering procedure reduced my sample to 23 countries, as listed in table 2.

I have drawn graphs 6 and 7, which give a picture of the level the poverty headcount against the Gini coefficient. Graph 6 is from the early US$1 census in the respective countries, and graph 7 from the later census. From these graphs, it is difficult to obtain an unambiguous conclusion. We can see that in graph 7 more countries than in graph 6 are clustered in the area indicating a poverty headcount of less than 20 %. This could be an improvement in immediate poverty alleviation measures. However, we can also discern a change in income equality within some nations. So did inequality in Zambia fall, while poverty was at least partly alleviated. On the flipside, in Uganda poverty and inequality has ascended. In China and some other nations, we have another scenario. Absolute poverty was partly combated, while inequality increased.

Let us draw another graph, which gives a much clearer picture. Graph 8 and table 3 contain the level of relative change in poverty and inequality in those 23 nations, using the early and the late census. A negative number implies an increase in poverty or inequality. We have four quartiles within the graph. Quartile I indicates that poverty was alleviated, and that inequality has decreased. Quartile II stands for a reduction of poverty but an increase in inequality. The nations in Quartile III have had both an increase in

[16] See Aturupane, Glewwe et al. (1994: 246), who put a plea to measure change of certain indicators and do not want to rely on absolute values of indicators when it comes to evaluate whether or not poverty alleviation measures were successful.

poverty and inequality. And finally, the forth quartile provides space for those countries that were unsuccessful in combating poverty but could at least reduce the level of income inequality.

The result is very interesting. We have eight nations in Quartile I (while Colombia is almost at the zero point of the axes, and Zambia an extreme case when it comes to the success in offsetting inequality), eight in Quartile II, seven nations in Quartile III (Rwanda and Bolivia being extreme cases, with sharp increases in poverty and inequality) and none in Quartile IV. If the results in the Quartile II had not existed, we would have had a clear picture: poverty alleviation programs, it would have had to be noted, have a positive effect on equality, whereby an increase in poverty results in an increase in inequality – at least in a simple bivariate analysis. The fact that Quartile IV does not contain any results would support this conclusion. But the eight nations in Quartile II, with the extreme cases of China and Sri Lanka, do not allow such a conclusion. They almost stand in clear contradiction to Quartile I.

From this scatterplot, it can be said that the relationship of poverty and inequality remains uncertain. This bivariate and rather simple analysis with only 23 cases and only two different points of time needs to be extended significantly in order to attain more reliable results. It also remains uncertain in how far a bivariate analysis is sufficient, or whether another attempt needs to be made with a multivariate analysis, trying to isolate other exogenous variables that distort any simple causal relationship of poverty and inequality. There *might* be a small evidence that the richer a country is (here meaning the less poor people a country has), the more equal it is.[17] But the relationship within this

[17] Maybe even this graph can be used as evidence for the Kuznets curve. In a considerable proportion of industrialized countries, the Gini coefficient lies below 0.3. In countries like India and China , which are

graph is not clear enough, and I suggest redoing the analysis with a bigger set of comprehensive data. Moreover, we need to make sure that the data we use is reliable enough. First, after careful scrutiny and filtering, I could only rely on 23 cases for this last analysis. Moreover, my general doubts whether the US$1 poverty line serves its purpose of being an apposite poverty line, or whether its existence and reliance by international organizations and donors is justified, persist – and are even stronger after doing the analysis.

This paper should be seen as a first step, a rough guide, towards working on this same question in a more comprehensive manner and with a different set of data. But the exercise as such did reveal many salient features (nature of poverty lines, concepts of poverty and inequality, use and computation of data, etc.) which are interesting to write down and which should be challenged in its very nature by future researchers. Maybe I did not succeed in answering my initial questions, but as a side effect I believe that I discovered many other interesting points worth noting.

IV. Conclusion

The main objective of this paper was to shed some light of the effect of changes in poverty on the income distribution. At first, we could see that the exercise to define poverty (and poverty lines) is very complicated, but very crucial. The relationship of monetary international and national poverty lines is inconsistent. This complicates any international poverty comparison and any exercise to look into general relationships.

rapidly developing, and in the other countries of Quartile II, which have been able to reduce poverty, inequality has ascended. It will be interesting to see, in particular at the example of India and China, whether inequality falls, after a certain level of development has been attained. Maybe India, and in particular China, are just at the peak level of the inverted parabola.

Indeed, it is another indicator that poverty analysis is best done on a case-to-case basis, appreciating the special culture, context and environment of the country or region surveyed. Nevertheless, I embarked upon the question whether or not a global trend in the relationship of poverty and inequality is possible, in using data from the World Bank that I had filtered and thus reduced for computation purposes. I am well aware of the limits of this data, but had to rely on it in absence of alternative data that is as comprehensive and allows international comparisons.

From the small analysis in the last part of the paper that was directed towards determining the effect of a change of poverty on the income distribution, we can draw a couple of lessons. At first, it is interesting to see that no country from the sample lies in Quartile IV. In other words, no country with ascending poverty can record an improvement of the income distribution. On the flipside, out of the sixteen countries with a decline in absolute poverty, eight countries witness a detrimental effect on the income distribution that has happened synchronically to the alleviation of poverty (Quartile II). The other eight countries show signs of an improvement of the income distribution as poverty declined isochronally (Quartile I). In all cases where the number of poor people has ascended, also the inequality in income did rise (Quartile III). However, I am careful in putting these results in a nutshell in saying that a decline/rise in poverty causes inequality to improve/worsen and in claiming a clear case of causality. I would rather say, after careful deliberation, that there might be a modicum of evidence that the absolute rise in income could lead to a light improvement of the income distribution. And this would be exactly the opposite of my hypothesis I had mentioned in the introduction. However, in too many examples, the opposite was true, which makes the formulation of a

general law impossible. The exception could become the rule, if the odds are defied. We should always keep in mind that direct domestic policy measures like land reforms, redistribution etc. also have a strong impact on the income distribution. And these variables, among others, have to be included in any model. Thus, I will denote two important points:

1.) Researchers interested in this question should see the accrual of proper data as a crucial exercise. It needs to be mentioned that ideally the data of all countries, and not only of a small sample, should be used, including the data of industrialized nations. For this, we need to define very clear cut relative poverty lines in the developed countries. It would be very interesting to rely on another set of poverty lines, which are internationally comparable. This alone is an endeavor that requires careful collection of data, in consideration of local and national circumstances, careful aggregation and careful deliberation on the question how to make the data internationally comparable. The analysis might have to be a multivariate regression in order to exclude third variables that distort any clear-cut relationship of poverty and inequality.

