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INCOME INEQUALITY AND HUMAN CAPITAL DEVELOPMENT

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>
> Field of Knowledge:
> Inequality and Investments in Human Capital
>
> Supervisor: Prof. Dr. Julia von Maltzan Pacheco

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Abstract

Human Capital investments are essential for the economic development of a country. In Brazil, several sources point to the lack of qualified workforce as a cause of slower economic growth. This dissertation explores the theoretical linkages made from income inequality to economic performance. The empirical section focuses on one of the theories presented, the one on credit-market imperfections. According to this theory, imperfect credit markets are poor resource allocators and do not allow for low income individuals to invest in their own human capital. In Brazil, there is a lack of empirical studies aimed at testing the channels through which inequality affects growth, therefore this research gains significance. The results presented here were drawn from family household survey – POF – undertaken by the IBGE. Data has evidenced that education investments grow as a percentage of the total budget with raises of income. Raises in income for very high income classes do not increase education spending. The data suggests the existence of a budget constraint for low and middle class Brazilians from all regions. It has been found strong evidence that low and middle income classes in Brazil have limited access to credit-markets. Therefore, there is evidence that redistribution would increase aggregate spending on education.

Keywords: Inequality, Savings, Human Capital, Household survey, Brazil.

Resumo

Investimentos em capital humano são essenciais para o desenvolvimento econômico de um pais. No Brasil, diversas fontes apontam para a falta de mão de obra qualificada como sendo uma das causas de um fraco crescimento econômico. Esta dissertação explora as teorias que ligam desigualdade de renda com performance econômica. A parte empírica se foca em uma das teorias apresentadas, a de imperfeições no mercado de credito. De acordo com esta teoria, mercados de credito imperfeitos são fracos alocadores de recursos e não possibilitam que indivíduos de baixa renda invistam no próprio capital humano. No Brasil, há uma escassez de estudos empíricos focados em testar os canais através dos quais a desigualdade de renda afeta o crescimento, trazendo significância para esta dissertação. Os resultados apresentados aqui foram obtidos através da pesquisa familiar – POF – realizada pelo IBGE. Os dados mostram que investimentos em educação crescem como percentual do orçamento com o aumento da renda familiar. Aumentos de renda para classes de renda já elevadas não provocam igual aumento nas despesas educacionais. Os dados sugerem a existência de uma restrição orçamentária para Brasileiros de baixa e média renda independente da região. Foram encontradas fortes evidencias de que classes de baixa e média renda no Brasil tem acesso limitado ao mercado de credito. Portanto, existe evidencia de que redistribuição aumentaria o gasto agregado em educação.

Palavras chave: Desigualdade, Poupança, Capital Humano, Pesquisa domiciliar, Brasil.

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List of Abbreviations

GDP: Gross Domestic Product

GNP: Gross National Product

PNAD: Pesquisa Nacional por Amostra Domiciliar

POF: Pesquisa de Orçamento Familiar

IBGE: Instituto Brasileiro de Geografia Estatística

IPEA: Instituto de Pesquisa Econômica Aplicada

SPI: Sociopolitical Index

1. Introduction

Brazilian wealth and income inequality has its origins from the country`s conception in the 16th century. Distribution of wealth has been unbalanced much due to the colonial past and not much has succeeded in bringing balance to it. Despite the end of slavery in 1888, still nowadays there is strong polarization of both wealth and income (World Bank, 2012).

Many reasons might have caused the endurance of inequality over the centuries. Some hypothesis have been raised. Rent-seeking behaviour seems to be a plausible cause as Brazilian society appears to endorse benefits to specific groups. Path-dependence is another good hypothesis given the lack of social mobility present in Brazilian society. Institutions fail to bridge the gap and provide equal opportunities, reinforcing path-dependence. Local financial markets are able to host international capital, but one can say they are not fully efficient, presenting another impediment for lower income Brazilians to invest in themselves or their projects.

Brazilian levels of inequality are also present in most countries in Latin America. Therefore, the discussion over the impacts of inequality on economic development should be of relevance to these economies as well. Despite some growth, Latin American countries fail to become developed in economic terms, income and wealth inequality might be one cause for the underdevelopment.

According to data from World Bank, 2012, Brazil has the 13th most unequal income in the world ranked by the Gini index. Despite such inequality, Brazil experiences some economic prosperity with the 74th best GDP per capita (World Bank, 2012) – behind countries such as Costa Rica, Venezuela and Kazakhstan. If the theories reviewed in this dissertation are correct, such inequality might be harming economic development and it is of interest to have a good diagnosis on the topic.

1.1. Purpose of the thesis

This dissertation aims at bringing evidence to link Brazil with internationally accepted theories of inequality and growth. More specifically, the theory of credit-market imperfections seems to be relevant in the Brazilian context and should be verified using local data.

Many theoretical studies of inequality in Brazil treat the topic through local perspectives. Methodology and assumptions are not always aligned with international literature. Brazilian peculiarities such as history, size, population, etc., are mentioned as a reason to treat the topic with a different approach from those developed abroad.

Empirical studies in Brazil commonly attempt a direct link from inequality to economic growth. This relation is hard to be obtained and does not provide a full picture. Testing for the channels through which inequality might affect GDP growth brings more specific information and improves the diagnosis. An improved analysis allows for public policy to be directed more efficiently and have better results.

Even though there are many Brazilian specificities that do not fit international literature, there is room to apply international models to Brazil. One of the reasons that make such approach of interest is that of verifying the convergence of diagnosis with other countries; similar problems might need comparable policies.

Furthermore, empirical studies in this field commonly use macroeconomic sources of data. This type of data can provide some insights, however, new theories link individual behaviour to aggregate output. Macro variables sometimes lack such information. This dissertation will use household survey, microeconomic data, in order to grasp evidences of the channels through which inequality harms the economy.

1.2. Chapter outline

The names chapter and section are used as synonyms perfectly exchangeable for the benefit of reducing word repetition during this dissertation.

