Does Economic Growth reduce Poverty?

An Empirical Analysis of the Relationship between Poverty and Economic Growth across Low- and Middle-income Countries, illustrated by the Case of Brazil

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ABSTRACT

Extreme poverty is a reality facing over a billion people, and a striking contradiction is that huge disparities coexist with a relatively rapid economic growth. This thesis investigates whether economic growth reduces poverty. Through an empirical cross-sectional regression, it analyses what impact economic growth has on poverty, and what structures that possibly preserve these phenomena. The theories of Dual Economy and Human Capital are used to explain such structures that cause poverty to coexist with growth. Brazil is an example of a dual economy whose recent history is characterised by successful economic and public policies that have managed to reduce the level of extreme poverty. Structures of dualistic labour markets contribute to the preservation of the extreme poverty, thus they do have some explanatory power of the coexistence of poverty and growth. The main conclusion from the empirical results is that economic growth does indeed reduce poverty. Also the level of poverty is strongly related to decrease of poverty, in such a way that a high level of poverty is associated to a slow decrease of poverty. However, economic growth does not appear to be sufficient a tool when the level of extreme poverty is high, suggesting that well-designed policies and investments in education are needed to obtain an inclusive, pro-poor growth and thus reduce the level of extreme poverty.

Keywords:

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1 INTRODUCTION

1.1 Background to the Study

The world is marked by massive inequalities. The effects of the disparities are multifaceted, and they are constantly present in the interplays between countries, regions, and the whole globalised world with its markets, trade patterns and political structures. But it also affects people's lives, their daily interaction, their capabilities and empowerment. Not least it affects the great part of the population that lives under extreme poverty. Economic development is believed to be the key to overcome these problems, and is seen as the main objective of the world's economies.[1] It is a complex issue that can be defined as improvement of welfare, and the focuses have developed as the views of development have done so. With the turn of the new millennium, the world has experienced structural changes, and countries across the world have managed to reduce the fraction of poor, hand in hand with the increased economic growth. Today there is a great challenge in explaining the contemporary economic developing processes, and one of the greatest contradictions is the fact that many countries do experience economic growth, but yet they suffer from the severe bearings of poverty. But when focus shifts from growth to one of the greatest problems it is aimed to reduce, it opens up for questions. *Does economic growth reduce poverty?* Or are economic policies necessary instruments to redistribute the additional resources from the increased per capita GDP?

To empirically prove what correlation between poverty and growth there is, there are basically two approaches. On the one hand there is an affirmative answer; *yes, economic growth does reduce poverty.*[2] People with this view are convinced that growth creates opportunities that are advantageous for nations at an aggregate level, including people with small material resources. On the other hand there is a negative attitude; *no, economic growth does not by itself reduce poverty.*[3] This way of thinking does generally not neglect the impact of economic growth, but sees it as only one of many conditions for poverty reduction. This approach does not believe that the gain from increased productivity automatically trickles down to the poorest. Here the question of economic policy is raised; an instrument to distribute the output generated from the growth so that it benefits people at all societal levels.

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[1] Ray, 1998, p. 5
[2] One example of a study that will be brought up in section 2 is Dollar, et al. 2013.
[3] One representation of this view is Basu, 2013, to be presented in section 2.

Which approach fits best with reality? A step in the right direction is to identify the structures that maintain a gap between the rich and the poor. The worldwide disparities and the fact that over one billion people live on less than $1 a day[4] prove a tremendous human failure. Reducing poverty is an acute accent for the globe to tackle, and to reach universal equity it is of inestimable interest to study what phenomena that need to be fought, and what tools that should be used in order to reduce poverty, or rather; eradicate it.

1.2 Research Question

Does economic growth reduce poverty?

1.3 Study Objective

This thesis aims to investigate whether there is a relationship between extreme poverty and economic growth across low- and middle-income countries. How come a great number of countries face a relatively rapid growth in per capita GDP, while simultaneously suffering from a huge level of poverty? The goal is to show empirically if economic growth has a reducing impact on the level of extreme poverty, thus some relevant theories will be examined. Focus will lay on the theory of Dual Economy, on whether dual structures and human capital have any explanatory power to the structures that cause poverty to coexist with growth. To try to incorporate the complexity surrounding poverty reduction, the analysis will be illustrated by the case of Brazil, a relatively fast-growing middle-income country that has managed to reduce its level of extreme poverty but still has considerable measures to take.

1.4 Methodology

This thesis will investigate whether economic growth reduces poverty by comparing the economic development in 123 low- and middle-income countries across the globe over a period that covers the preceding decade, 2000-2009. An econometric cross-sectional regression analysis will be conducted. The dependent variable will consist of yearly percentage change in poverty, using the headcount ratio. The independent variables that will be included are economic growth, level of poverty, initial level of GDP per capita, education, employment in industry, and public spending on education. This will be based on secondary data collected from recognised institutes and organisations like The World Bank, UNDP and

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[4] PovcalNet, 2013. "An introduction to PovcalNet"

PovcalNet, and from this material the relationship between poverty and economic growth will be analysed. As a complement to the general results, the case of Brazil will be presented.

1.5 Scope of the Study

This thesis will focus on the measureable, quantitative dimensions of poverty and not on the qualitative aspects, this in order to facilitate cross-country comparisons from the regression. For the same reason it will exclusively look at absolute poverty measures. Investigating income distribution and relative poverty would be relevant and surely interesting, but it lies beyond the scope of this thesis. Solely data on low-income, lower middle-income and upper middle-income countries will be used.[5] 123 economies will be included in the sample, selected as there is available data on almost all the chosen variables for the selected years.[6] As focus in this study is on the relationship between extreme poverty and GDP per capita growth, high-income countries are excluded because the structures in these countries are assumed to be different enough for demanding other explanations. As it aims to come up with an empirical analysis of possible structures that explain the coexistence of poverty and growth, the theory of the Dual Economy is considered, which characteristics are incorporated as proxy variables in the regression. However, it only treats flows of labour and output between the sectors within countries, and not the trade and migration between countries. The thesis treats the preceding decade and the data is collected between the years 2000-2009, a period marked by relatively large economic changes. The regression analysis is followed by the case of Brazil, based on the empirical findings, but extended to show data from the earlier decades.

1.6 Thesis Structure

The first section reviews previous studies related to the research question and relevant theories. The theoretical part is next, laying the groundwork to this thesis. The meaning and impacts of poverty are being explained, as well as ways to measure it. Then a description of the theory of Dual Economy is provided, and by including the human capital model, this will

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[5] By classifying economies as low, middle or high income countries based on their gross national income, GNI, a more depictive and up-to-date categorising is obtained than if using the terms developing and developed countries. For this reason the term developing country will not be used throughout this thesis, even if it is used in the original source. For further discussion on this, see the World Bank, 2013, "How we classify the countries".

[6] Firstly the selection was made from the PovcalNet's database, the World Bank's poverty analysis tool, of low income, lower middle income and higher middle income countries. Of these 125 countries, two were removed: Bulgaria, since it has data on the headcount ratio for only one year, making it impossible to calculate change the chosen poverty measure for this thesis, and West Bank and Gaza, for lacking data on six of the chosen variables.

be connected to poverty and growth. The case of Brazil is treated to enable more perspectives and a more comprehensive analysis. The empirical analysis is the subsequent section, presenting the regression model through data and specification for the chosen variables, followed by the results. This will lead up to the final conclusions. After this the references are presented, and the Appendix provides relevant information about the data and the regression.

2 PREVIOUS STUDIES

"Growth Still is Good for the Poor" is the title of a recent study that delivers the conclusion that economic growth is of fundamental importance for poverty reduction, and that it is very difficult to identify specific macroeconomic policies that can be significantly linked to the relative growth rates of those in the poorest quintiles.[7] The authors' evidence is that incomes in the poorest two quintiles on average increase at the same rate as overall average incomes. This is based on a global dataset covering 118 countries over the past four decades,[8] showing that changes in income shares of the poorest quintiles generally are small and not correlated with average income changes. Likewise, the variation in changes in quintile shares is small relative to in average incomes, indicating that the latter relationship is accountable for the major part of the variation in income growth in the poorest quintiles. This is true for most of their examined regions and time periods. To capture any possible effect on growth in incomes of the poor from other sources, proxies for different policies or institutions are included. The authors conclude that most of the variables are not significantly correlated with income share of the poorest quintiles, due to average growth. In sum, about 75% of the variation in growth rates of income of the bottom 20 or 40%, across countries and over time, can be explained by variation in growth rates of mean income, while the rest is from quintile share changes.

Dollar et al. start by presenting some striking statistics of the absolute poverty levels over the last three decades, the share of the population in the world that lived below the $1.25 a day poverty line: in 1980 it was 52%, in 1990 42%, and in 2010 21%. This substantial reduction is deduced to the rapid growth in all regions across the globe, and particularly in large countries that were initially poor, like China and India. Based on this, they argue that it has become less relevant to use these kinds of low absolute poverty lines, as only a small part of the population in many developing countries lives below this severe threshold. This is why the World Bank

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[7] Dollar et al. 2013.
[8] This data relies on the PovcalNet database of the World Bank for "developing countries", and the Luxembourg Income Study (LIS) data for "advanced economies" (using their expressions).

has developed a new focus, beyond the absolute poverty standard, that traces the "shared prosperity", that is, the growth rate of incomes in the bottom 40% of households.

It is here the article by Basu, "Reason and the end of poverty" offsets, with these new goals of the World Bank, of ending extreme and chronic poverty in the world by 2010, and promoting shared prosperity.[9] It is written as a counter reaction to the study above. Basu asks:

> "Will the benefits of economic growth trickle down on their own, reaching all, or will we need targeted redistributive policies?"[10]

According to Basu, the reason why many people stay in the "growth-only camp" is due to an error in deductive reasoning, based on ideological conviction and not on actual evidence. He directly criticises the empirical conclusions of Dollar et al. that economies' overall income growth was the driver of the recent poverty reduction, as it makes people make the wrong conclusion that direct government policies are of little importance. To illustrate how this deduction lacks logic, Basu uses the example of an economist who, in 1930, conducted a study of what cured infectious diseases, finding that 98% of all treatable illnesses were cured by non-antibiotic, traditional medicines, which should be valid right after the discovery of penicillin. But arguing that it consequently is bad to give patients penicillin would be a wrong deduction, as it does not show that penicillin does not work. The point is that creating evidence that does not exist is a common mistake. Regarding poverty reduction, theory and evidence show that policy interventions can be an important matter when skilfully designed. Successful policies exist, but others must still be invented, referred to as "the antibiotics of our time". An example of such a policy that would benefit all is a public-private partnership in which the state gives a subsidy directly to the poor, who use it to buy food directly from private farmers and traders. Improved nutrition combined with good schooling and health services increases poor people's productivity. The article ends with a concluding remark:

> "Overall economic growth is important, but the poor should not have to wait until its benefits trickle down to them; with the right anti-poverty policies, governments can encourage trickle-up growth as well."[11]

Basu produced a paper about the relationship between globalisation, poverty, marginalisation and inequality, within and across countries, that also aims to ask policy questions about what should be done. He comes to the conclusion that globalisation and global inequality are inter-

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[9] Basu, 2013. Kaushik Basu is the chief economist and senior vice president of the World Bank.
[10] Basu, 2013.
[11] Basu, 2013.

connected, and as a consequence of this, alternative policies that fight extreme poverty and inequality need to be of a global, cross-country character. As such policies do not exist, the study encourages for the establishment of an international initiative to coordinate this kind of policies.[12] The paper starts with a comparison of two extreme conditions to depict the severity of global inequalities: the ten richest people together possessed a net worth of $217 billion in 2002, while the total GDP of Tanzania the same year was $10.15 billion, with a population of 35 million. The gap between the richest and the poorest is very hard to grasp, but with the statistics Basu emphasises that the amount of inequality and the extent of poverty, irrespective of the debate on whether it has risen or not, is unacceptable. Two suggestions for policy making are presented. The first is "equity for workers"; to give workers claims to a part of corporate equity income. The idea is that the poorest take part in the profits earned by firms, as a fraction of equity in firms should be on behalf of people in the poorest category. The second policy is a new international organisation for coordinating equitable development and inter-country anti-poverty policies, like WTO or ILO when related to trade or labour market policies, so that anti-poverty programs can be globally coordinated in a successful manner.