2.) If the researchers come to the conclusion that any obtained result does not lead to a desired conclusion and formulation of a general law, as it is the case here, there might be a need to ‘decentralize’ the poverty discussion, without searching for general laws but seeing poverty as a national or even local affair. Although this is a denial to respond to any question like ‘How many poor people live in the world”, this might help to see poverty more culturally relatively and might help to implement tailor-made policy measures that really help to change things, as

opposed to targeting poverty in the frame of so-called structural adjustment programs that have possibly harmed the people more than they have benefited.

Sanjay Reddy and Thomas Pogge (2005: 4) from Barnard College have written a terrific paper in which he challenges the overall methodology and data of the World Bank. At the end of my paper, I want to give their arguments some consideration. In their very impressively written essay, they point out that the poverty lines that have been established by the World Bank are arbitrary, the PPP concept "is neither well defined nor appropriate for poverty assessment", and that the bank "extrapolates incorrectly from limited data". In a nutshell, both economists challenge not only the use of data by the bank and international agencies, but also this very approach to poverty per se. I am very aware that my analysis has relied on a lot of this 'phony' data and thus makes the conclusion of my paper weaker. However, I hope that I was transparent and critical with my use of data and could contribute to the discussion and stimulate further research in this subject matter to consider the weaknesses official published data contains and thus make appropriate corrections. In the end, we could define poverty lines – as it has already been done very often – carefully in national surroundings, using social indicators. Aturupane, Glewwe et al. (1994: 249) mention that regression results show some agreement of income-based indicators with social indicators, although the former is not the main source of improvement in social indicators. Hence, it would be interesting to do an analysis with both social indicators, like literacy, calorie intake, or even aggregate indicators like the HDI, regressed against the Gini or even an alternative indicator for social inequality, and see whether these results are similar or different to a comparable analysis with money-metric indicators. The final answer to my research question whether

a change in poverty leads to a change in inequality is: ‘We don’t know as by yet, but there *might* be a small indication that richer countries in the long term turn out to be more equal, with the usual set of exceptions as they exist in international economics.”