The first chapter is this introduction. Literature review comes in the second section divided into fundamentals and channels through which inequality affects economic development. The third chapter focuses on uniting the literature reviewed with the motivation for this dissertation. Fourth chapter explains the origins of the data and collection procedures. The data used for this dissertation has gone through some adjustments, these modifications and their methodology are explained on chapter five. Chapter six contains the results and graphs of interest. Concluding remarks are on chapter seven.

2. Theoretical framework

The literature on income inequality has been divided into two parts. The first concerns fundamental aspects of inequality theory. The second concerns the mechanisms through which inequality affects economic growth. This division is relevant given two different approaches to the topic that have been present in different periods of time. Until the middle of the 20th century most studies were empirical and there was a lack of theories linking observed inequality with economic performance. Development theories started to come about from the 1950`s which also brought theories that attempt to explain causality to the debate.

This review starts with the fundamental works, since they are also crucial for the understanding of modern theories.

2.1. Fundamental aspects in the theory of inequality

Fundamental studies have set the ground in the field. Recent developments in the theory lie in the framework set by researchers such as Pareto, Gini and Lorenz. Furthermore, fundamental debates have occurred even after development theories started to discuss the mechanisms. John Rawls and others have promoted qualitative debates over social utility functions and social preferences in more recent times. The relevance of these works is on increasing the understanding of some fundaments and general features of inequality which might be a matter of preferences, therefore, adjusting the focus of the debate.

2.1.1. First studies

First studies in the field of inequality are empirical and try to provide evidence that could give a perspective over the level of inequality. This topic begins to gain some predominance by the end of the 19th century. At that time data was scarce and there were no consensus on standards of measurement.

Edward Atkinson (Atkinson, 1886) writes about general economic aspects of the USA. At his time there was a lack of national accounts such as total production as well as total investment – public or private. His work, therefore, aims at estimating general size and features of that economy. Furthermore, he has special focus on the distribution of product. The value of his work to present inequality literature lies on the division of product that goes to workers and to capitalists according to his own calculations. Moreover, he tries to reach the amount saved by each income category using macro and aggregate data. To attempt to calculate such features is a first effort into describing inequality.

Frederick Hawley (Hawley, 1888) entered a debate with Atkinson over his conclusions. For the period of 1890`s they have performed several studies pointing out to imperfections on each other`s calculations of the distribution of the product in the USA. For the sake of exemplifying, some features found by Atkinson which were questioned by Hawley are 10% savings rate of income by capitalists as well as an issue of double counting in the estimation of national product. Their results are not as relevant to the literature in present times, on the other hand, their effort into estimating such distributional features gave birth to debate on the topic of inequality.

Another researcher who attempted to estimate the distribution of production was Vilfredo Pareto. His work has been more successful in providing overall features of inequality. His research is still influential nowadays not only for his attempts but also for his findings.

Pareto (1896) used data of tax payments from several countries such as Switzerland, Germany and Peru amongst others. This information was the closest to actual household data that one could find at that time. His data set allowed him to find that the distribution of income followed an 80-20 rule of thumb independently of country or size of the economy. This meant that about 20% of the population would generate/earn roughly around 80% of income. Furthermore, such behavior should repeat within subclasses. For example within the 20% group that earns 80% of income, around 80% of their income would be generated/earned by 20% of those people.

Pareto`s findings are of such relevance that he began to define the next step into the theory of inequality and social preferences.

2.1.2. Defining measurement standards

First standards on the measurement of inequality came about due to their success in accurately portraying inequality. The first challenge for researchers, interested in the topic of inequality, was to obtain data that could tell something about the actual distribution of product. As it was explored on section 2.1.1. Pareto (1896) was able to provide substantial evidence of the distribution of income. With data in hands, debates over how to portray and measure that information started to come about.

Lorenz (1905) focuses on the several formulations possible for plotting inequality data. He mentions that forms such as number of individuals per income branch fail to provide the true dimension of inequality as this way of organizing data would not allow for visualization in the case of changes in inequality.

His solution is to first arrange individuals by their income in order from lowest to highest income. Secondly aggregate income from the lowest to the *n* individual. (e.g.: the lowest income individual has income equal to 1, the second lowest has income equal to 2. Aggregate income at individual 1 equals 1 and aggregate income at individual 2 equals 3.). From this treated data Lorenz (1905) plots what has come to be known as the Lorenz curve. He always portrait both values in percentages of the total.

Lorenz`s formulation has the purpose of providing better visualization of most features of income inequality. Despite its success in revealing the main features of inequality in a single graphical representation, alternative methods have been studied focused in allowing for other features to be noted. Social mobility is an example that Lorenz`s formulation is incapable of identifying and that called for alternative methods.

Nevertheless, the Lorenz curve is widely used and the most relevant formulation so far. From its concept arises the most commonly used index of inequality – the Gini index.

Gini (1912) performs a study on variability. One of the many mathematical formulations developed in this study has later been used in order to create an index for inequality. The variability measured by the Gini index is between a curve of ideal distribution and the actual distribution in a country. The ideal distribution is one where all individuals receive the same income. The actual distribution is given by the Lorenz curve.
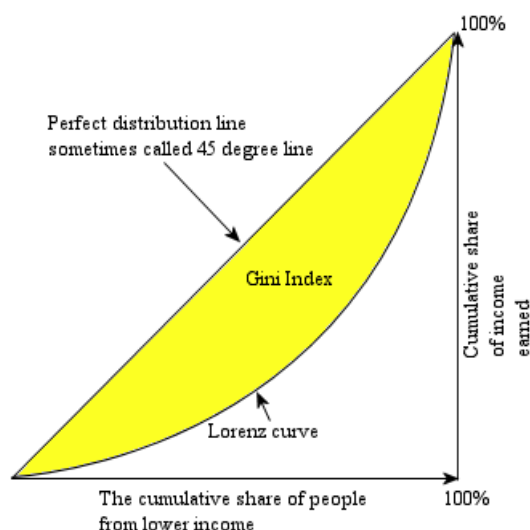
Figure 1:The Lorenz Curve and The Gini Index – source: http://people.stfx.ca/mgerriet/econ241/Gini%20coefficient%20-%20Wikipedia,%20the%20free%20encyclopedia.htm

Figure 1 provides the graphical representation for the Lorenz curve as well as the Gini index. Population is shown as a percentage from the one with lowest income to that of highest income forming, at that person, 100% of the population. Income is shown also in cumulative

terms adding income up to the specific individual. This standard set out by Lorenz and Gini are relevant for the literature up to nowadays.