> "Despite substantial differences in their views of the appropriate policy response to the existence of poverty, neither the proponents of dual market theory nor its critics have proposed potentially conclusive tests of the dual market hypothesis."[13]

These words initiate the paper "A Test of Dual Labor Market Theory"[14] which presents a test of the two central propositions of dual market theory, which are: 1) the existence of two distinct labour markets with different wage setting mechanisms, and 2) the existence of barriers to mobility between the labour markets. The authors find substantial support for both hypotheses. Based on their approach of considering the distribution of wages and worker attributes, they manage to make conclusions in a noncircular manner, which they held was common among earlier studies within this field. Dickens and Lang use two distinct wage equations, one for the "primary" sector and one for the "secondary", as the dual market theory suggests. The primary is similar to the standard human capital regression with significant returns to education and experience, while the other equation is flat without returns to human capital, where wages are low and there exist noneconomic barriers, preventing at least some secondary workers from obtaining jobs in the primary sector. Their interpretation of the

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[12] Basu, 2006. "Globalization, Poverty, and Inequality: What is the Relationship? What Can Be Done?"
[13] Dickens and Lang, 1984. "Abstract"
[14] Dickens and Lang, 1984.

results provides empirical support for the dual market hypothesis as well as for theoretical work on efficiency wage models. In addition, they present evidence that some non-white workers are unwillingly restricted to the secondary market, resulting in considerable white/non-white wage differences.

3 THEORETICAL DISCUSSION

In this theoretical section, the meaning of poverty will be explained, how it can be measured and its functional impacts. The theory of Dual Economy will then be presented in order to try to visualise the contradictory fact that many countries are facing a relatively fast economic growth while a huge part of the population is poor. The final part is about Human Capital and its impacts on growth, to search for possible causality between poverty and economic growth.

3.1 Poverty

> "There is little excuse for living with poverty today. Considering that the world has generated significant growth in per capita income, its track record on poverty is pretty dismal."[15]

Poverty is a multidimensional phenomenon. The view of what it means, what causes it and how to battle it has shifted over the course of time. Poverty can be defined as "the condition of having little or no wealth or few material possessions"[16] or "whether households or individuals have enough resources or abilities today to meet their needs".[17] When someone has a life standard that is unacceptably low, her situation can be formulated in absolute numbers as survival and basic needs. Beyond this focus on physical capacity, it has been widened to include intangible properties; literacy, health, social relations, living, nutrition etc. Poverty studies from the 1980s observed dissimilarity between the way experts and people defined poverty, which led to methods aiming to find an accordant definition.[18] Income poverty is what most is commonly referred to, typically measuring families, so economists try to identify families whose income is below the minimum acceptance level.[19] Differences within households are however huge; women and elderly are discriminated, and children consume and earn less than adults. So the ideal estimates of poverty at macro level are the ones that are complemented with micro studies.

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[15] Ray, 1998, p. 250
[16] OED Online, 2013, "poverty, n."
[17] The World Bank – Poverty Reduction & Equity – Measuring Poverty
[18] Nationalencyklopedin, 2013, "fattigdom"
[19] UNESCO – Social and Human Sciences – Poverty

Poverty can be defined in absolute or relative terms. *Absolute poverty* measures poverty as the sum of money needed to meet the basic needs. *Relative poverty*, on the other hand, is the failure in living up to the economic status that is standardised in a certain social context, so that poverty leads to social exclusion. Both absolute and relative poverty are criticised for being too concerned with income and consumption, and the absolute poverty measure has been criticised for being too purely economic and for not concerning aspects such as quality of life or inequality.[20] Yet the absolute perspective is used throughout this thesis, because it is accurate to make comparisons about the levels and rates of change of absolute poverty.

3.1.1 Measuring Poverty

Poverty reduction has turned out to become an international urgency, but still there is no consensus on how to measure poverty.[21] According to the World Bank, there are three components to construct a poverty measure. Those are: 1) Define the relevant welfare measures; 2) Choose and estimate a poverty line; and 3) Choose and estimate a poverty indicator. When focusing on monetary dimensions of poverty, a *welfare measure* can be either based on income or consumption. Most specialists prefer consumption measures, since they refer more directly to a person's well-being, while income is only a capacity to consume. Another aspect is that measuring income is complicated in societies with large informal sectors or self-contained farmers.[22] A *poverty line* is a threshold access to goods and services below which persons are classified as poor. This line is the minimum level of economic participation that is acceptable in a certain time and place,[23] and it can be both monetary, e.g. consumption or income based, or non-monetary, e.g. literacy based; both absolute, e.g. measuring costs of basic food needs, or relative, measuring income distribution. Different lines can be combined, and the levels can vary between different countries.[24] As stated, this thesis uses an absolute poverty line, since a relative one is easily confused with inequality, which lies beyond the scope of this study. Even absolute poverty lines do however include some relative notions of what sets up basic needs or necessities.[25] Lastly one chooses a *poverty indicator* which is compared with the poverty line to create the poverty measure's statistical function. There are various indicators, but the most commonly used are the

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[20] Ray, 1998, p. 252
[21] UNESCO – Social and Human Sciences – Poverty
[22] The World Bank – Poverty Reduction & Equity – Defining Welfare Measures
[23] Ray, 1998, p. 250
[24] The World Bank – Poverty Reduction & Equity – Choosing and Estimating a Poverty Line
[25] Ray, 1998, p.251

headcount ratio, the poverty gap and the squared poverty gap. The *headcount ratio* is the relative incidence of poverty; the share of the population with income or consumption below the poverty line.[26] This measure is widely used, but it has a drawback: it says nothing about the extent to which individual income or expenditure falls below the poverty line, making poverty appear as an "all or nothing concept", which it of course is not.[27] Despite this, the headcount ratio is the measure that represents poverty in this thesis, but the others are worth mentioning. The *poverty gap* handles the problem that the headcount does not, namely the depth of poverty; the average income or consumption shortfall from the poverty line. One adds up all shortfalls of the poor and divides the total by the population, which shows the resources needed to get all poor people to the poverty line and thus eradicate poverty. The *squared poverty gap* measures the poverty severity by including the inequality among the poor by putting higher weight on the households whose distance to the poverty line is greater. Both these measures can be used for non-monetary indicators, but then there are some limitations for them to make sense.[28]

It is of high importance to choose the welfare measure, line and indicator in an accurate way, as it can affect the statistical results.[29] Complex concepts are complex to measure, and it was decided to use the poverty headcount ratio based on the poverty line of $ 1,25 (PPP), which is the notion of extreme poverty, and is the mean of the national poverty lines in the poorest 15 countries in the world.[30] The exchange rate method is used and it converts each country's local currency into a common currency, usually U.S. dollars, and divides by that country's population. Exchange rates are used to reflect the differences in prices of goods and services, and to facilitate a cross-country comparison. The purchasing power parity method (PPP) constructs international prices and thus tries to adjust for the problematic fact that different countries have different price levels. This thesis includes only low- and middle-income countries, and poor people in poor countries can be called "twice cursed", both for living in countries that are poor on average, and for the high levels of inequality within these countries.[31] This feeds back on the importance of seeing poverty and underdevelopment in both a global context and in an internal, structural one.[32]

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[26] The World Bank – Poverty Reduction & Equity – Choosing and Estimating Poverty Indicators
[27] Ray, 1998, p. 254
[28] The World Bank – Poverty Reduction & Equity – Choosing and Estimating Poverty Indicators
[29] The World Bank – Poverty Reduction & Equity – Measuring Poverty
[30] PovcalNet, 2013, "An introduction to PovcalNet"
[31] Ray, 1998, p. 10, 22, 43
[32] Ray, 1998, p. 4

3.1.2 The Functional Impact of Poverty

Poverty is of intrinsic as well as functional significance. Few would disagree on that poverty reduction is an essential goal of economic development, and the intrinsic concern makes it vital to consider the characteristics of the poor and the suitable measure of poverty, which is the only way to create policies that are sharply targeted toward the poor.[33] Poor people are empirically shown to have many characteristics in common. Poverty is correlated with lack of education and low levels of human capital. In general, families are large with many children and live to a greater extent in rural areas, but the ones who live in urban areas work in the informal sector. They lack ownership of productive assets, and suffer from undernutrition, which reduces muscular strength, resistance to disease, and the capacity of doing productive work. Yet another feature is that poor people lack access to markets, most importantly the markets for credit, insurance, land and labour, which are outcomes from absence of collateral, moral hazard, incomplete information, and imperfect access to the labour market. This generates a vicious circle, as low levels of wealth prevent people from making productive educational choices, as they cannot fund their education by loans. This contributes further to lower work capacity. All these features are fundamental implications of unequal distributions of income and wealth which creates poverty, and except for being important in its own right, poverty influences the economic performance, including the rate of economic growth.[34]

> "Inequality has a built-in tendency to beget inefficiency, because it does not permit people at the lower end of the wealth or income scale to fully exploit their capabilities."[35]

This brings about the existence of uneven growth, meaning that economic development causes fast growth for some parts of the economy, while other parts are left behind. The structural transformation that is the basis of this takes us to the next section.