Appendix: Tables and Graphs

Table 1

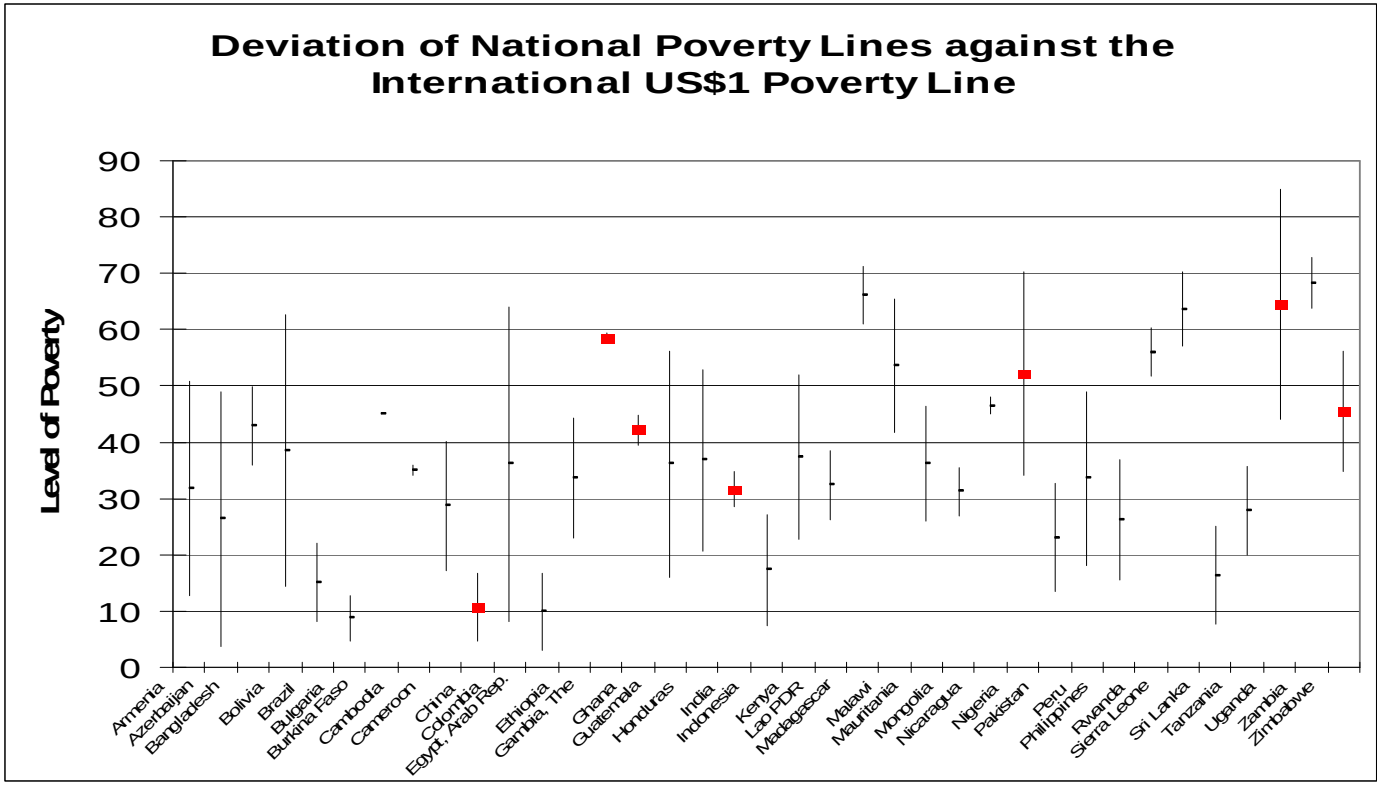
Country	National Poverty Line (NPL) Survey Year	% of Poor	International Poverty Line (IPL) Survey Year	% of Poor (US$1)	% of Poor (US$2)	NPL minus IPL (US$1)	NPL minus IPL (US$2)	Survey Year	Gini Index
Armenia	2001	50.9	1998 a	12.8	49	38.1	1.9	1998 c,d	37.9
Azerbaijan	2001	49	2001 a	3.7	9.1	45.3	39.9	2001 c,d	36.5
Bangladesh	2000	49.8	2000 a	36	82.8	13.8	-33	2000 c,d	31.8
Bolivia	1999	62.7	1999 a	14.4	34.3	**48.3**	28.4	1999 c,d	44.7
Brazil	1998	22	2001 b	8.2	22.4	13.8	-0.4	2001 e,f	59.3
Bulgaria	2001	12.8	2001 a	4.7	16.2	8.1	-3.4	2001 e,f	31.9
Burkina Faso	1998	45.3	1998 a	44.9	81	0.4	-35.7	1998 c,d	48.2
Cambodia	1999	35.9	1997 a	34.1	77.7	1.8	-41.8	1997 c,d	40.4
Cameroon	2001	40.2	2001 a	17.1	50.6	23.1	-10.4	2001 c,d	44.6
China	1998	4.6	2001 a	16.6	46.7	-12	-42.1	2001 c,d	44.7
Colombia	1999	64	1999 b	8.2	22.6	**55.8**	41.4	1999 e,f	57.6
Egypt, Arab Rep.	1999-00	16.7	1999-2000 a	3.1	43.9	13.6	-27.2	1999-00 c,d	34.4
Ethiopia	1999-00	44.2	1999-2000 a	23	77.8	21.2	-33.6	1999-00 c,d	30
Gambia, The	1998	57.6	1998 a	59.3	82.9	-1.7	-25.3	1998 c,d	47.5
Ghana	1998-99	39.5	1998-99 a	44.8	78.5	-5.3	-39	1998-99 c,d	18
Guatemala	2000	56.2	2000 b	16	37.4	40.2	18.8	2000 e,f	59.9
Honduras	1993	53	1999 b	20.7	44	32.3	9	1999 e,f	55
India	1999-00	28.6	1999-2000 a	34.7	79.9	-6.1	-51.3	1999-00 c,d	32.5
Indonesia	1999	27.1	2002 a	7.5	52.4	19.6	-25.3	2002 c,d	34.3
Kenya	1997	52	1997 a	22.8	58.3	29.2	-6.3	1997 c,d	42.5
Lao PDR	1997-98	38.6	1997-98 a	26.3	73.2	12.3	-34.6	1997 c,d	37
Madagascar	1999	71.3	2001 a	61	85.1	10.3	-13.8	2001 c,d	47.5
Malawi	1997-98	65.3	1997-98 a	41.7	76.1	23.6	-10.8	1997 c,d	50.3
Mauritania	2000	46.3	2000 a	25.9	63.1	20.4	-16.8	2000 c,d	39
Mongolia	1998	35.6	1998 a	27	74.9	8.6	-39.3	1998 c,d	30.3
Nicaragua	1998	47.9	2001 a	45.1	79.9	2.8	-32	2001 c,d	43.1
Nigeria	1992-93	34.1	1997 a	70.2	90.8	-36.1	-56.7	1996-97 c,d	50.6

	National Poverty Line (NPL)		International Poverty Line (IPL)						
Country	Survey Year	% of Poor	Survey Year	% of Poor (US$1)	% of Poor (US$2)	NPL minus IPL (US$1)	NPL minus IPL (US$2)	Survey Year	Gini Index
Pakistan	1998-99	32.6	1998-99 a	13.4	65.6	19.2	-33	1998-99 a,b	33
Peru	1997	49	2000 b	18.1	37.7	30.9	11.3	2000 c,d	49.8
Philippines	1997	36.8	2000 a	15.5	47.5	21.3	-10.7	2000 a,b	46.1
Rwanda	1999-00	60.3	1999-2000 a	51.7	83.7	8.6	-23.4	1983-85 a,b	28.9
Sierra Leone	2003-04	70.2	1989 a	57	74.5	13.2	-4.3	1989 a,b	62.9
Sri Lanka	1995-96	25	1999-2000 a	7.6	50.7	17.4	-25.7	1999-2000 a,b	33.2
Tanzania	2000-01	35.7	1993 a	19.9	59.7	15.8	-24	1993 a,b	38.2
Uganda	1997	44	1999a	84.9	96.6	-40.9	-52.6	1999 a,b	43
Zambia	1998	72.9	1998 a	63.7	87.4	9.2	-14.5	1998 a,b	52.6
Zimbabwe	1995-96	34.9	1995-96 a	56.1	83	-21.2	-48.1	1995 a,b	56.8
Mean		43.6		30.2	61.5	20.0	26.1		42.5
Median		44.2		23	65.6	17.4	25.7		43

a. Expenditure base b. Income base c. Refers to expenditure shares by percentiles of population d. Ranked by per capita expenditure
e. Refers to income shares by percentiles of population f. Ranked by per capita income
Source: Tables 2.5 and 2.7 of the World Development Indicators 2005 (published by the World Bank). Online at http://devdata.worldbank.org/wdi2005/Cover.htm