Such framework has established a standard on how to portray the data. The topic of standards of collection, however, has been perfecting ever since the work of Pareto (1986). Most standards had been established by the middle of the 20th century when data started to be collected by international development agencies.

The work by Kuznets (1955) is known as pioneer in presenting a theoretical relation between growth and inequality. His works is mostly known from the creation of the Kuznets hypothesis. Despite his main contribution to the literature be due to his hypothesis, his work has also provided insights in the standardization of data collection. He specified such rules of collection as part of his empirical work that resulted in his theory. These rules were already established by that time and it reflects standards of collection that were formed over the years by several researchers. He has set out the following rules:

(i) relevant income is family income to avoid people with zero income (dependents) or people with excessive income that would not correspond to actual spending features;

(ii) measures should cover an entire country rather than segments of it;

(iii) income should be only for full-time employees not to complicate the picture with retired or students who would distort interpretations;

(iv) income should be defined as it is in the specific country – excluding income in capital gains, all received in kind, before and after taxes, etc - ;

(v) units must be grouped by "secular" levels of income, to avoid cycles or other temporal disruptions.

For the purposes of analyzing the Brazilian population definition (ii) might not be necessary. His intention is to aggregate all individuals that coexist in a single economic environment, however, there is evidence of regionalization in Brazil (present later in the literature).

Definition (iii) also might not fit for the Brazilian reality. Many workers, mainly low income, have more than one job in order to complement the salary which might be half-time. Furthermore, students or retired individuals do help complement income in households. This feature is also a critic to definition (i) that constraints the inclusion of complementary income by other family members.

Definition (iv) can also be criticized. Capital gains form wealth and can act as collateral and alter lifetime consumption patterns and could, therefore, be added to income.

Definition (v) makes more sense in the the time of Kuznets (1955). He is concerned with earnings that oscillate each year. This is a relevant mainly for agriculture related businesses which are dependent on weather conditions and other variations. This point`s importance is lessened when you take urban or hired individuals, not self-employed.

The Pesquisa de Orcamento Familiar (POF), household survey used in this dissertation, follows many of these specifications as they have become standards of data collection. For example, it uses the income of the person of reference and do not add complementary income. The empirical works mentioned so far have formed the backbone of the literature on income inequality. The standards reviewed here are also in the structure of recent literature.

Kuznets (1955) is a pioneer study in linking empirical data with some theory. He provides standards of collection in order to research on causes for observed shifts in inequality. By doing that, his work became groundbreaking in providing a link between empirical works and theoretical studies.

2.1.3. From empirical to theoretical

Theoretical studies came about from the empirical works developed mainly in the first half of the 20th century. From this surge in theories we find two different goals. Some researchers tried to clarify the channels through which inequality and growth are related. Meanwhile, others were concerned with the qualitative aspects of inequality.

Qualitative assessments over inequality have been coming about since Pareto (1896). His concept of Pareto optimum set out qualitative feature over an otherwise purely descriptive fact. All different qualitative concepts towards social preferences can be portrait as social utility curves. The classical works, influenced by philosophical ideologies of its times such as liberalism or utilitarianism, have emphasized on the quality of Pareto improvements. Social utilities, however, were never taken as consensual.

Social Utility curves indicate social preferences. This consideration is qualitative, not allowing for comparison of better or worse amongst societies – each one will have their own preference.

The most common form of social utility curves are defined in Dolan (1998). The graphical representation below, figure 5, reveals some possible Social Utility Curves. With curve UR you only improve by augmenting the utility of the worse off. On the opposing end, curve UI means that the social utility is given by the person with higher utility.

Dolan (1998) classifies these curves as: UR – Ralwsian, UC – Convex, UB – Utilitarian, UI – Concave. Rawlsian curve is derived from the max-min criterion mentioned in Rawls (1974). UC and UB are intermediary cases between extreme equality (UR) and extreme inequality (UI).
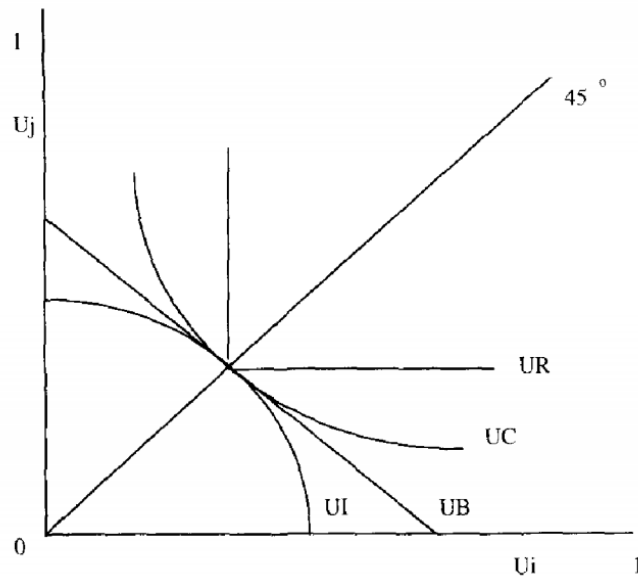
Figure 2: Social Utility Curves (Source: Dolan, 1998, p. 45)

Rawls (1974) has debated over the relevance of the max-min criterion as a solution for unfair asset and bargain power distribution. The max-min criterion is the social utility function representation of his concept of social fairness. He states that the max-min social utility curve means that *"…the natural distribution of abilities is viewed in some respects as a collective asset" (Rawls, 1974, p. 145).* He is focused at balancing randomly inherited skills that would create an unfair society. The max-min criterion transforms this unequal distribution of talents into a collective asset by forcing for the improvement of the well-being of the individual worse off.