3.2 The Dual Economy

3.2.1 The Functioning of the Dual Economy

The theory of the Dual Economy is essential to our understanding of what preserves poverty. An economy is dualistic when it has a bisectional labour market, divided in two sectors; one rural and one urban. This distinction is alone the most important structural feature of low- and

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[33] Ray, 1998, p. 249-250
[34] Ray, 1998, p. 5, 237, 256-267, 289
[35] Ray, 1998, p. 237

middle-income countries, in which typically a great majority lives in the rural areas, with agriculture as main occupation. The *rural sector*[36] is often described as backward, stagnating, labour-intensive, uses older techniques of production, and refers to "traditional" forms of economic organisation. This is a generalisation, but it is important to note that agriculture commonly works as a massive informal sector, with untaxed output and great difficulties in implementing welfare policies, like minimum wages, pension schemes, unemployment benefits, safety standards etc. Not surprisingly, this sector is the one where poverty is more widespread. Then there is the *urban sector*[37], seen as the driver of economic development. It is progressive, capital-intensive, produces manufactured commodities, uses new technology, and organises production on capitalist principles, pursuing economic profit. This description is only valid for the formal sector, but there is another form of urban economic activity, namely the *informal sector*, holding a big fraction of the population in low- and middle-income countries. The informal sector is excluded from rules and regulations imposed by the government, and from the unions' bargaining for benefits that cause a higher worker utility.[38]

Another vital characteristic of low- and middle-income countries is that there are large transfers of people from relatively poor to relatively advanced sectors proceeding along with economic development. This means that agriculture works as a supplier of labour to industry, but also as a supplier of food, meaning that it must manage to produce a surplus. In fact agriculture is often the main demander for the industrial products.[39] Ray puts it this way:

> "development proceeds by the advanced sector feeding on the backward sector for resources to propel its own growth."[40]

Lewis was the one who first traced a view of development based on the rural/urban interaction by creating the idea of a dual economy.[41] Ever since then, many economists have used and developed this theoretical notion. Harris and Todaro wrote "Migration, Unemployment and Development" in 1970, which is the base of the classic theory of rural-urban migration. They stated that it was a counter-reaction against the standard economic models focusing solely on reaching a full employment equilibrium by adjustments of wages and prices. They perceived that these models could not accurately explain the contemporary rural-urban migration that

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[36] Also appears under names like agricultural sector, traditional sector, subsistence sector and secondary sector.
[37] The urban sector is also called the manufacturing sector, the industrial sector, the modern sector, the capitalist sector and the primary sector, among others.
[38] Ray, 1998, p. 210, 345, 372
[39] Ray 1998, p. 353
[40] Ray 1998, p. 210
[41] See Lewis' work "Economic Development with Unlimited Supplies of Labor", 1954.

already at that time was occurring across low- and middle-income countries at an accelerating speed, creating large urban unemployment as economies do not contain absolute labour redundancy. They pointed out that the absence of a suitable analytical model often leads to vague descriptions of the phenomenon, such as the city's "bright lights" attracting farmers like a magnet.[42]

3.2.2 The Harris-Todaro Model of Rural-Urban Migration

Harris and Todaro formulated a two-sector internal trade model of rural-urban migration, triggered by wage gaps between the two sectors. The model identifies a minimum urban wage that is politically set and considerably higher than agricultural earnings, and then it investigates its impact on the rural people's economic behaviour.[43] The principal idea is that the formal urban sector pays high wages, due to regulations, unions, and to attract the most qualified workers and push for effort, and it is these high wages that cause urban unemployment. As a group of people is prevented from being absorbed into the formal sector, because of the high wages, it turns to the informal sector, or becomes unemployed. That sector, as well as the rural one, has low wages that fluctuate by supply and demand.[44]

The basic model starts by assuming two sectors in the economy: a rural sector with Agriculture, *(A)*, and a formal urban sector, *(F)*, whose labour forces are pictured on the horizontal axis and wages on the vertical axis in Figure 3.1 and 3.2, with two downward sloping "absorption curves". The formal urban wage rate is not perfectly flexible, but fixed at a too high level. Figure 3.1 shows that the too high wage *($\bar{w}$)* leads to fewer employed in the urban sector *($\bar{L}_F$)*, so for full employment in both sectors, wage in agriculture must fall *($\underline{w}$)*. But as the wages differ and both sectors have full employment, workers will desire to migrate to the sector with the higher wage, meaning that it does not represent an equilibrium state. Then again, by setting wages equal across the two sectors does not create an equilibrium state either, since there would be a pool of unemployed people (*U* shows its size). This is because of the assumed flexible wages of agriculture, meaning that the unemployed would rather enter this sector and then lower the wages. So these workers decide to migrate to the urban formal sector, although wages are the same and there is vast risk of unemployment. This does not describe the final outcome, but rather what the equilibrium might look like.

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[42] Harris and Todaro, 1970, p. 126
[43] Harris and Todaro, 1970, p. 126-142
[44] Ray, 1998, p. 372

Figure 3.1 A floor on the formal wage   **Figure 3.2 Harris-Todaro Equilibrium**[45]
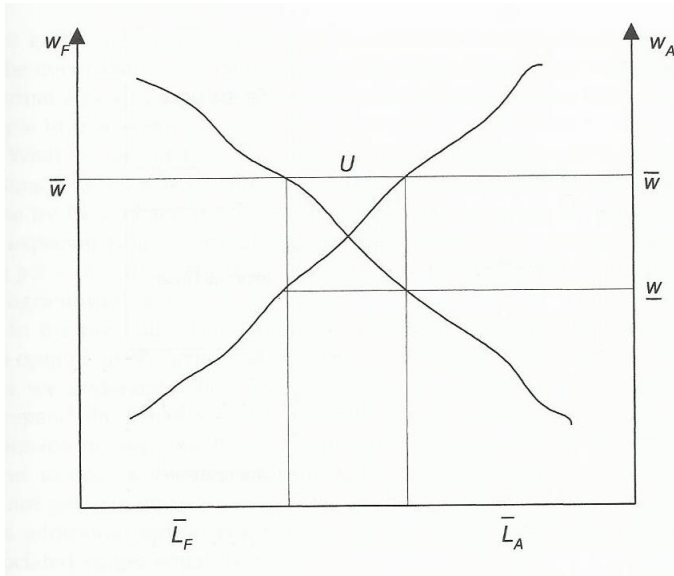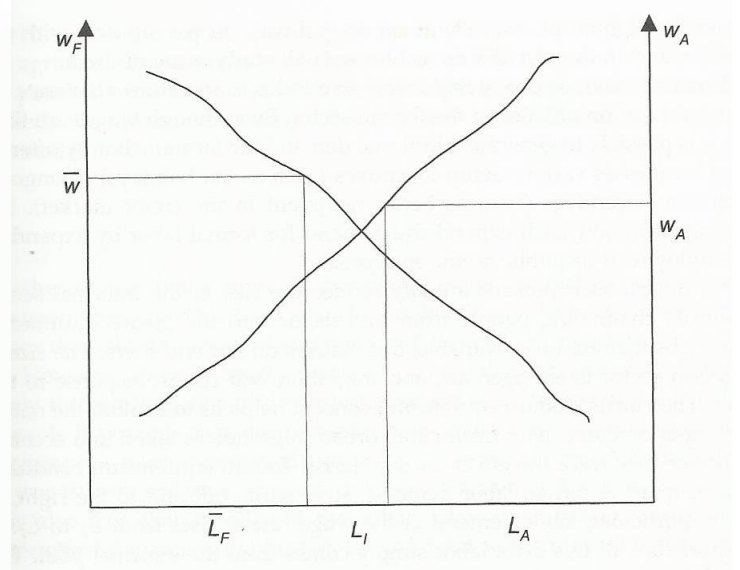
The Harris-Todaro model captures that migration emerges due to urban-rural differences in expected earnings. It is the urban employment rate that has an equilibrating impact on this kind of migration.[46] The idea is that potential migrants make a decision between staying in the agricultural sector, the safe but less favourable choice, and moving to the urban sector, looking for a formal job with high wage. If this does not succeed the person becomes unemployed or enters the informal sector. The ratio of formal job seekers to available vacancies decides the probability of getting a job in the urban sector *(p)*.[47] To calculate the expected value of the decision we weigh each outcome by its probability of incidence and add up over all outcomes, so the expected wage in the urban sector is *p$\bar{w}$ + (1-p) w_I* which is compared to the wage in the agricultural sector *(w_A)*. Adding the probability of getting a job in the informal sector *(q)* and the risk of open unemployment *(1 − q)*, the expected value is: *qw_I+ (1 − q)0 = qw_I*. The overall expected wage is now: p$\bar{w}$ + (1-p)qw_I. By dividing the number of jobs by the number of potential job seekers, $L_F/(L_F + L_I)$ we get the ratio of the chances for an urban dweller to get a formal or informal job. Now we reach the important equilibrium concept. Migration from the rural sector is seen as a permanent decision, at least in the short run, by comparing the expected income from migration with the actual income received in agriculture. This represents the *Harris-Todaro equilibrium condition:*

$$\frac{\bar{L}_F}{\bar{L}_F+L_I}\,\bar{w} + \frac{L_I}{\bar{L}_F+L_I}\,w_I = w_A \tag{1}$$

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[45] The figures are from Ray, 1998, p. 375 and 379, respectively.
[46] Harris and Todaro, 1970, p. 126-142
[47] Ray, 1998, p. 373-377

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Before, people are indifferent between migrating and not migrating, but after, they will be very satisfied that they did migrate if they manage to get a formal job, while those who end up in the informal sector will regret it. This equilibrium concept indicates a particular allocation of labour between the three sectors since that affects the probabilities of getting a job. If it is known that the formal sector is a smaller proportion of total urban employment, people will take the decision under more consideration as their expected wage calculation has a lower wage. This will decrease the size of the urban labour force, but increase the proportional size of the formal sector, which in turn resubmits to the probability of getting the formal job. Note that the central requirement is that expected wages are equalised over the two sectors for migration equilibrium to occur, but these expectations could as well be the outcome of wages in more than two sectors.

Figure 3.2 illustrates the Harris-Todaro equilibrium. Figure 3.1 would as well serve for this purpose, but with less clearness, as the informal sector is not included. In Figure 3.2, (L_A) people are employed in agriculture, earning wage (w_A), which is between the two extremes in Figure 3.1. (L_F) people are in the formal urban sector, and the rest, (L_I), escape to the informal urban sector. The allocation is such that the equilibrium condition, equation (1), holds.[48]

3.2.3 The Dual Economy and Government Policy

According to this model, the informal sector is a result of the rural-urban migration that occurs as a reaction of the too high wages in the formal sector, and this outcome is seen as necessary to balance the formal sector's attractive force and reduce the speed of rural-urban migration. Nevertheless, from the view of the government, the informal sector is an undesirable phenomenon, as it is often related to an increase in urban problems such as unplanned growth, pollution, higher crime rates, etc. By using the model one can study what impacts different policies have on the size of the informal sector.

A clear policy is one that accelerates the absorption of labour in the formal sector, by increasing demand for formal labour by offering investment incentives. This would initially reduce the size of the informal sector, but the size of the urban sector is endogenous, so as a response to the improved conditions from this policy, migration from the rural sector would rise and hence enlarge the size of the informal one. This is called *The Todaro Paradox.* But yet it could have the positive outcome of a smaller informal sector if measured as a fraction of

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[48] Ray, 1998, p. 373-379

the total urban sector, but this is not necessarily the case, and in either way, the informal sector cannot shrink as a fraction of the total labour force. This is true since urban labour force has expanded, meaning that as an outcome from the policy that was implemented to reduce the informal sector, it can do just the opposite and increase it. This seems a paradox, but in fact it is seen in many low- and middle-income countries.[49]

Next to be considered are policies that move the economy toward an efficient allocation of labour. In equilibrium, the marginal productivities are equalised, but when the marginal products differ, a small transfer of labour from the sector with the lower marginal product to the one with higher rises the total value of national income. By having this in mind, one should rethink what the purpose of the policy is. Eradicating the informal sector is not intrinsically the goal; what is important is approaching the efficient allocation. Though this holds only in cases where both demand curves arise through competitive profit maximisation, so that they answer to the value of the marginal product.