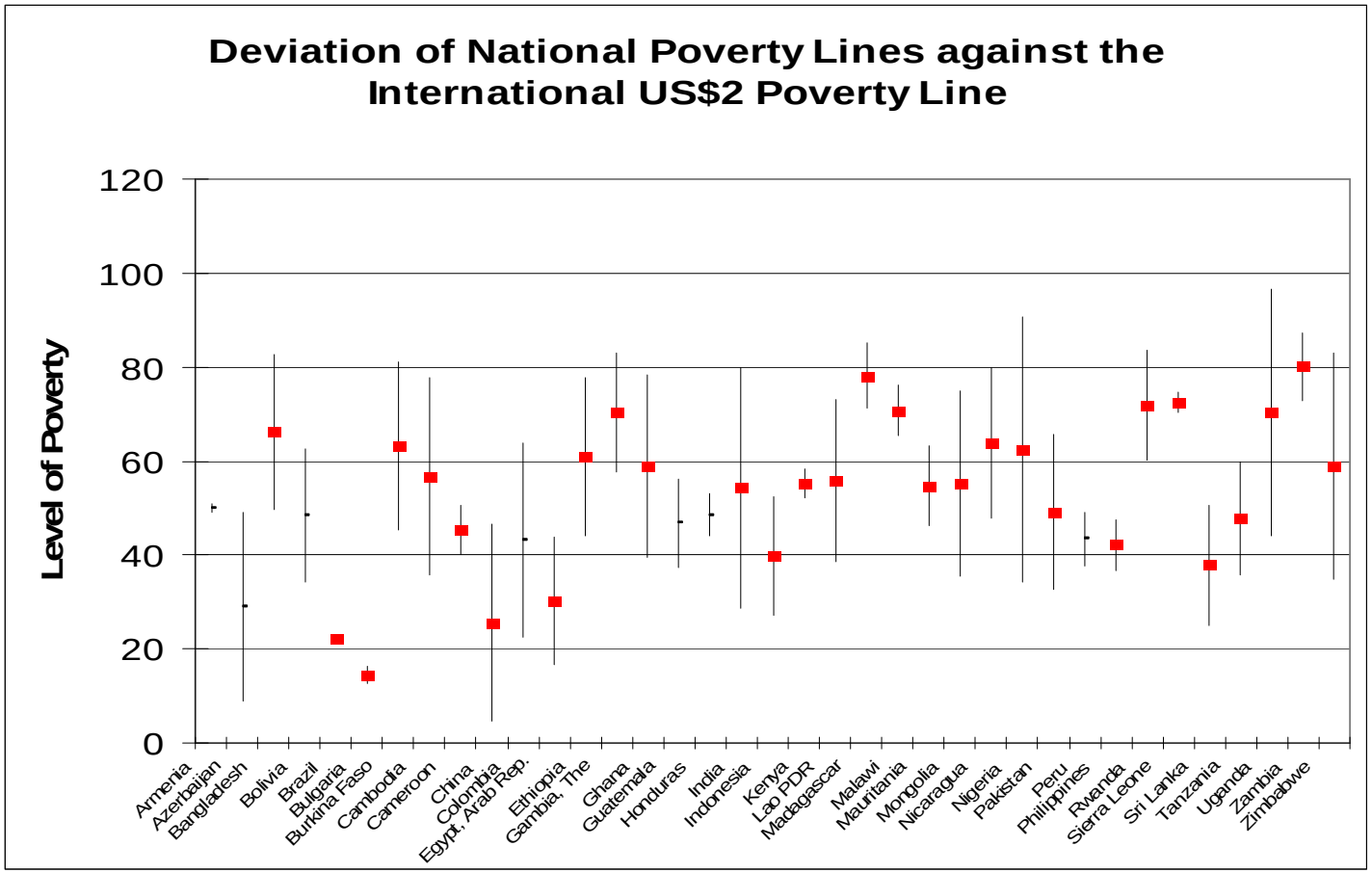
These are the numbers I used for all of the analysis except for the last section, where I examine a possible causal relationship of change in poverty to change in inequality. Red numbers indicate that the poverty estimates by the international poverty lines are higher as compared to the estimates by the national poverty lines.