Rawls (1974) was so influential as to have, nowadays, his notion of social fairness denominated as Rawlsian. The other forms of social utility have been drawn as a consequence of other economic fields that could provide a qualitative reasoning over the distribution of product. Curve UB, for example, derives from John Stuart Mills` utilitarianism which was developed before data on the distribution of income was available.

With the advancement of empirical findings it has become more common for researchers to find out unfair aspects on the distribution of income. They had found evidence that supported theories which challenged mainstream notions such as utilitarianism or liberalism.

So far much has been debated about income inequality. Even the Rawlsian perspective takes mainly income into consideration. The notion of equality of opportunity, argued by Sen (1997), contends weather or not income inequality is too narrow of a concept.

Sen (1997) argues that the focus of the discussion on income inequality is misleading. He points that economic inequality is a broader concept which should be the focus of the discussion when concerning the well-being of citizens.

The difference between both concepts is in the surrounding environments of an individual. For example, one disabled person will have higher expenses just to perform the same regular activities as a healthy individual. In order to consider them as equal in terms of well-being it is necessary to take such inherent costs into consideration.

Sen (1997), pp. 385, describes 5 different types of contingencies that "…lead to systematic variations in the conversions of incomes into the distinct functionings we can achieve, and that affects the lifestyles we can enjoy."

Personal heterogeneities are natural differences in age, gender, disability or illnesses that makes people`s needs diverse, requiring different amounts of income to compensate for them.

Environmental diversities account for rainfalls, floods, temperature ranges, that account for different material needs and, therefore, have to be taken into account when comparing income.

Variations in social climate refers to the access to public security, health, education as well as the level of social interactions which can be interpreted as social capital. These social interactions provide a background from which material well-being is obtained and better social climate makes it "cheaper" for the same goals to be obtained when compared to a worse social climate.

Differences in relational perspectives are the various perspectives that individuals have over success depending on their society. Sen (1997) has given the example of poor individuals in rich societies wishing they could "appear in public without shame", which would require more income. Meanwhile, individuals who are poorer in absolute terms but live in an overall poorer society do not suffer such shame and can achieve good social status and self-fulfillment with lower levels of income.

Distribution within the family refers to the importance of household income. Sen (1997) makes the same argument as Kuznets (1955) about the relevance of household income vs simple individual income. In the essence of this argument is that family relations are frequently

surrounded by transfers of money and consumption from one individual to another, similar to donations from one to another. Therefore, for both authors, household income denotes better the well-being of an individual than individual income would.

Sen`s (1997) considerations are of extreme relevance for developing countries such as Brazil. High levels of inequality, originated from historical reasons, have a way to reinforce themselves. The aspect of income and well-being, therefore, relates to more than just an economic analysis, it is part of a social analysis.

2.2.How does inequality affects economic growth?

Classical literature has developed a framework of measurement and collection which evolved from empirical studies. First theories on inequality were focused on the qualitative aspects of it. Especially since the 1980`s literature has been focused on explaining the channels through which inequality affects economic growth.

Many empirical studies have been performed trying to link inequality and growth directly. Their results are inconclusive with some articles pointing to positive effects and others to negative ones. This uncertain result about the direct link between inequality and growth has fostered the debate about channels through which inequality might affect economic growth. Some of the effects of inequality seem to be beneficial for growth while others are not. Figure 3, below, reveals the main theoretical linkages between inequality and growth present in recent literature.
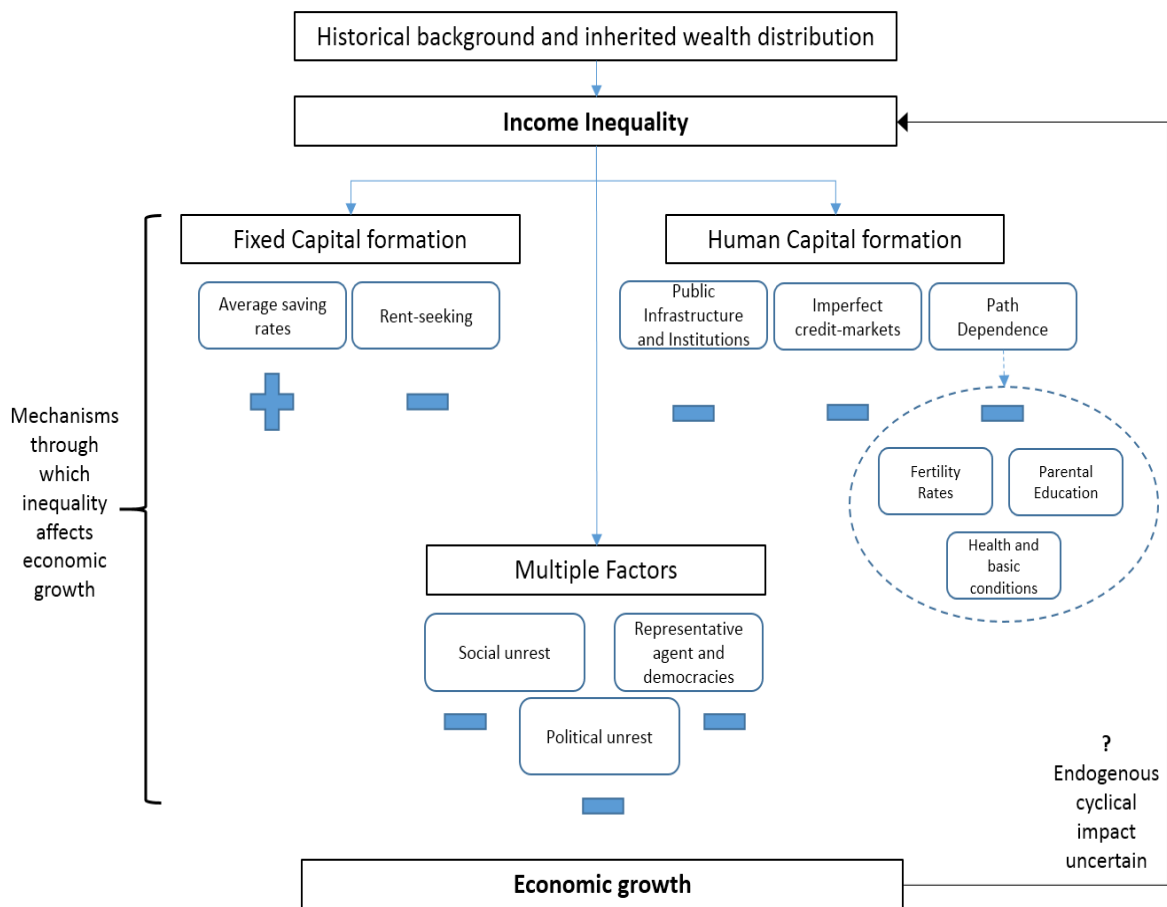
Figure 3: Channels through which inequality affects growth - source: Own illustration

The diagram in Figure 3 presents the channels according to the production factor each one influences. This form of organization follows the idea that GDP is a sub-product of capital and labor. Other factors that influence GDP would also be a consequence of capital and labor – such as technology.