Now two policies that reduce or remove the informal sector are to be considered. The first policy is to restrict migration, by preventing people who do not work in the formal sector to enter the cities. This will get rid of the informal urban sector, but making it work is not easy. It does not imply an efficient outcome, as it would lead to too few people in the cities relative to the efficient allocation. The second policy is of wage subsidies; to offer a subsidy to formal sector employers for every unit of labour that they hire. Again, the informal sector is removed, but the other effect is the reverse: now there is too much labour in the urban sector relative to the efficient solution. What is suggested is a mixed policy, combining migration restrictions with wage subsidies in the formal sector, carefully selected so that it reaches exactly the flexible equilibrium level.[50] Harris and Todaro aimed to prove that the rural-urban migration, after implementing this high minimum wage, will remain only as a result of economically rational choices. They wanted to show that economists' standard policies to create urban employment do not automatically result in improvement of welfare but might rather worsen it. They also intended to assess the impacts on welfare from alternative policies when it is noted that full wage flexibility does not work politically for practical ends, focusing is on how the rural sector's welfare is affected by migration with unemployment.[51]

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[49] A more specified description of the process of the *Todaro Paradox* is found in Ray, 1998, p.379-382

[50] Ray, 1998, p. 382-386. For a discussion on some of the various extensions of the Harris-Todaro model, see Ray, 1998, p. 386-395.

[51] Harris and Todaro,1970, p. 126-142

3.3 Human Capital and Economic Growth

Human capital is theoretically and empirically proven to be an engine of growth and central to economic development, and it has complemented the neoclassical model of economic growth. The main arguments for not considering the neoclassical growth model a useable theory of economic development are its obvious incapability to explain the eminent diversity across economies and its forecast that international trade should cause rapid movement toward equality in capital-labour ratios and factor prices, which is contrary to the strong, empirical facts.[52] The focus of the theory of human capital is on the way an individual allocates her time over different activities in the present period and its impact on her productivity in the future. Investments in human capital increase the general skill level and create returns to the individual, but except for these internal effects, there are external ones that are observable at an aggregate level. It augments the productivity of both labour and physical capital, and the accumulation of human capital has positive effects for whole societies. By letting these facts create a framework for economic development theory, one can judge how to create possibilities to achieve economic growth.[53]

Education is the most important measure of human capital. There are many similarities between human capital, in the shape of education, and physical capital: both need investment to create, and both have, once created, economic value. Calculating the returns to education is however more difficult, but economists assume that returns to human capital can be captured by people's wages, as higher levels of education generate higher wages. Hence the return to education can be defined as the increase in wages that a worker would receive if she had one more year of schooling. Differences in the accumulation of human capital across countries appear to stand for a relatively great part of the explanation to why some countries are rich and others are poor.[54]

4 THE CASE OF BRAZIL

Brazil has been depicted as a flourishing, upcoming country in international contexts over the last years, which there are reasons for. It is the 7th wealthiest economy in the world at an aggregate level, and between 2002 and 2009, it grew from being the 13th to the 8th country

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[52] Lucas, 1988, provides thorough review of theories on economic growth, emphasising physical capital accumulation and technological change, human capital accumulation through schooling and learning-by-doing.
[53] Lucas, 1988, p. 17-27, 35-41
[54] Weil, 2009, Chapter 6 "Human Capital"

with the largest GDP.[55] Brazil's average growth rate in GDP was of 4.4% between 2004 and 2010, triggered by a consumer-led economic boom and a prospering labour market that created over 10 million formal jobs.[56] The income growth rate between 2001 and 2009 of the poorest 10% of the population was 7% per year, while that of the richest 10% was 1.7%, which led to a fall in income inequality by 9%, measured by the Gini index of the household per capita income.[57] These two movements resulted in a rapid reduction of extreme poverty, measured by the US$ 1.25 per day poverty line, from 14% in 2001 to less than 5% in 2009.[58]

It could be argued that the positive image of this "country of the future" has been exaggerated, but nevertheless, these statistics appear even more successful when taking a closer look at its turbulent history. Until only recently, the pro-poor growth that we see today seemed like an unrealistic utopia.[59] The 1970s was an era of an authoritarian military dictatorship which accomplished high growth rates, of 8.6% per year, followed by a big increase in external public debt to finance public spending. Even though this period is called "the economic miracle", it failed to reduce social inequality as there was deficient expenditure on human capital and education. People abandoned the rural jobs seeking the fast growing industry, leading to a big increase in the industry work force, but also of the informal sector. In the growing *favelas*, townships with unplanned districts, massive urban problems arouse with lack of basic services such as schools, hospitals, treated water and sewage collection, and public transportation, problems that to a considerable degree remain today. Despite the great growth rates, the Gini index remained the same, of 0.62, during the whole regime period.

1985 was a milestone for the country: it was the end of the 21 year long period of military dictatorship, but the task to get the country up on its feet was not easy. The growth had not been based on solid measures, and the economic unbalances caused the economy rebound, leading to the "lost decade" of the 80's, marked by hyperinflation and a severe economic crisis.[60] In 1988 Brazil adopted the new Federal Constitution, and since then, social policies have been implemented to a much greater extent and with improved redistributive results.[61] After various different economic plans, the country introduced the currency Real in 1994.

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[55] IMF, 2011.
[56] Ferreira de Souza, 2012.
[57] The World Bank. 2013. "Countries" – "Brazil Overview" – "Context".
[58] Ferreira de Souza, 2012. The poverty number used in this thesis is a median over the 2000s, measured according to the above definition, giving the that 8.52% of the Brazilian population live in poverty.
[59] Ferreira de Souza, 2012.
[60] Barbosa, 1998.
[61] Barbosa, 1998.

During the 1990s, the FHC government pursued neoliberal politics, aimed to stabilise the economy. Despite the vast operational, institutional and political challenges, great coordination effort was made, and with the presidency of Lula, starting in 2002, even more reform programs were implemented, such as increased minimum wages. In 2003 *Bolsa Família* was created, a conditional cash transfer programme (CCT), which was a paradigm shift in the recent Brazilian history, as it was the first policy that was implemented at a large-scale that targeted systematic poverty. Now ten years later, one can conclude that its impacts have been enormous. Not only is it one of the greatest CCT programmes in the world, including over 50 million people; Bolsa Família is also one of the most successful CCT programmes that the world has experienced. Its impact is enormous, but yet it costs only 0.4% of the GDP. It has an intergenerational focus and has developed strong federative and intersectoral cooperation, primarily in the fields of education and health.[62]

Even with these achievements in mind, Brazil still has relatively high levels of inequality for being a middle-income country. One of its most important struggles is to improve the quality and outcome of the primary education system, especially at the basic and secondary levels. The regional differences in the country are extreme, particularly in social indicators like health, infant mortality and nutrition. The poorer North and Northeast regions' indicators are a lot worse than the richer South and Southeast.[63] This, together with its large informal sector, conduces to the depiction of Brazil as a typical dual economy.

In 2011, Brazil proclaimed that it would eradicate extreme poverty by the end of 2014. The current president, Dilma Rousseff, won the election that year, and made her presidency's slogan: "A rich country is a country without poverty". During the past one year and a half, 22 million Brazilians have been lifted out of extreme poverty, which should definitely be considered a triumph.[64] But there is still a long way to go. In 2011, growth started to slow down. In spite of this, the Brazilian labour market continued to tighten, which conduced growth in real wages and thus strong household spending. The most recent status is that Brazil gradually is recovering, even though the recovery stays uneven, and inflation increases.[65] In a medium term, the overall macroeconomic framework is considered solid and sustainable. The country is attracting international attention due to the fact that it will be the hostess of the

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[62] Falcão and Vieira da Costa, 2013.
[63] The World Bank. 2013. "Countries" – "Brazil Overview" – "Context".
[64] Falcão and Vieira da Costa, 2013.
[65] IMF, 2013, p. 1, 64.

FIFA World Cup in 2014 and the Olympic Games in 2016, two events that are demanding immense investments in areas such as urban and social development and transport infrastructure.[66]

This recent development of Brazil is to a considerable extent captured in Table 4.1 containing the data of the variables to be explained in the subsequent empirical section, but extended to include the two proceeding decades:

Table 4.1 Median yearly values for chosen variables in Brazil and in the median from a sample of 123 low- and middle-income countries

Country	POV	Δ POV	GROWTH	GDP Initial	EDU	IND	GOV
Brazil 2000-09	8,52	-8,13	2,39	7905,7	6,75	21,40	14,50
Brazil 1990-99	14,72	-2,72	0,22	7175,0	3,80	20,05	11,38
Brazil 1980-98	13,64	0,27	1,51	7564,9	2,60	23,70	
Sample 2000-09	16,25	-5,48	3,02	3005,4	6,08	19,45	15,59

It is clear that Brazil has reduced the fraction of extreme poverty; from roughly 15% in the 1990s, to less than 9% in the 2000s, and this reduction has occurred at an increased speed, whereas the 1980s had an increase in extreme poverty. Brazil has had a substantially increased growth rate. Note that the *GDP Initial* shows the value for each period's starting year, 1980, 1990 and 2000, respectively. Simultaneously the mean years of schooling for the adult population have gone from 2.6 years in the 80s to 6.75 years in the 2000s. The industrial sector has been relatively stable. Finally the public expenditure on education has increased with over 25% since the 90s.

When comparing Brazil in the 2000s to the median of the sample of the 123 low- and middle-income countries for the same period, two main conclusions can be made. The first is that the picture of Brazil as a successful example seems confirmed, especially when considering the less favourable numbers of the earlier two decades. Its level of extreme poverty is almost half that of the sample median and the rate of poverty reduction is faster, even though the growth is lower than the sample median. Its starting level of GDP per capita is however more than twice as high. The second conclusion is that Brazil is to be considered a dual economy, as the theoretical descriptions seem to be captured by the last three variables. Yet the degree of duality has decreased extensively during the last three decades.

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[66] The World Bank. 2013. "Countries" – "Brazil Overview" – "Context".

5 EMPIRICAL ANALYSIS

The empirical analysis that forms the basis of this thesis is composed of a presentation of the regression model, followed by detailed information about the data and the specifications for the chosen variables. The results of the regression are then presented, which are finally being analysed.

5.1 Regression Model

This thesis is constructed from a multivariate linear regression model based on cross-sectional study design for 123 countries under the period 2000-2009. The model is as follows:

$$\Delta POV = \alpha + \beta_1 GROWTH + \beta_2 POV + \beta_3 GDP_{initial} + \beta_4 EDU + \beta_5 IND + \beta_6 GOV + \varepsilon$$

Explanation of the variables

ΔPOV = percentage change in poverty *(POV)* per year, dependent variable

α = intercept

$GROWTH$ = average GDP per capita growth

POV = level of poverty, measured as headcount ratio

$GDP_{initial}$ = level of GDP per capita in the base year 2000

EDU = education, mean years of schooling of adults

IND = employment in industry (% of total employment)

GOV = governmental spending on education (% of government expenditure)

ε = error term

Table 5.1 Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev
POV	22,97	16,25	88,19	0,05	23,53
ΔPOV	-7,18	-5,48	20,24	-28,67	7,85
GROWTH	3,39	3,02	12,25	-2,18	2,67
GDP Initial	4598,18	3005,39	19766,26	275,00	4180,34
EDU	6,29	6,08	11,9	1,1	2,82
IND	19,15	19,45	39,55	2,5	8,67
GOV	15,96	15,59	27,46	4,41	4,75

Table 5.2 Overview of regression variables and its sources

Variable	Description	Source
ΔPOV	Percentage change per year in Poverty headcount ratio at $1.25 a day (PPP)	PovcalNet
GROWTH	GDP per capita growth (annual %)	World Bank - World Development Indicators
POV	Poverty headcount ratio at $1.25 a day (PPP, % of population)	PovcalNet
GDP	GDP per capita level in the base year 2000 (PPP, constant 2005 international $)	World Bank - World Development Indicators
EDU	Education, mean years of schooling (of adults)	UNDP - International Human Development Indicators
IND	Employment in industry (% of total employment)	World Bank - World Development Indicators
GOV	Public spending on education, total (% of government expenditure)	World Bank - World Development Indicators

5.2 Data and Specification for chosen Variables

Poverty - Poverty headcount ratio

The chosen poverty measure is the headcount ratio, the percent of an economy's total population living in households with consumption or income per person below the poverty line, here defined as $1.25 per day at 2005 international prices, adjusted for purchasing power parity. Another commonly used poverty line is the "$2 a day" line, which represents the typical middle-income countries,[67] but as this thesis aims to investigate the low-income countries as well, it considers the $1.25 a day line.[68] The population living on less than $1.25 a day is classified as poor; the greater the headcount ratio, the greater the relative incidence of being poor. The level of poverty in each economy is obtained by calculating the median of the headcount ratios over a period of ten years between 2000 and 2009; more precisely, by plotting the median for its headcount ratio in the years 2002, 2005 and 2008. The median value is chosen in order for eventual extreme values to have a smaller effect on the results.