Graph 1



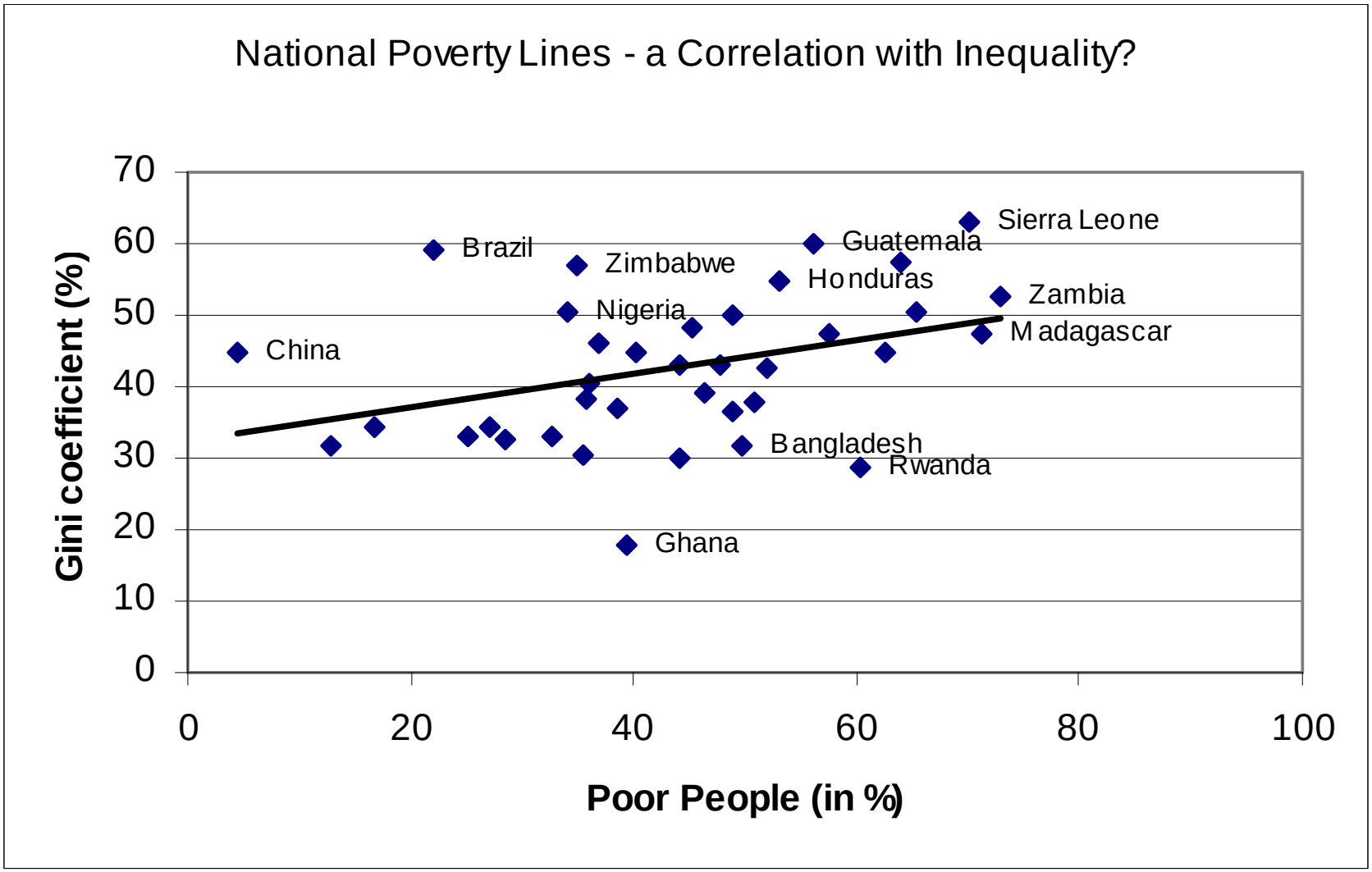
This graph shows how national poverty lines and the US$1 international poverty line can diverge. The seven countries with a red dot on the graph indicate that the international poverty line estimates a higher headcount of poverty as compared to the respective national poverty lines. In the other examples, the national poverty estimates are higher than the international ones. The detailed data can be found in table 1.

Graph 2



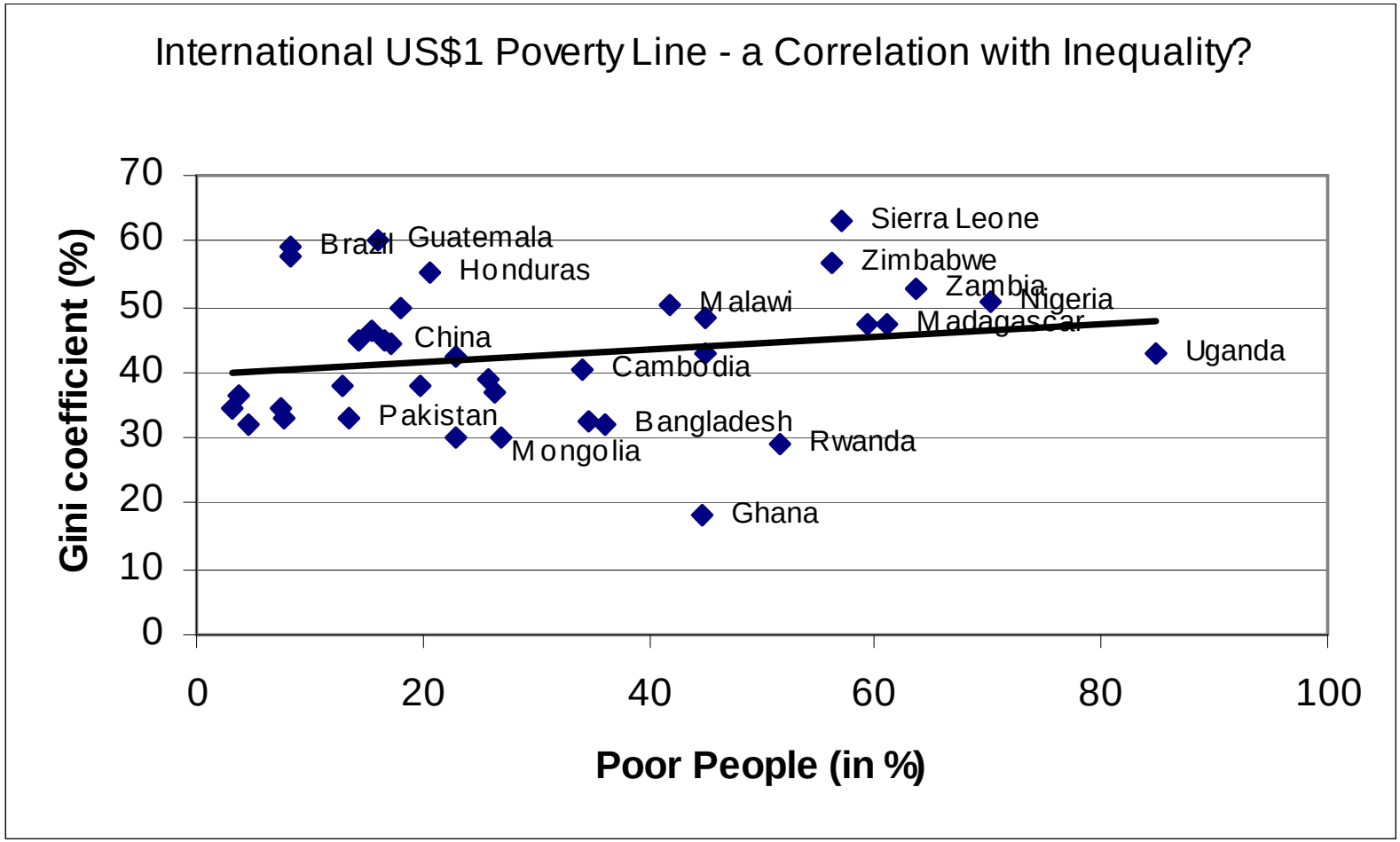
As in graph 1, but this time the US$ 2 International Poverty Line has been used. The countries without a red dot on the graph indicate that the international poverty line estimates a lower headcount of poverty as compared to the respective national poverty lines. In the other examples, the international poverty estimates are higher than the national ones. The detailed data can be found in table 1.