Channels such as social and political unrest, and the representative agent issue, end up pressuring both human and fixed capital development. Rent-seeking and average savings rates interfere with the formation of fixed capital. Imperfections in credit-markets, lack of public institutions and path dependence end up damaging human capital development. All of these factors independently influence economic performance in their own particular manner. All these channel are going to be reviewed in this section of the dissertation.

Other studies have organized the debate in alternative manners. Studies such as Barro (2000) and Thorbecke & Charumilind (2002) have laid out other frames for the literature on the channels from inequality to growth.

Barro (2000) presents the debate in four main arguments. The first is the theory on Credit-Market Imperfections, the second talks about Political Economy, the third concerns

Sociopolitical Unrest and the fourth discusses the Saving Rates. His frame emphasizes on the similarities between political and social unrest placing them both under Sociopolitical unrest. It also places path dependence as a condition which can be surpassed when these other four channels are functioning well. For example, the lack of education from parents could be surpassed by good public policies (that follow the Political Economy debate) as well as perfect credit-markets.

Thorbecke & Charumilind (2002) perform their review according to the chronological order of the studies. They divide the debate into three main frameworks. The classical approach, modern approaches and the "unified" approach.

The classical approach concerns the theory of savings rates which was established by Kaldor in 1956, being one of the first theoretical works on the field.

Modern approaches started to come about in the decades of 1980 and 1990. They concern theories of rent-seeking, political economy, imperfect credit-markets, etc.

What Thorbecke & Charumilind (2002) calls of "unified" approach was developed by Galor (2000) where he has set out a two-step characteristic to economic development. In the first step fixed capital is predominant for economic development and inequality would foster growth. In the second step, more developed, human capital is the main engine for growth and inequality would harm economic growth.

These studies reveal different ways to organize current literature. They all encompass the same theories, revealing a consensus about which theories are relevant to the current debate. Furthermore, both studies (Barro, 2000, and Thorbecke & Charumilind, 2002) emphasize the relevance of the credit-market imperfections theory as one of the main channels through which inequality harms human capital investments.

So far, this overview has focused on theories about the channels that link inequality and growth. These theories are now going to be explored in details.

2.2.1. Multiple factor theories

Literature on the channels through which inequality affects economic growth has been divided according to affected production factors. Theories reviewed under this chapter develop a reasoning in which both human and fixed capital are affected.

Social and political unrest theories deal with the same concept. Some studies emphasize the lack of social cohesion and instability that arises in the form of violence or corruption. Others are focused in the lack of political representation and consequent lack of legitimacy.

Representative agent issue for democracies also deal with the impact of inequality in the political process. Differently from the surge of political unrest, here the shift in the electorate`s preferences occurs in the existing institutional framework while political unrest causes a disruption with existing institutions. In an unequal democracy the average voter, or the representative agent, tends to be poorer and his preferences might push democratic results for inefficient redistributive public policy.

This section will first go about political and social unrest theories emphasizing on their differences, thirdly the issues on representative agents are going to be explored.

2.2.1.1.Social unrest

Social unrest can be seen as the igniter of both political unrest and representative agent issue. Social unrest differs from political unrest when the instability it causes is not expressed under political dissatisfaction. It differs from the representative agent perspective when social frustration is not expressed through voting.

Several studies put both theories of social and political unrest together as they do not emphasize the distinct methods through which unrest affects existing institutions. Empirical studies tend to differentiate depending on the variables chosen to measure instability.

The impact of instability in political decision making has been formalized in quantitative models. Social unrest, however, is linked through a logical argument focused at the reduction in institutional security.

Alesina & Perotti (1993), p. 3, explain the different approaches to socio-political instability in two different existing paths in the literature. "The first one emphasizes executive instability. The second one is based upon indicators of social unrest and political violence". The first one is defined as "the propensity to observe government changes". The second "does not focus directly on executive changes. Socio-political instability is measured by constructing an index which summarizes various variables capturing the phenomena of social unrest." Therefore, social unrest is treated more as a phenomena than a formal theory.

This dissertation denominates the first approach as political unrest and the second approach as social unrest.

Alesina & Perotti (1994), p. 362, explore the link between inequality and social unrest. "A large group of impoverished citizens, facing a small and very rich group of well-off individuals, is likely to become dissatisfied with the existing socioeconomic status quo and demand radical changes". Again, there is no formal linkage between inequality and the

insurgence of instability. However, the logical argument seems to stand when faced with empirical testing.

Formal links between inequality, social unrest and economic growth are usually tested under the channel of political instability or representative agent. Sub-chapter 2.2.1.2. explores political instability and sub-chapter 2.2.1.3. representative agent issue.

2.2.1.2. Political instability

On the channel of political instability some formal theoretical linkages have been presented by Edwards & Tabellini (1991) and Alesina, Ozler, Roubini & Swagel (1992). Edwards & Tabellini (1991) have defined political instability as the probability of government in office to not remain in power on the next term. Their definition allow for instability to be present in working democracies.

An alternative definition provided by Alesina, Ozler, Roubini & Swagel (1992), p. 3, as "… the propensity of a change in the executive, either by "constitutional" or "unconstitutional" means.". Their definitions are very similar in the sense that political instability is defined by the chance of existing government to not remain in power. The main implications of such feature are that public policy ends up short sighted and increases investment uncertainty.