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[67] PovcalNet, 2013. "An introduction to PovcalNet"
[68] To see whether the number is obtained from consumption, which is roughly half of the countries, or income, I refer to the PovcalNet tool, click on "Choose countries/aggregates" and "Select all countries" before you submit.

This data is replicated from PovcalNet, the on-line tool for poverty measurement developed by the Development Research Group of the World Bank. This institution has based its data on almost 850 socio-economic sample surveys from 125 countries, and detailed information was obtained by interviews from roughly 1.2 million randomly sampled households.[69] The fact that poor families themselves were interviewed, which naturally are the only ones who can truly tell how they are living, together with the great sample size, makes the source reliable. One must however be aware of the many problems related to the difficult task in measuring poverty. The level of poverty is assumed to affect the rate of change in poverty, but in what way is not clear. It might be the case that a high level of poverty, i.e. headcount ratio, makes it easier to reduce the share of poor people. On the other hand, a country with huge portion of poor might face economic structures that are hard to combat. Once again, the awareness of the complexity related to the poverty issue must be constantly considered.

Percentage change in poverty

The change in poverty is the dependent variable in this regression and represents the percentage change per year in poverty headcount ratio, described above. Reduced poverty is defined as a negative value, $\Delta POV<0$, and increased poverty as a positive value, $\Delta POV>0$. It is calculated as the relative median change per year at the extreme poverty line of $1.25 a day (PPP), based on data from PovcalNet for the years 2002 and 2008. More precisely, the yearly percentage change of poverty in each economy is obtained by calculating:

$$\Delta POV = 100*\frac{POV_{2008}-POV_{2002}}{POV_{2002}}/6.[70]$$

Economic growth in GDP per capita

The variable *GROWTH* is the one independent variable directly related to the research question about economic growth's impact on poverty, and shows how much explanatory power per capita GDP has over poverty reduction. It is measured as an economy's growth in per capita gross domestic product, in percent per year, based on the World Bank's databank. It is calculated in real terms as the median over the period 2000-2009, in order to obtain values that capture the growth rate in a way as complete as possible. There exist different views on

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[69] PovcalNet, 2013. "An introduction to PovcalNet"

[70] In the data from PovcalNet of 125 countries, two countries are excluded: Bulgaria, for having available headcount ratio data for only one year, making it impossible to measure the dependent variable of change in poverty; and West Bank and Gaza, for lacking data for six of the chosen variables. A few countries did not have values in all three years and needed another formula to obtain a value, based on the existing data for two years. These countries are: Latvia, Malaysia, Russian Federation, Serbia and Turkey.

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whether economic growth reduces poverty, and if this is a sufficient tool, so the expected sign of the coefficient is ambiguous. Growth is commonly assumed to have a negative impact on the level of poverty, which would mean a negative sign of this coefficient, since there is both theory and empirics concluding that high GDP per capita growth is of great importance for poverty reduction.[71] But this result is not taken for granted.

Initial GDP per capita

The GDP per capita level is from the base year 2000, the starting year of the investigated period, at 2005 international prices, adjusted for purchasing power parity. The source of the data is the World Bank's database.[72] Initial GDP per capita is heavily used as an important variable whenever to explain economic growth. The Solow-Swan model predicts unconditional convergence; that poor countries should grow at faster rates than rich countries, which is controversial and not empirically confirmed.[73] The neoclassical model expects the coefficient on initial GDP will be negative when the other independent variables are held constant, representing the rate of conditional convergence.[74] If there is a positive estimated sign of this variable, then a higher level of initial GDP per capita does increase poverty, and thus suggests for unconditional convergence. Empirics suggest however that conditional convergence is more reasonable, which could imply a negative sign of the *GDP* variable. Studies show that there is no faster progress against poverty in the poorest countries but that high incidence of poverty leads to a lower rate of progress against poverty at any given growth rate.[75]

Education - Mean years of schooling

According to economic theory, education is one of the most powerful tools for poverty and inequality reduction and lays the groundwork for economic growth.[76] Thus, the sign is expected to be negative; increased mean years of education should have a positive impact on the economy, but probably not immediately. Therefore, it could have been relevant to pick this data from earlier periods, but this data is missing. The score is the median of the mean

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[71] Dollar et al. 2013, among many others.
[72] Three of the 123 countries included in the data set do not have data on GDP per capita in 2000. The number was thus substituted with the first available data (the year is shown in the parenthesis after each country). The countries with other base years are: Jamaica (2005), Maldives (2001) and Sao Tome and Principe (2001).
[73] Carlin and Soskice, 2006, p. 490
[74] Barro, 1996, p. 14
[75] Ravallion, Martin, 2009, "Abstract"
[76] The World Bank, 2013. "Topic: Education"

years of schooling between 2000 and 2009. The education measure in this model has the function of a proxy variable for the degree of duality in the economy, as low education represents a barrier to mobility between the labour markets.[77] With low mean years of schooling, a country might have difficulty in overcoming the problems with a bisectional labour market due to lack of knowledge, preventing the industrial sector to increase and the labour market to be more inclusive and flexible.

The data is collected from the UNDPs International Human Development Indicators, which contains information from different public international sources used to produce the Human Development Index, HDI. The statistics is the most trustworthy and recent available within this field,[78] but in spite of this, the mean years of schooling measure is problematic. There are various options for education measures, each facing problems as there are many aspects that would be ideal to capture, both quantitative and qualitative. This measure does not have any qualitative aspects; it says nothing about neither its value to productivity, nor to the usefulness to society. Yet the mean years of schooling of adults represents the education and degree of duality as it is a clear and relatively consistent measure of the population's education.

Industry - Employment in industry

This variable of employment in industry, in % of total employment, is included in order to capture the "level of dual structure" in an economy, as a proxy variable for the degree of duality. As this thesis investigates absolute and not relative poverty, it is not the fraction of the population employed in the industrial sector per se that gets the attention, but this "upper" part of the labour market has an inevitable impact on the duality of an economy. It is assumed that a big industrial sector creates benefits that have a positive impact on worker utility within this sector, but if a big part of the population is employed in the industrial sector, while the level of poverty is high, it indicates that the country is characterised by a bisectional labour market. Thus *IND* is expected to have a negative sign, reducing the fraction of poverty. The data is from the World Bank and includes employees who work for a public or private employer in the industrial sector, including mining, manufacturing, construction, and public utilities, such as electricity, gas and water.[79]

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[77] Dickens and Lang, 1985.
[78] UNDP, 2013.
[79] The World Bank, Data – " Employment in industry (% of total employment)"

Public spending on education

It is assumed that education is a mean to reduce poverty, and a way to mitigate the problems with dual economy. A way to acquire a more profound picture of the issue is to consider the political incentives to improve the educational situation in the country. This variable is included in the regression as the third duality proxy in order to draw conclusions in a more long-run and qualitative perspective. By taking account for total public spending on education, in % of total government expenditure, one can understand how stable the duality of the economy is. It is assumed that if a big part of the total governmental expenditure is spent on education, the quality of education improves, which is a mean to decrease the level of poverty in that country, at least in the long run. The value is the median of the annual numbers from 2000-2009. The data is from the World Bank's databank, which is compiled by the UNESCO Institute for Statistics from both official surveys and reports by education authorities in each country,[80] which makes it credible. Furthermore, public expenditures are officially reported, making this variable less problematic than some of the others.

5.3 Regression Results

Ordinary Least Squares (OLS) is the chosen method for obtaining estimates of the regression coefficients from the data set. The results of the regression are here presented in six different models, where each one contains a different specification, performed with the intention of obtaining results that are robust and unmitigated. This is a kind of sensitivity analysis, showing that the regression results are significant for different combinations of variables, which reduces the risk of multicollinerarity between the variables.[81] To strengthen this, the variables have been tested for multicollinearity in a Variance Inflation Factors test (VIF) which is presented in Table 5.5 in Appendix 2 and shows that there does not seem to be any problem with collinearity in any of the variables. The software Gretl was used for the statistical calculations.

The Regression results are presented in Table 5.3 below, and the descriptive statistics in Table 5.1 above. In Appendix 1 you will find the median yearly values for all countries in the dataset. A Correlation Matrix for the variables and the VIF test (Table 5.4 and 5.5).

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[80] UNDP, 2013. "About the data"
[81] Studenmund, 2010, p. 184, 250, 389

Table 5.3 Regression Results

Dependent variable: Percentage change per year in Poverty headcount ratio (at $1.25 a day, PPP)						
Time period: 2000-2009						
Models:	**1**	**2**	**3**	**4**	**5**	**6**
Independent Variables	Estimated Coefficient	Estimated Coefficient	Estimated Coefficient	Estimated Coefficient	Estimated Coefficient	Estimated Coefficient
Constant	-2.92 *** (1.04)	-6.89 *** (1.24)	-11.85 *** (1.83)	-10.94 *** (2.60)	-14,08 *** (4,40)	-2,51 (6,22)
Growth	-1.26 *** (0.24)	-0.97 *** (0.23)	-0.88 *** (0.22)	-0.88 *** (0.26)	-1,07 *** (0,32)	-1,44 *** (0,35)
Poverty		0.13 *** (0.03)	0.21 *** (0.03)	0.20 *** (0.04)	0,24 *** (0,06)	0,21 *** (0,06)
Initial GDP per Capita			0.0006 *** (0.00018)	0.0007 *** (0.00024)	0,0007 ** (0,00027)	0,0008 ** (0,00032)
Education				-0.15 (0.34)	0,58 (0,43)	0,41 (0,46)
Industry					-0,08 (0,16)	-0,23 (0,19)
Public spending on education						-0,40 ** (0,17)
R-squared	0.18	0.33	0.39	0.37	0,36	0,45
Adjusted R-squared	0.17	0.31	0.37	0.35	0,32	0,40
F-statistic	26.84	28.89	25.34	15.73	9,13	8,96
P-value	8.92e-07	5.72e-11	9.56e-13	4.05e-10	6.65e-07	3.73e-07
Number of Observations	123	123	123	110	86	73

Standard error in parenthesis

*** level of significance at 1 %

** level of significance at 5 %

* level of significance at 10 %

5.4 Regression Analysis

The regression results consist of six different models that can be interpreted as two categories, which interestingly give notably different results. The first contains the explanatory variables growth, poverty and initial GDP per capita. This category, of model 1-3, represents the more general view of what factors cause a change in poverty. In model 1-3, all variables are significant at a level of significance at 1%, indicating that the explanatory variables are consistent with theoretical reasoning and do affect the dependent variable. This may however be a biased result, with possible omitted variables, so conclusions from model 3 should be drawn carefully, even though its adjusted R-squared is 0.37, which is to consider a relatively high for being a cross-sectional study with a large span of countries.