Graph 3



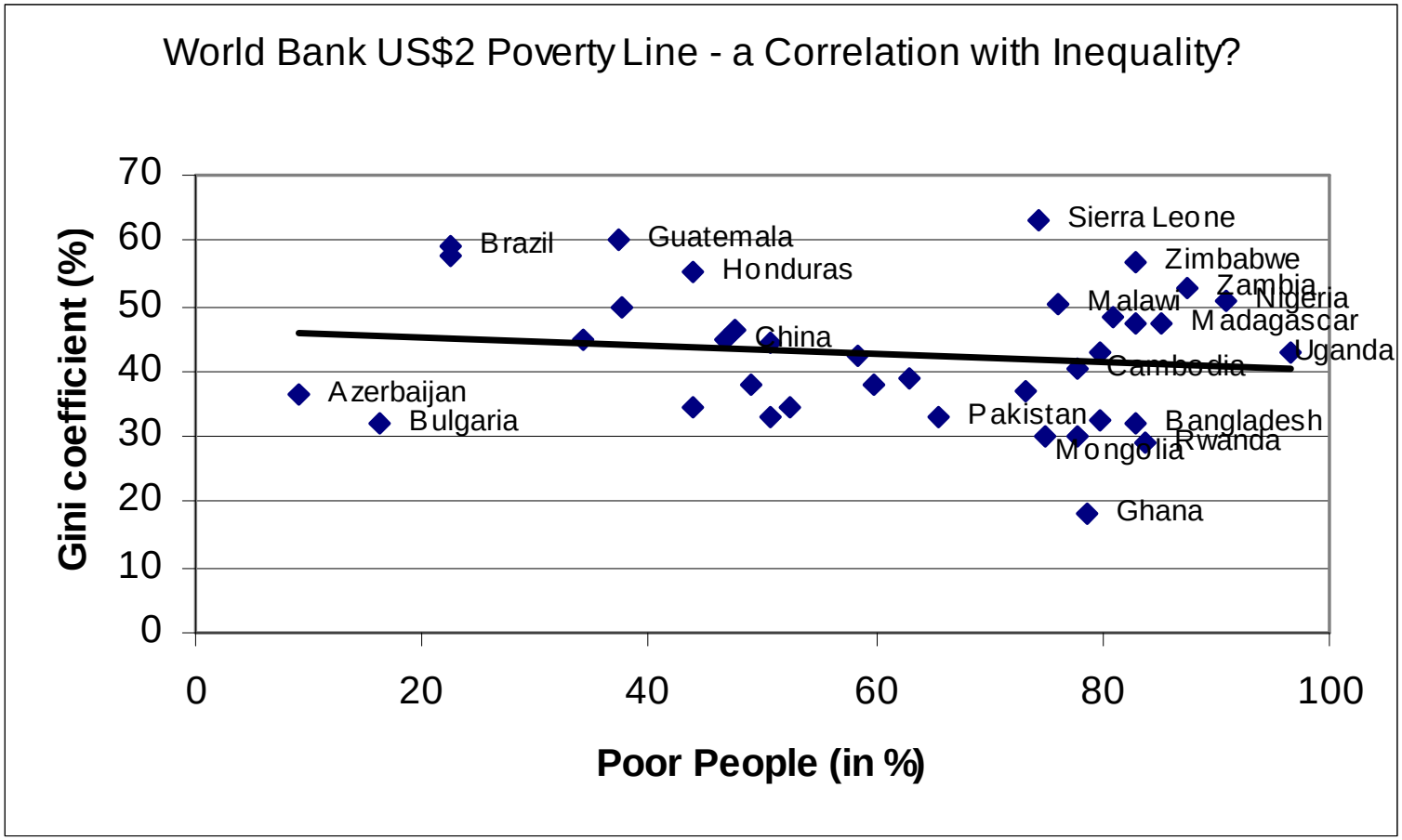
This graph (which relies on the data of table 1) shows the poverty headcount against the Gini coefficient. From this simple relationship, we can discern a light trend indicating that an increase in poverty might lead to an increase in equality and vice versa.

Graph 4



As in graph 3, but this time the international US$1 poverty line is used as poverty indicator. The ostensible correlation is already weaker, and we can identify extreme cases as Ghana, Rwanda, Sierra Leone, Brazil, Guatemala, Honduras etc. Nevertheless, it is remarkable that the countries from Zimbabwe to the right have a considerable high inequality – except of Uganda, which is still comparatively reasonable.

Graph 5



As in graph 3 and 4, but this time the international US$2 poverty line has been used. The picture is stunning. Using this poverty indicator turns a possible positive correlation into a light negative one, as many more people in the sampled countries are classified as poor. Many countries from graph 4, which had a lower amount of poor people according to the US$1 standard but a comparatively reasonable Gini coefficient, are now classified as having much more poverty. Thus, we can see that any correlation is very dependent on how the poverty line is defined. In other words, I cannot confirm of seeing any significant correlation of poverty and inequality with this data after reading graphs 3 till 5 together. This exercise has to be done with more comprehensive data and clearly demarked poverty lines.