Alesina, Ozler, Roubini & Swagel (1992) do not present the various arguments of this channel in a formal model. They name three existing hypothesis. The first is that uncertain investment environment is formed in the presence of political instability. The second is the tendency for public policies to be either short sighted or disruptive in the presence of political instability. Those in power have incentives to make policies that will harm growth for future periods when other parties are likely to be empowered. The third argument focuses on the weakness of government when it is faced with instability about its political future. Such environment increases bargain power of lobbyists or other rent-seeking activities due to the weakness and uncertainty of ruling governments.

Rent-seeking theory will be revised independently since it affects mainly fixed capital formation. Its stronger impact is in private appropriation of public capital, endangering private property rights.

Edwards & Tabellini (1991) present a formal theoretical model based on previous works. They formulate a budget constraint for government and individuals. Furthermore, they insert the possibility for seignorage as an inflationary tax. This feature indicates one of the possible disruptive ways a government can harm the economy, increasing the money supply

and causing inflation. Finally, they introduce a probability of continuity in the executive power in the next term.

Their model finds an unstable political system to lead to inefficient government. This instability leads the government to accept a more wasteful governing apparatus. An inefficient tax system leads to more seignorage which disrupts economic growth due to higher inflation and higher distortionary taxes.

Intuitive reasons for the decrease in the effectiveness of the tax system are, for example, that tax evasion may be welcome to those who disagree with current government. Furthermore, a legislative majority might also enforce an inefficient tax system in order to constrain the behavior of future governments.

Alesina & Perotti (1994) explore the link between growth and political instability through a review of other studies. They emphasize on the different formulations of political instability and reviews empirical articles according to their methodology. They find mainly two ways to perform tests on political instability.

The first method uses probit econometric models. These models have as dependent variable a binary response – in the case of political instability theory is commonly used the occurrence of *coups d`etat* (governments being overthrown). Independent variables can be binary, discretionary or continuous. This way allows the use of all the social and political variables that would compose an index in their original form and relate them to a dependent variable of interest. There is no need to input weights that would require further framework or justification. The creation of an index is the second common formulation.

The second is through the development of an index. This proxy is constructed through the weighted grouping of several variables related to sociopolitical instability, such as riots, political demonstrations, assassinations or number of changes of executive in power. The formulations vary and the composition of the index (named Sociopolitical index – SPI) is up to the researcher.

SPIs are wide in their form and are very common for the measurement of social unrest. Some studies construct SPIs that encompasses both political and social unrest. As it was mentioned in section 2.2.1., there are many similarities between both theories.

2.2.1.3. Representative agent issue for democracies

The issue of the representative agent is only relevant for democracies. It concerns political theory that sees the electorate according to the median voter. This theory is also known

as poor median voter theory. This name refers to the predominance of poor voters in a democracy which might lead to sub-optimal policy making in aggregate economic terms.

Voting preferences seek to maximize an individual`s own utility as defined in terms of consumption. Wealth and income patterns influences voting preferences. Theory points out that poor median voter would vote for redistributive policies which are distortionary and harmful for economic growth. Representative agent issue is when the representative agent in a society has incentives for policies that benefit him exclusively and harms the aggregate output. This theory resembles that of rent-seeking in the sense that inequality can form groups of individuals which struggle for private benefits in detriment of social well-being.

The main theoretical frameworks follow two different formulations.

Bertola (1991) develops a model where growth is set by the accumulation of physical capital. There are two types of individuals, the "rentiers" and the "capitalists". The former has all income from labor, his income is prevenient from "non-accumulated" factors. The latter has all income from capital.

His model divides all individuals into two classes in order to analyze the dynamics of wealth accumulation by a part of society. This way, he uses utility functions to explain optimum savings rates for each class and their consumption. In his model, "capitalists" save while "rentiers" do not. This dynamic happens to shape an unequal society where median and average (or aggregate) voter have distinct interests.

Aggregate voter is a social representation of the preferences of the whole economy as if it was one single organism. The median voter represents the preference of an individual voter who is the most representative in number in that society.

In such dynamics Bertola (1991) finds that the median voter will demand for taxation in capital incomes given the polarization between "rentiers" and "capitalists". Such laws damage property rights as well as distort free market economy (Thorbecke and Charumilind, 2002, pp. 10) harming economic growth.

Another theoretical formulation by Persson and Tabellini (1991) differentiates individuals according to their skill sets – or education level. Differently from Bertola (1991), Persson and Tabellini (1991) divide society into an almost continuous range varying with the level of education. Their model takes into account consumption and investment decisions in order to maximize individual utility. Their model has also found that inequality brings about redistributive policies.

In this formulation inequality affects the democratic process in a harmful way for economic development when the median voter is poorer than the average voter. The median and the average voter denominations used here have the same definitions as before. When median voter has lower income than the average voter, there will be predominance for redistributive policies. On the other hand, when median voter has higher income than the average voter, the tendency is for no redistributive policies.

Persson and Tabellini (1991) have included redistributive policies` costs in terms of the loss of efficiency translated into lower GDP growth. This feature ends up causing that societies with higher average income tend to increase the cost of redistributive policies and, therefore, discourage these policies. The equilibrium ends up considering the difference between average and median voter`s income as well as loss in efficiency that leads to lower GDP.

Both models find that inequality affects economic performance the most the wider the distance between average and median (or aggregate and median) is (with median being lower than average).

2.2.1.4.Empirical evidences

The three topics of this chapter – Social unrest, Political instability and Representative agent issue – deal with political problems that arise from the social unrest caused by high inequality. It is important to verify what some empirical studies have found about such theories and hypothesis.

Alesina and Perotti (1993) tested the hypothesis of sociopolitical instability using data from 70 countries in the years between 1960 and 1985. They have grouped both social and political instability in the creation of an SPI (index). As discussed before, a usual method for empirical testing on Social unrest and Political instability is to form the index using both social and political variables. Their SPI is formed using the method of principal component, weighted sum of a selection of components.