The second group, model 4-6, is related to the theory of dual economy. When all the last three variables are added, the adjusted R-squared is increased to 0.40. The fact that this is higher than without the dual-variables shows that the theory of dual economy can be considered a structural feature that actually does explain forces that affect poverty and its relation to economic growth.

Growth is significant at a 1% level of significance in all the 6 models, and they all show that growth does indeed reduce poverty; poverty is reduced when growth increases. Thus the estimation gives us an affirmative answer to the research question. Nevertheless, this does not tell anything about if growth is *sufficient* to reduce extreme poverty. This question is hard to answer with a statistical method, but the subject will be brought up in the conclusive section. The impact from growth on poverty reduction is shown in Figure 5.1.

GROWTH	N	Median ΔPOV
-3 - 0	9	-0,53
0 - 3	51	-4,58
3 - 6	41	-6,52
6 - 9	18	-13,97
9 - 12	3	-16,69
>12	1	-23,54
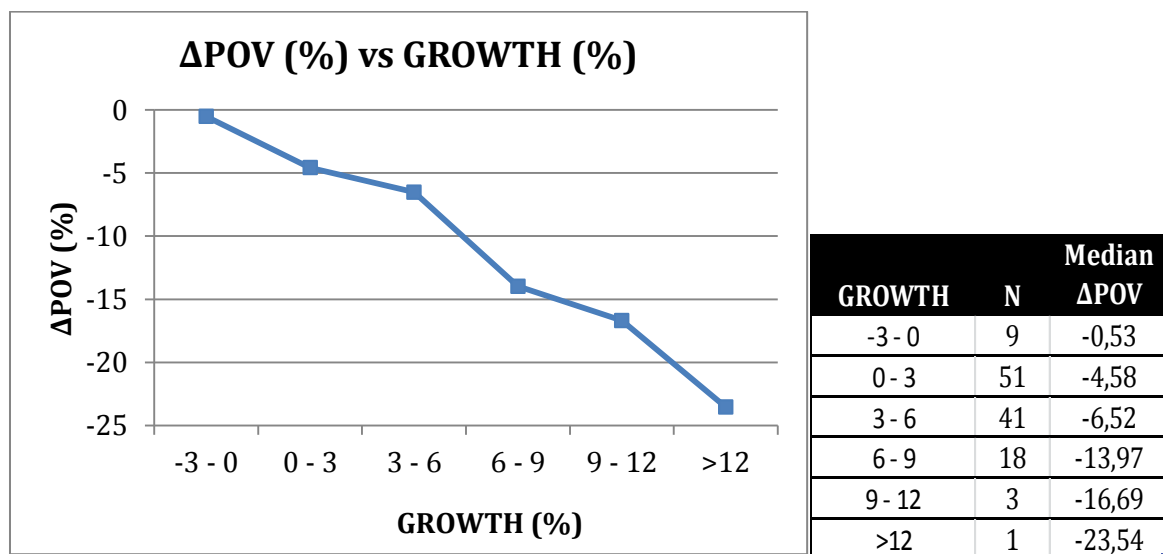
Figure 5.1 Change in Poverty (%) as a function of Growth (%). N=123.

The level of poverty is inversely correlated to a reduction in extreme poverty as it is significant at a 1% level in all the models. This regression shows that countries with a large portion of poor show a slower rate of reduction in poverty. This might seem surprising, but when one takes a closer look at the data,[82] it becomes apparent that a number of countries, mainly in the Sub-Saharan Africa, have a very big fraction of their population in extreme poverty, and in these countries, there generally is no trend in reducing this level. This can be interpreted as an existence of structures that are hard to break, and the theory of the dual economy appears to capture these structures quite well. In the following figure 5.2, this outcome is visualised.

POV	N	Median ΔPOV
0-10	51	-10,41
10-20	20	-8,76
20-30	11	-5,38
30-40	10	-4,89
40-50	10	-1,17
50-60	9	-3,65
60-70	5	0,34
70-80	4	-2,06
80-90	3	-0,64
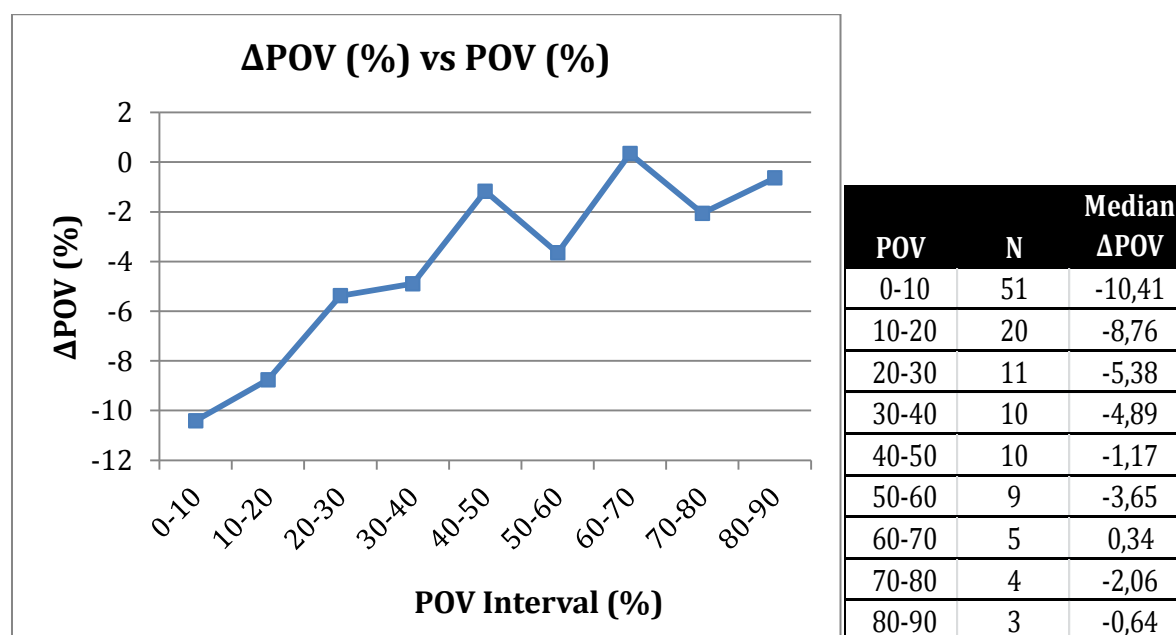
Figure 5.2 Change in Poverty (%) as a function of Poverty (% of population). N=123.

The initial level of GDP per capita is significant at a 1% level in model 3 and 4, and at a 5% level in model 5 and 6. The impact on poverty change is very small but positive. Since the coefficient is close to zero, its explanatory power to poverty reduction is quite weak. Therefore it is not appropriate to draw any conclusions about whether it confirms the ideas about conditional convergence. The fact that the coefficient is positive may be interpreted as an indication that a high level of GDP per capita has an unbalanced distribution in a way that does not benefit the whole population of an economy, causing poverty to increase. However, the growth rate is not much affected by the level of extreme poverty,[83] which strengthens the notion that the relationships shown in figure 5.1 and 5.2 are not due to a common factor.

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[82] See the data in Appendix 1.
[83] See Figure 5.3 in Appendix 2.

The results of the education variable are somewhat surprising. When *EDU* is first included, it does as assumed cause a negative change in poverty, but contrary to the theory, it is not shown significant.[84] In model 5 and 6 the coefficient is positive, but still insignificant, which is the opposite direction as the prediction. This might be a reflection of the time-lagged effects from education. Also, the effect might not be direct, but rather indirect via another variable.

The industry variable does not appear to have a significant impact on poverty reduction, but as its coefficient is negative, it can be associated with poverty reduction and support the theory of dual economy. That it is not significant even at a 10% level can be related to the smaller sample size.

Public spending on education is related to poverty reduction. It is significant at a level of significance at 5%, and even though the sample size decreases, due to lacking data, the adjusted R-squared increases when *GOV* is included. This goes hand in hand with the part of the theory of dual economy that suggests that economic policy is a way to affect the labour market's construction and further the amount of poor. This result shows an indication for the more qualitative, long-run features of poverty reduction. An interpretation might be that it is the quality of the education and the political will to improve the educational system that is more relevant to consider than the years of schooling when the goal is to reduce poverty. One could also imagine that a high fraction of spending on education out of the total public spending indicates that a country pursues redistributive politics overall.

Considering the sample size, only two countries, Bulgaria and West Bank and Gaza, were excluded from the PovcalNet database, due to deficient data. The sample size consists of 123 countries, which can be motivated large enough to represent the population in low- and middle-income countries. There is thus missing data for some of the variables, which gives different numbers of observations in the different models. Model 4 consist of 110 countries, model 5 of 86, and model 6 of 73. It is important to keep in mind that it is a biased sample, and even the database itself is a selected sample, meaning that there is a risk for selection bias and distorted results.[85] Still the sample that creates the base for this regression is selected in order to obtain a sample size as large as possible, and when adding the quality of the data sources, the regression seems robust enough to make an adequate analysis.

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[84] The regression was also conducted with the variable EDU*GROWTH, representing the interaction between education and growth. This would mean that if taken two countries, A and B, with the same growth rate but where education is higher in A than in B, then poverty will decrease more in A than in B. The variable was however excluded, as it led to multicollinearity. It was tested for Variance Inflation Factors (VIF) and the value was 13.497, which indicates multicollinearity for the interaction term.

[85] Studenmund, 2010, p. 556

6 CONCLUSIONS

Poverty is a multidimensional phenomenon, and its complexity does not decrease the more carefully it is investigated. Economic growth decreases the level of extreme poverty. This is a main conclusion drawn from the regression, which confirms theory and earlier studies. Also the level of poverty is strongly related to decrease of poverty, in such a way that a high level of poverty is associated to a slow decrease of poverty. A country with a large fraction of poor and a low growth rate is thus shown to have problems in reducing poverty. Economic growth does not appear to be sufficient a tool when the level of extreme poverty is high. This seems to indicate that poverty reduction must be triggered, the gears must be set in motion, especially in countries with a large portion of extremely poor.

This could be interpreted as an indication for considering the role of possible underlying structures on how poverty coexists with economic development and growth. The theory of the Dual Economy does indeed seem to contribute to the understanding of poverty and its sources. It shows that the coexistence of a rural, low-productive sector and an urban, high-productive one are dependent on one another, but the extent to which they benefit from development and outputs are completely different. The base is that it captures the structural features of the uneven distribution of economic development within countries. By combining the Harris-Todaro model of rural-urban migration with the human capital model, it becomes clear that deficient education contributes to the existence of a bisectional labour market, with lacking education posing a barrier, preventing people from changing their occupation and to escape from poverty. The choice to study is in the human capital model described as a decision of how to allocate one's time in the most advantageous way. This is in reality not a decision that everyone is capable of making, given the unfairly distributed opportunities. People that belong to the group of extremely poor generally do not have the qualifications required to meet an eventual increased demand for labour in the industrial sector, which makes it an isolated sector. This labour supply shortage hinders the industrial sector from absorbing more workers, which is negative for the growth rate.