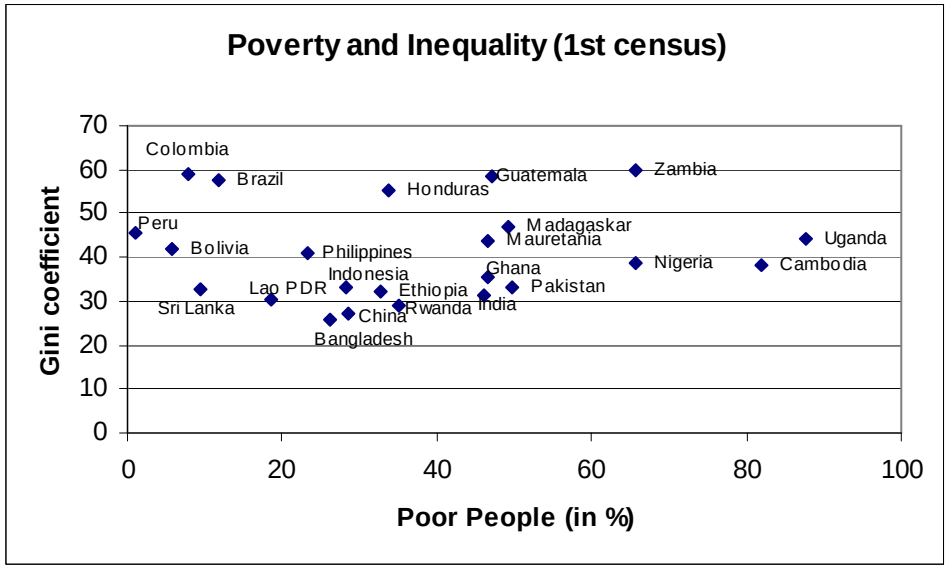
Table 2

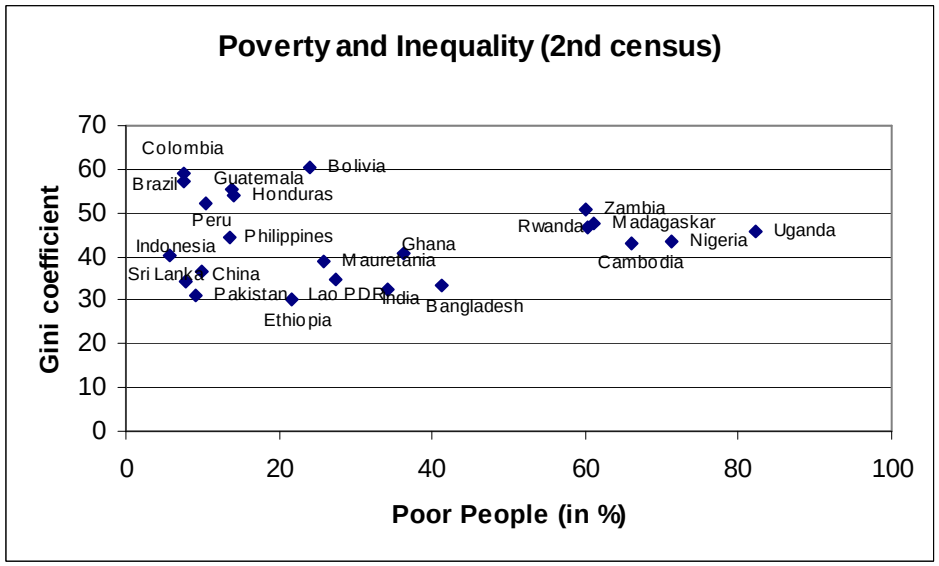
Country	Year (1st census)	US$1 headcount (%)	Gini(%)	Pop(million)	Year (2nd census)	US$1 headcount (%)	Gini(%)	Pop(million)
Bangladesh	1983.5	26.16	25.88	92.21	2000	41.3	33.42	131.05
Bolivia	1990.5	5.68	42.04	6.7	2002	24.01	60.24	8.7
Brazil	1981	11.8	57.57	124.48	2004	7.59	56.99	183.9
Cambodia	1994	82.03	38.28	10.37	2004	66.01	42.94	13.8
China	1987	28.64	27.11	809.6	2004	9.9	36.37	541.3
Colombia	1980	7.85	59.13	28.45	2003	7.63	58.83	*
Ethiopia	1981.5	32.73	32.42	38.8	2000	21.6	30	64.3
Ghana	1987.5	46.51	35.35	14.2	1998.3	36.17	40.75	18.45
Guatemala	1987	47.04	58.26	8.3	2002	13.93	55.34	11.7
Honduras	1986	33.74	55.09	4.31	2003	14.05	53.88	*
India	1987.5	46.16	31.48	600.8	2004.5	34.33	32.49	772
Indonesia	1987	28.15	33.12	169	2002	7.78	34.3	211.8
Lao PDR	1992	18.57	30.4	4.35	2002	27.37	34.67	5.5
Madagascar	1980	49.18	46.85	8.87	2001	61.04	47.47	15.98
Mauritania	1987	46.67	43.94	1.9	2000	25.94	39.04	2.66
Nigeria	1985.5	65.72	38.68	83.2	2003	71.18	43.6	*
Pakistan	1987	49.63	33.35	100	2004.5	9.03	31.18	152.1
Peru	1985.5	1.14	45.72	19.49	2003	10.53	52.03	*
Philippines	1985	23.42	41.04	54.23	2003	13.49	44.48	*
Rwanda	1984.5	35.01	28.9	5.8	2000	60.29	46.68	8.51
Sri Lanka	1985	9.39	32.47	15.48	2002	5.77	40.18	19
Uganda	1989	87.67	44.36	15.77	2002	82.28	45.77	26
Zambia	1991	65.65	60.05	8.02	2004.3	60.04	50.74	11.5
Mean		36.89	40.93			30.92	43.97	
Median		33.74	38.68			24.01	43.6	

Source: The PovcalNet Database, published from the World Bank. Online at http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp
** For unknown reasons, PovcalNet did not list any population numbers for the 2nd census within these nations.*

This table contains the data that has been used for the graphs 6 onwards. Obtaining the data for China and India has been more complicated, as the data was only published with a rural/urban divide. In order to have national data, I did the following: I built aggregate figures of rural and urban data to have a national poverty headcount, as opposed to separate rural and urban headcounts. Then I took the rural and urban Gini coefficient and weighted it against the rural and urban population numbers and thus obtained a national Gini coefficient.