Alesina and Perotti`s (1993) SPI is formed by the following components as described in their study. (i) Number of politically motivated assassinations. (ii) Number of people killed in conjunction with domestic mass violence. (iii) Number of successful *coups d`etat* in the selected period. (iv) Number of unsuccessful attempts of *coups d`etat*. (v) A dummy variable which is "0" in democracies, "0.5" in semi-democracies and "1" in dictatorships.

They have found Sociopolitical instability to reduce investment and to reduce the middle class – defined as the population in the third and fourth quintiles by income. Some examples in

their sample are Japan and Argentina. Japan presented a much lower level of instability compared to countries at the same development level in 1960, thirty years later "…this country is one of the richest in the world" (Alesina and Perotti, 1993, p. 7). Argentina has the second highest SPI in 1960 and has "…dropped several steps in the income ladder" (Alesina and Perotti, 1993, p. 7).

While Alesina and Perotti (1993) finds that sociopolitical instability is related to lower growth, Edwards and Tabellini (1991) provide one possible linkage between political instability and growth.

Edwards and Tabellini (1991), using data from 71 countries between 1971 and 1982, found political instability to increase the use of seignorage. This mechanism is one of many through which instability affects growth. Their regression was not performed through the use of an index. Alternatively, they have regressed seignorage as GDP percentage against several independent variables. One of such variables captures the changes in the governing party. This is used as the proxy for political instability. They find instability to increase the use of seignorage.

On the theory of representative agent we find empirical evidence in the work of Alesina and Rodrik (1994).

Alesina and Rodrik (1994) used two sets of samples between the years of 1960 to 1985 – one of OECD countries and another with OECD plus 24 developing countries. They regress as dependent variable the amount of redistributive taxation and test the effect of inequality (both income and wealth) as independent variable.

The variable used to represent the amount of redistributive taxation is capital taxation. They discuss the impossibility to accurately form a variable that captures all forms of redistributive taxation.

The variable used for income inequality is the Gini index available for all of the studied countries. For wealth inequality they use a sample of land distribution as a proxy.

They found both forms of inequality to impact positively the introduction and extent of redistributive policies here measured by capital taxation. Furthermore, land inequality has a bigger impact than income inequality. Growth is found to be negatively correlated to the introduction of such forms of taxation.

The selected empirical studies explored here are a selection out of many others. Their methodologies follow what has been exposed here. Some variations and other formulations

have found slightly different results. Nevertheless, the theories explored in this chapter find support in empirical studies.

2.2.2. Human Capital formation

This chapter goes about the channels through which inequality affects mainly the formation of human capital. Some channels have formal theories while others rely on logical reasoning and some empirical testing.

The theory on the impact of institutions to social development is not specific for the case of inequality. It does provide an explanation for some aspects of path dependence and imperfection in credit markets. Some of the causes of inequality could have their damaging effect reduced if institutions were in place.

The theory of credit-market imperfections is fairly recent. Its first formulations date from the end of the 1980`s. Nowadays, it is one of the most widely accepted theories on the negative impacts of inequality on economic development (Barro, 2000, Thorbecke and Charumilind, 2002). Much of the traditional argument about economic development and inequality relies on the assumption of perfect markets. However, when this assumption is questioned it comes that some essential features of inequality, such as lack of collateral or income, become an entanglement to investment.

Factors that are reinforced from parent to children have been grouped under the chapter on path dependence. They encompass features that are characterized by a vicious cycle. Parents are sometimes incapable of providing an environment more suitable for the development of their children because they did not have that for themselves. These features end up reinforcing inequality and underdevelopment.

As mentioned earlier, institutions are an external factor that can interrupt the vicious cycles of path dependence or can bridge market inefficiencies. Therefore they are the first topic reviewed.

2.2.2.1. Public infrastructure and institutions

This review will take a partial view of the institutional theory in order to extract uniquely the aspects relevant to inequality and human capital investments. This theoretical framework encompasses much wider aspects in a much deeper level. That depth, however, does not provide an answer for the topic of inequality and development and will not be the subject of this review.

Institutional theory has its origins in the works by Douglass North. In North (1991) he divides the concepts of institutions and organizations. The first is defined as the "rules of the

game", meaning the set of commonly shared understandings or rules that will define payoffs and individual results. The second is a part of the institutional framework, organizations act as players in the game of economic transactions. Some players, such as the government, introduce public infrastructure depending on the payoffs laid out by existing institutions. Therefore, the decision of investing in public infrastructure comes from the payoff set out by institutions.

North (1991) justify the need for institutions when wealth-maximizing individuals do not have full information or when cooperative games are not repeated or they have an end. Under these situations, individuals will not have the incentives to undertake productive activities in order to achieve wealth-maximizing goals. Therefore, institutions shape individual payoffs.

Institutions exist in formal and informal settings. Formal institutions are those formed by constitutions, laws, property rights. Informal ones are sanctions, taboos, customs, traditions and codes of conduct. (North, 1991, p. 97). Despite institutions being an external force to individual decision making, they are endogenous to a society. Such endogeneity makes it difficult for underdeveloped societies to depart from a sub-optimal institutional framework.

Sub-optimal institutional framework, in the sense of not providing incentives for productive activity, will define payoffs that can result in household under investment. Human capital investments might arise naturally if all returns from human capital investment can be easily and surely acquired.

Therefore, good institutions shape individual decision making into productive activities. Furthermore, they shape the behaviour of public organizations which will affect income inequality and public infrastructure. Sen (1997) has focused on the notion of economic inequality and the impact that public institutions can have on it.

Departing from the institutional perspective of shaping individual payoffs, Sen (1997) debates what can be accurately denominated as equality. An accurate concept helps define the goal of public infrastructure. Therefore he aims at institutional changes towards economic equality. His definition has been explored in chapter 2.1.3., he states that individuals who present some physical or emotional handicap require extra income in order to make their existence equal to those who do not have them. These needs must be attended by institutions in order to provide equality in opportunity. Institutions must balance the payoffs so that governments can offer infrastructure in order to bridge such needs.

These two works reviewed are complementary in view of inequality and human capital development. North (1991) focuses on the impact that institutions can have as an exogenous

factor. Sen (1997) is concerned about how these exogenous factors should be directed by public institutions.