What could then be done? Throughout this thesis, various policies are brought up, some are mainly theoretical, others are real-life examples of policies that have been implemented. Some policies have resulted in the reverse effect than its purpose, so it is clearly not a simple task to design them so that they target toward poor not just in theory but in practice as well. Regarding the regression results, a powerful tool to reduce the level of extreme poverty in a

country is to invest a great part of the public spending in education. From this, one can conclude that the quality of the education and the political will to improve the educational system seem to be of higher importance than the years of schooling when the goal is to reduce poverty. A decision to invest in human capital through education is economic but only in part. It generates positive external effects, such as increased aggregate productivity, which increases growth. Poverty does therefore have a functional role, affecting the way in which entire economies operate. By investing a small share of the public expenses on education, the dualistic characteristics appear likely to be preserved, which inhibits growth from being inclusive, or put differently; the growth does not trickle down on the poor.

Brazil is a successful example of a middle-income country that has managed to reduce the incidence of extreme poverty in the last decade from a high level to a relatively low one. During the era of the military regime in the 1970-80s, the growth rates were high but few benefitted from them, as there were no substantial redistributive policies. Its stabilisation policies and commodity boom in the 90s lay up for economic growth, which created monetary excesses. GDP is however just a sum of economic activities, which can be distributed in many different ways. In Brazil there was a political will to face the problems of the high incidence of poverty, so the growth policies were combined with redistributive public and economic policies targeted toward the poor, which has led to an achievement of pro-poor growth. What can also be noted from the case of Brazil as well as the regression analysis is that both the two approaches are relevant. Growth does reduce poverty, yes, but in countries where the level of extreme poverty is high, growth policies do not seem to decrease the incidence of poverty. This shows the complexity surrounding these phenomena.

A conclusive remark is that the poverty-growth causality is not of a one-way, uncomplicated character. Apart from the research question about if economic growth reduces poverty, there is a problem with *convert causality*; that poverty lowers economic growth. Poverty, with undernutrition and ill health as dimensions, contributes to a lower productivity, which hampers growth. The regression results confirm earlier findings about that when the structural impacts of poverty are so deeply rooted in a society, it appears difficult to reverse the negative spiral of an enormous fraction of extremely poor, especially when focusing primarily on growth. Then poverty even prevents economic growth from occurring. Accounting for this fact should, if something, be an initiative for governments across the world to invest in poverty reducing activities targeted strongly toward eradication of extreme poverty.

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APPENDIX 1: Median yearly values 2000-2009

1.1 East Asia and Pacific

Country	POV	ΔPOV	GROWTH	GDP Initial	EDU	IND	GOV
Cambodia	33,78	-9,03	6,52	1054,5	5,7	9,55	13,52
China	16,25	-10,39	9,18	2667,5	7,25	23,15	
Fiji	17,91	-18,54	0,58	3886,4	10,15		19,40
Indonesia	22,64	-3,54	3,48	2679,0	5,45	18,7	14,87
Lao PDR	39,5	-4,06	5,08	1337,5	4,35		11,23
Malaysia	0,8	-21,85	3,51	10619,0	9,15	30,2	20,30
Micronesia, Fed. Sts.	30,64	0,77	1,12	3016,4	8,8		
Papua New Guinea	46,55	-2,02	0,17	1950,4	3,65	3,6	
Philippines	22,23	-2,24	2,63	2685,6	8,65	15,6	16,12
Thailand	1,02	-16,92	3,98	5568,4	6,1	20	23,60
Timor-Leste	41,98	-5,40	2,51	1141,8			13,62
Vietnam	24,94	-11,69	5,97	1597,2	5,15	15,55	19,79

1.2 Europe and Central Asia

Country	POV	ΔPOV	GROWTH	GDP Initial	EDU	IND	GOV
Albania	0,62	3,68	6,42	4461,0	10,25	13,55	10,64
Armenia	3,98	-23,54	12,25	2295,4		16	12,58
Azerbaijan	1,54	-16,69	9,98	2490,0		12	18,29
Belarus	0,18	-19,07	8,47	5810,0	10,2		11,33
Bosnia and Herzegovina	0,08	-13,89	5,00	4909,0	8,5	31,4	
Croatia	0,06	3,33	4,54	12370,7	9,55	29,7	9,99
Czech Republic	0,11	-1,39	4,02	17340,8		39,55	9,52
Estonia	0,35	-9,51	7,32	11512,5	11,9	33,3	14,53
Georgia	15,73	-0,48	6,15	2502,2		9,15	10,40
Hungary	0,14	20,24	4,10	13673,6	11,5	32,7	10,44
Kazakhstan	0,78	-28,67	8,89	5405,8	10,2	18	12,09
Kyrgyz Republic	22,94	-17,46	4,25	1506,6		17,6	23,19
Latvia	0,22	-17,78	8,34	8529,2	10,7	26,65	14,35
Lithuania	0,32	-12,30	7,61	9518,3	10,75	28,15	14,71
Macedonia, FYR	0,29	-7,59	3,89	7233,4		32,6	15,62
Moldova	12,49	-20,03	6,62	1657,3	9,45	16,1	20,00
Montenegro	0,12	-4,17	3,57	7354,1	10,6	20,7	
Poland	0,1	-6,52	4,38	11753,4	9,75	30,25	11,98
Romania	1,15	-19,39	6,44	6838,0	10,25	30,15	10,18
Russian Federation	0,24	-16,67	7,32	8612,7	11,6	29,35	11,71
Serbia	0,19	-6,94	4,86	6501,3	9,85	27,25	9,33
Slovak Republic	0,15	-2,06	4,88	12726,5		38,6	10,22
Slovenia	0,05	0,56	3,76	19766,3	11,6	36,4	12,47
Tajikistan	17,71	-15,64	6,16	981,2	9,9	17,9	17,92
Turkey	1,985	-0,50	4,23	9898,2	6,15	24,4	
Turkmenistan	0,5	-27,82	4,52	3916,9	9,9		
Ukraine	0,1	-23,40	7,50	3696,4	11,2	24,2	19,09

1.3 Latin America and the Caribbean

Country	POV	ΔPOV	GROWTH	GDP Initial	EDU	IND	GOV
Argentina	4,55	-20,19	7,52	10290,1		23,05	13,72
Belize	11,72	5,23	1,99	5884,8	7,85	16,95	18,71
Bolivia	18,21	-5,26	1,91	3488,0	8,6	19,45	19,06
Brazil	8,52	-8,13	2,39	7905,7	6,75	21,4	14,50
Chile	1,38	-7,30	3,02	10990,3	9,45	23,4	17,38
Colombia	12,71	-8,03	2,49	6596,6	6,9	19,4	14,56
Costa Rica	3,91	-12,21	1,79	8115,7	8,05	22,1	21,78
Dominican Republic	5,7	-6,42	3,90	5737,4	6,85	22,1	12,37
Ecuador	9,13	-10,41	2,05	6183,6	7,35	18,3	8,01
El Salvador	11,57	-12,42	1,79	5155,0	6,9	23,55	19,25
Guatemala	18,98	-9,48	0,75	3971,5	3,8	22,5	
Guyana	8,17	-0,46	0,96	2454,3	8,15	23,55	15,01
Haiti	63,58	0,34	-0,64	1146,0	4,55		
Honduras	26,44	-4,22	3,02	2879,8	6,05	21,7	
Jamaica	0,19	-11,71	0,29	7082,6	9,25	17,55	10,80
Mexico	1,15	-10,59	1,02	11406,1	8,05	25,55	23,82
Nicaragua	11,91	-7,50	2,57	2759,0	5,35	18,85	16,49
Panama	9,5	-5,87	3,70	7869,2	9,15	17,55	7,74
Paraguay	7,2	-12,78	1,14	4572,2	7,1	16,9	10,75
Peru	8,55	-9,76	3,66	5513,6	8,35	22,65	17,15
St. Lucia	17,38	-3,67	0,13	9118,9		16,5	15,59
Suriname	11,86	-5,42	3,12	4964,5	7,2	23	
Trinidad and Tobago	0,51	-15,89	5,55	14171,3	8,95	30,2	12,96
Uruguay	0,79	-0,70	2,92	9551,1	8,05	21,8	11,58
Venezuela, RB	13,44	-12,83	2,63	9526,6	6,8	22,3	

1.4 Middle East and North Africa

Country	POV	ΔPOV	GROWTH	GDP Initial	EDU	IND	GOV
Algeria	3,62	-9,42	1,25	5854,1	7,1	26	20,27
Djibouti	17,11	-4,77	1,74	1777,1	3,8		22,61
Egypt, Arab Rep.	1,9	-1,72	2,84	4236,0	5,8	21,4	14,06
Iran, Islamic Rep.	1,45	-8,79	3,67	7438,0	7,3	31,85	19,75
Iraq	4,75	-14,41	-2,18	4714,2	5,35	18	
Jordan	0,38	-23,73	4,08	3590,9		21,05	
Morocco	3,46	-13,11	3,71	2924,0	4,05	20,7	25,92
Syrian Arab Republic	0,8	-24,20	2,08	3667,9	5,7	28	16,65
Tunisia	1,35	-11,95	3,64	6053,5	5,9	32,3	21,13
Yemen, Rep.	17,13	1,31	1,09	2144,3	2		24,39

1.5 South Asia

Country	POV	ΔPOV	GROWTH	GDP Initial	EDU	IND	GOV
Bangladesh	50,47	-2,53	4,60	949,3	4,35	13,7	14,99
Bhutan	18,88	-14,11	4,47	2778,4		7	13,32
India	40,82	-2,78	6,24	1741,3	4,1	17,5	10,74
Maldives	2,32	-27,89	9,40	4518,6	5,25	23,4	14,77
Nepal	46,34	-6,97	2,43	950,0	2,85	13,4	15,62
Pakistan	22,3	-7,25	2,44	1854,1	4,65	20,3	11,15
Sri Lanka	10,1	-12,11	4,78	3005,4	9,1	25,35	8,08