Graph 6 and Graph 7





In these two graphs, poverty is scattered against inequality, once with the early census, and then with the late census. While it can easily be said that absolute poverty has been reduced (at least according to the international US$1 poverty line), the question whether there was an effect on inequality needs to be drawn on another graph (8).

Graph 8

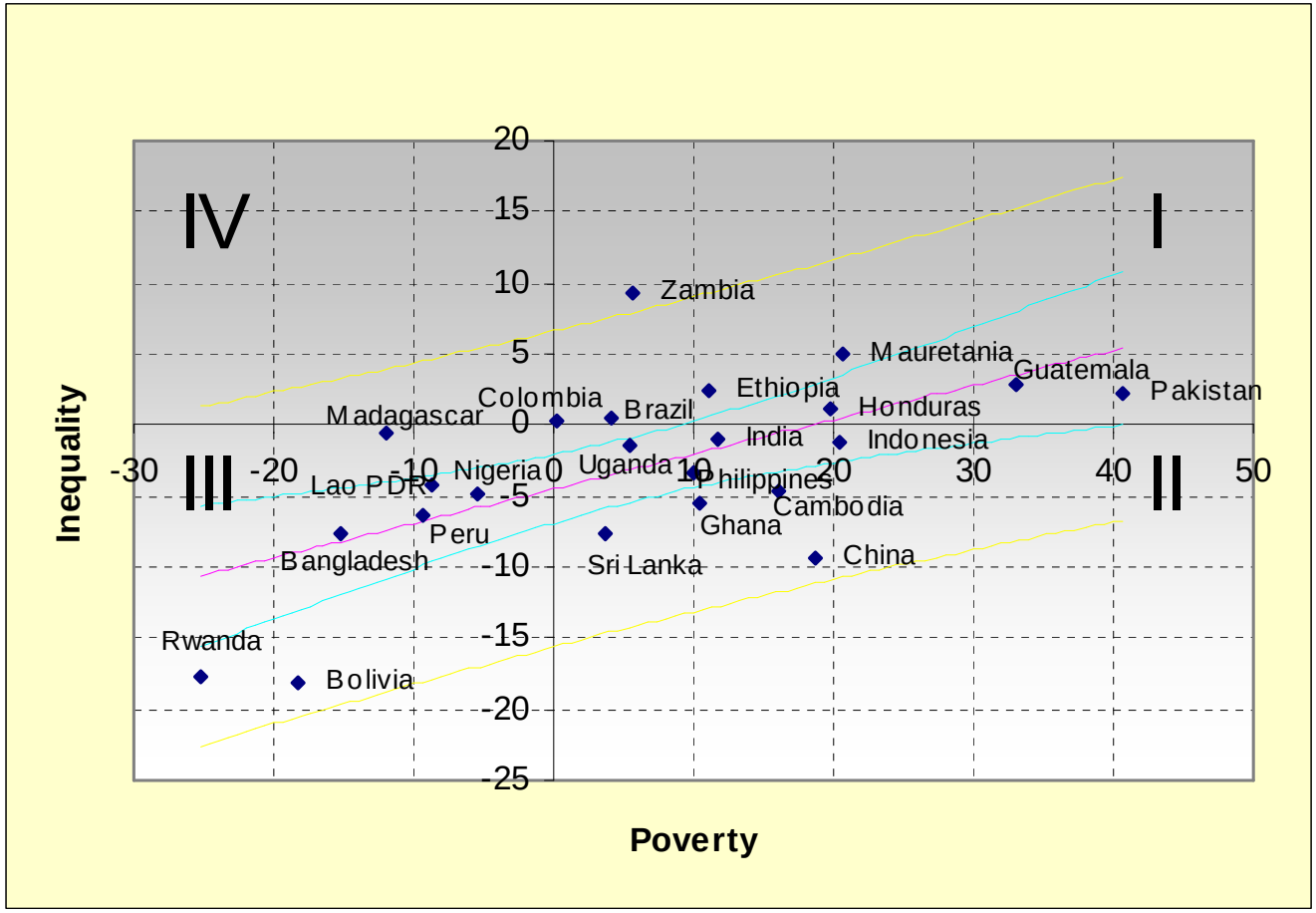


Table 3

	%-point change in Poverty	Inequality
Bangladesh	-15.14	-7.54
Bolivia	-18.33	-18.2
Brazil	4.21	0.58
Cambodia	16.02	-4.66
China	18.74	-9.27
Colombia	0.22	0.3
Ethiopia	11.13	2.42
Ghana	10.34	-5.4
Guatemala	33.11	2.92
Honduras	19.69	1.21
India	11.83	-1.01
Indonesia	20.37	-1.18
Lao PDR	-8.8	-4.27
Madagascar	-11.86	-0.62
Mauritania	20.73	4.9
Nigeria	-5.46	-4.92
Pakistan	40.6	2.17
Peru	-9.39	-6.31
Philippines	9.93	-3.44
Rwanda	-25.28	-17.78
Sri Lanka	3.62	-7.71
Uganda	5.39	-1.41
Zambia	5.61	9.31
Mean	14.16521739	5.10999288
Median	11.83	4.27

This graph shows the change in poverty and inequality of the 2nd census, as compared to the first census. While no country is located in Quartile IV, eight countries are clustered in Quartile I, another eight in Quartile II and seven in Quartile III.

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