1.6 Sub Saharan Africa

Country	POV	ΔPOV	GROWTH	GDP Initial	EDU	IND	GOV
Angola	55,55	0,17	8,70	2476,4	4,5		4,41
Benin	44,79	0,37	0,79	1232,2	3	9,5	17,63
Botswana	15,9	-7,98	4,03	9544,8	8,4	21,75	21,04
Burkina Faso	50,73	-4,58	2,44	903,9	1,3	3,25	16,39
Burundi	82,84	-0,64	0,58	474,0	2,4		13,58
Cameroon	9,99	-1,76	0,90	1824,2	5,55	11,6	16,46
Cape Verde	16,84	-9,54	4,71	2161,4	3,5		16,55
Central African Republic	62,83	0,77	-0,45	772,4	3,35		12,80
Chad	44,86	-4,76	0,71	743,3	1,5		12,56
Comoros	45,52	1,06	-0,95	1117,4	2,8		24,12
Congo, Dem. Rep.	88,19	-0,74	2,69	275,0	5,8		
Congo, Rep.	54,1	-0,86	2,23	3131,5	3,4	20,6	9,18
Cote d'Ivoire	23,75	0,45	-0,52	1861,2	3,85		21,85
Ethiopia	38,96	-6,10	6,89	523,7	1,7	5,95	20,17
Gabon	3,92	-4,18	-1,11	13356,6	7,05	11,8	
Gambia, The	33,41	-0,64	2,46	1654,9	2,45		15,13
Ghana	30,24	-5,48	2,71	1086,1	6,65	13,6	24,56
Guinea	53,63	-4,33	0,62	862,7	1,6		12,86
Guinea-Bissau	48,9	-0,31	0,57	1008,6	2,3		
Kenya	40,58	3,15	0,62	1282,0	6,65	6,7	22,59
Lesotho	37,64	-4,30	3,45	1165,5	5,45		26,27
Liberia	83,06	3,35	7,98	338,6	3,55	2,5	12,06
Madagascar	71,62	-0,72	2,11	881,8	5,2	5,2	16,68
Malawi	73,96	-2,74	1,05	664,3	3,65		13,82
Mali	50,96	-2,20	1,45	835,4	1,75	11,05	16,02
Mauritania	24,8	-0,99	-0,16	1728,0	3,45		12,86
Mozambique	66,7	-3,94	4,26	498,6	1,1	3,4	21,85

Namibia	32,33	-6,48	2,47	4484,1	6	14,8	21,99
Niger	50,2	-4,41	0,06	593,4	1,3	11,1	17,43
Nigeria	65,36	0,29	3,30	1479,0	5,1	11,5	
Rwanda	72,75	-1,38	5,10	631,3	2,95	3,8	20,72
Sao Tome and Principe	24,24	-5,38	1,61	1318,2	4,35	19,2	
Senegal	33,5	-7,08	1,40	1472,0	4,15	13,6	19,58
Seychelles	0,46	-7,54	-1,14	18703,7			12,58
Sierra Leone	50,31	-3,65	2,77	742,9	3	5,35	17,11
South Africa	20,24	-8,63	2,37	7641,0	8,25	25,6	17,96
Sudan	29,48	-7,06	3,28	1302,9	2,9		
Swaziland	47,1	1,75	1,31	4226,8	6,75		21,65
Tanzania	74,21	-3,24	4,10	868,5	4,85	3,45	27,46
Togo	39,78	-0,53	-0,44	902,7	4,95	6,8	18,65
Uganda	54,83	-3,91	3,47	771,6	4,45	6,25	18,57
Zambia	65,99	0,73	2,69	1038,4	6,45	6,45	10,59

APPENDIX 2

Table 5.4 Correlation Matrix Table

ΔPOV	GROWTH	POV	GDP Initial	EDU	IND	GOV	Correlation
1.0000	-0.4261	0.4732	-0.0913	-0.3483	-0.2369	-0.0808	ΔPOV
	1.0000	-0.2499	0.0832	0.3985	0.1608	-0.2501	GROWTH
		1.0000	-0.6532	-0.6871	-0.7711	0.1237	POV
			1.0000	0.6948	0.7449	-0.2619	GDP Initial
				1.0000	0.6850	-0.2252	EDU
					1.0000	-0.2693	IND
						1.0000	GOV

Table 5.5 Testing for multicollinearity: Variance Inflation Factors

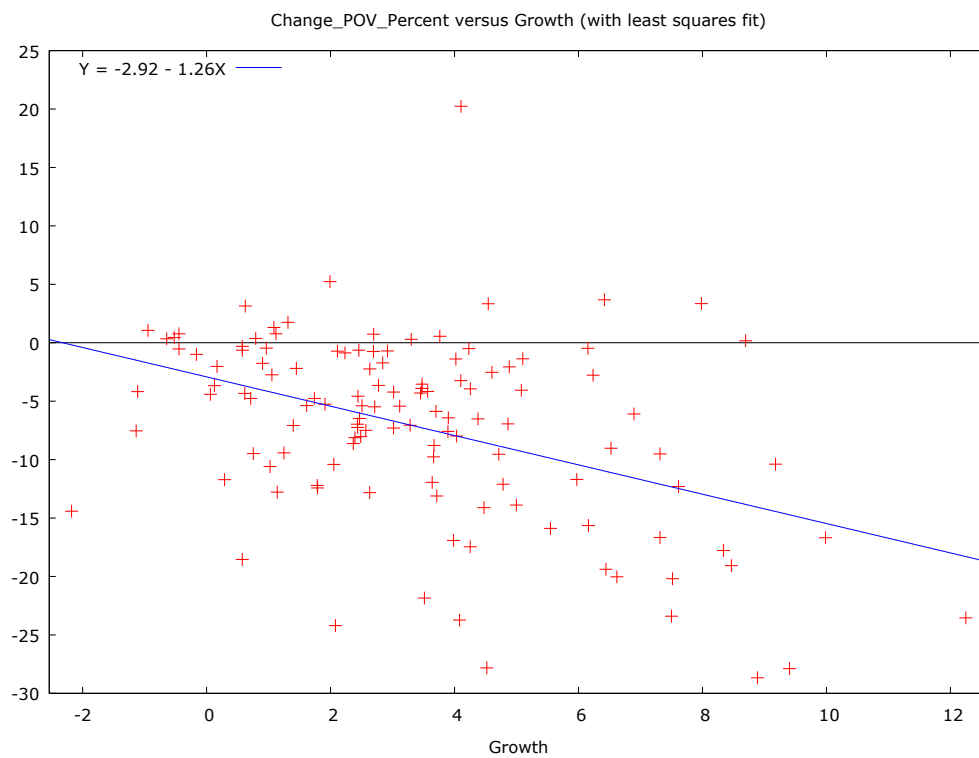| Variable	Variance Inflation Factors
Growth	1.191
POV	4.038
GDP Initial	3.260
EDU	3.075
IND	5.046
GOV	1.129

Values > 10.0 may indicate a collinearity problem

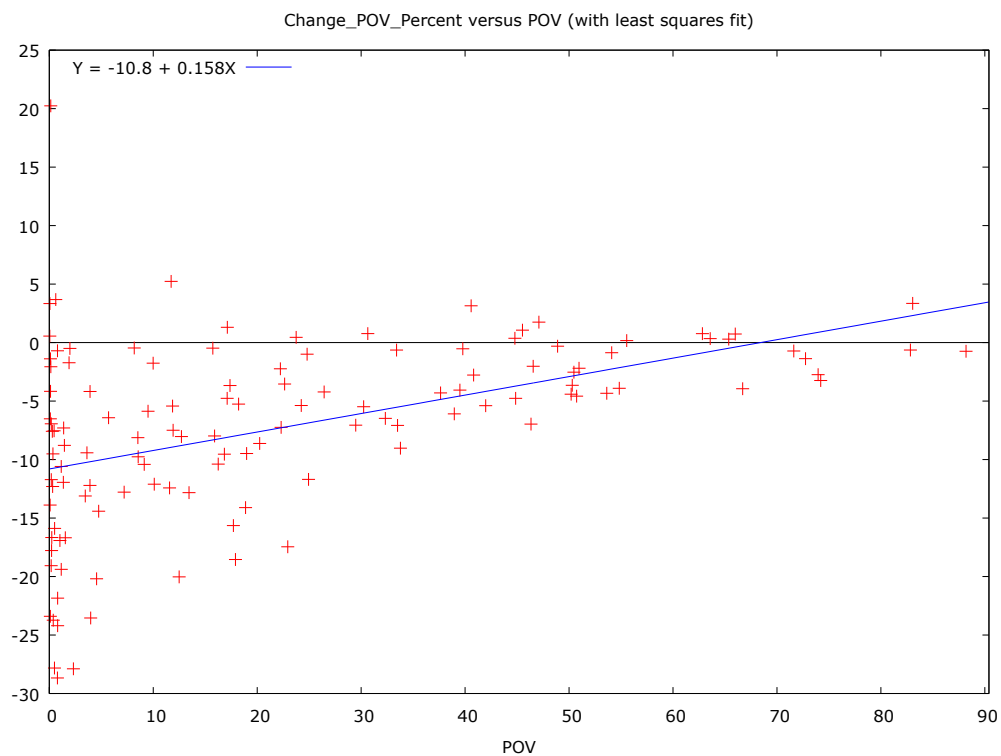## Figure 5.3 Growth (%) as a function of Poverty (% of population). N=123

POV	N	Median ΔPOV
0-9,9	51	3,90
10-19,9	20	2,60
20-29,9	11	2,63
30-39,9	10	2,59
40-49,9	10	0,75
50-59,9	9	2,44
60-69,9	5	2,70
70-79,9	4	3,11
80-89,9	3	2,69
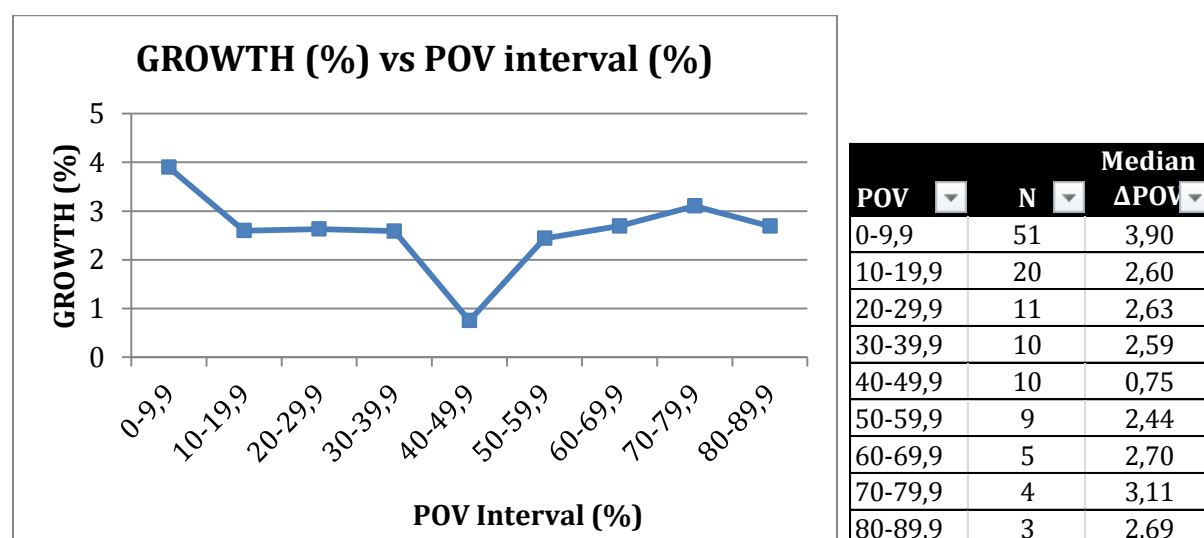
APPENDIX 3

Figure 3.3 Percentage Change in Poverty and Economic Growth

Change_POV_Percent versus Growth (with least squares fit)

Y = -2.92 - 1.26X

Figure 3.4 Percentage Change in Poverty and Level of Poverty

Change_POV_Percent versus POV (with least squares fit)

Y = -10.8 + 0.158X

Figure 3.5 Percentage Change in Poverty and Initial Level of GDP per capita (2000)