These theories, of institutions and public infrastructure, are debated at this moment because many of the channels which will be explored under this section argue on the concept of path dependence and poverty trap. Institutions and public infrastructure are exogenous factors that can take societies out of such trap. Therefore they are relevant as they provide a solution for diagnosed cases of path dependence.

2.2.2.2. Imperfections in credit markets constricting investments

The model by Galor and Zeira (1993) reviewed for this chapter receives especial attention to its mechanisms due to the focus of this dissertation on the theory of imperfect credit markets.

Efficient credit markets function as a resource allocator from savers to borrowers. They should find which investments can pay highest returns with lowest risks and make capital available. If financial markets work well, aggregate savings will be efficiently allocated allowing for low income individuals to invest even if they do not have savings. If, on the other hand, they do not perform fully efficiently than important investments will not be funded.

The work by Galor and Zeira (1993) is cited as the proponent of credit-market imperfections theory (Thorbecke and Charumilind, 2002, Barro, 2000). Their definition of imperfect financial markets is anytime when there are differences between lender`s and borrower`s interest rate.

The reason for this assumption is because borrowers can evade loan payments by moving to other regions at a cost. Lenders can, also at a cost, enforce the debt payment. Such costs generate the discrepancy between lender`s interest rate and that of borrower`s. Lenders receive r and borrowers pay i, with $i > r$.

They have simplifying assumptions that could be worsened without damaging their conclusions. Their model allows for free access to international financial markets by any individual. There is no population growth, individuals have one offspring and one parent. They divide a lifetime in two generations and utility is drawn from own consumption and bequests left for one`s children. These simplifications do not harm their conclusions as all of them would most likely be less favorable in real life, backing their reasoning.

Their conclusion is drawn from individual utility functions which take into account consumption and children`s bequests. In the path towards utility maximization, credit markets

influence the cost and payoff of investing in becoming skilled or not. Their model finds thresholds dividing individuals in four different categories. These threshold is the basis for their theory.

In their model, they find initial wealth to influence investment decision making due to thresholds in behavior varying with initial wealth. This threshold is set out by an indivisibility of human capital investments and is the minimum amount possible to be invested. This indivisibility consists of some investments coming in unities, such as a book or tuition fees.

Two thresholds arise from the level of initial wealth. The lowest bound separates individuals who do not invest in human capital at all. This fact occurs because their initial wealth is too low to pay for borrowers` interest rate and still have higher final wealth with skilled labor`s wage – the utility in the final period of staying unskilled and landing at interest rate r is higher.

Between low and high threshold are located the individuals who borrow to invest in human capital. An intermediary point divides those who will succeed in leaving their offspring with more wealth than their parents and those who will leave their children with less wealth despite investing in human capital.

The third group above both thresholds have enough wealth to be lenders and invest in human capital.

Two assumptions in their model allow for Galor and Zeira (1993) to conclude that imperfect credit markets constrain human capital investments. The first is that some investments are indivisible. The second is that there is a natural cost to curb defaults (the reason why credit-markets are imperfect).
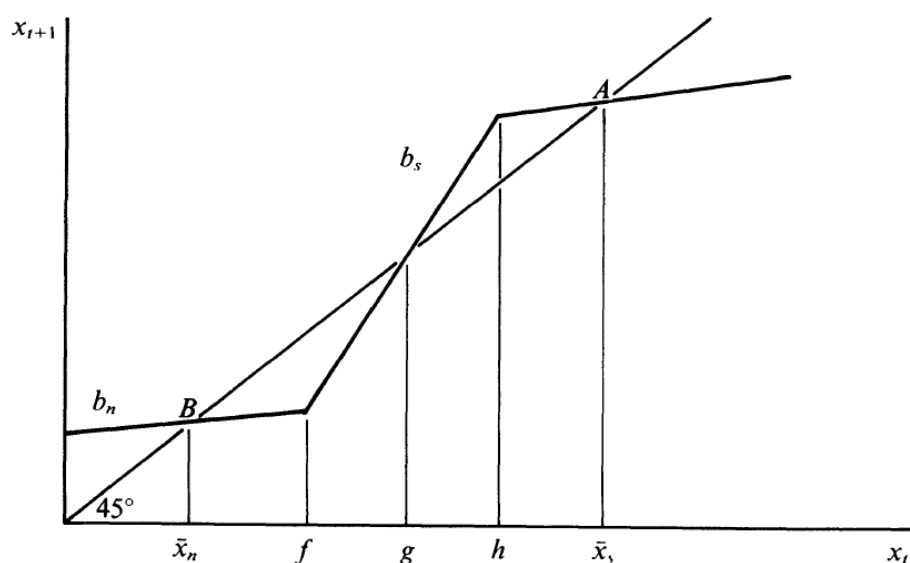
Figure 4: The impact of initial wealth to future wealth. source: Galor and Zeira (1993), p. 41.

Figure 4 portraits the thresholds mentioned and sum up the conclusions in Galor and Zeira (1993). In the *x* axis is wealth at period t, in the *y* axis is wealth at period t+1. Wealth in future periods is a consequence of human capital investments. Therefore, figure 4 provides conclusions that are drawn from the theory of imperfect credit-markets and the dependence on initial wealth. For individuals with less wealth than *f*, the equilibrium wealth for his dynasty is at $\tilde{X}_n$ and there is no investment in human capital. Individuals with wealth below *g* do invest in human capital, however their dynasty end up at equilibrium point B with wealth $\tilde{X}_n$. Individuals with wealth above *g* invest in education and find equilibrium at $\tilde{X}_s$. Point *h* marks where marginal returns on human capital investment becomes decreasing, which allows wealth to converge at a maximum point (the value of *h* means the minimal unitary investment in human capital – therefore those with less wealth than this point need to borrow in order to invest).

Galor has later further improved the explanation provided by the channel of imperfect credit-markets. Galor (2000) has divided societies according to their developmental stage. He makes use of development theories which differentiate the need for fixed or human capital depending on existing GDP per capita. He states, based on previous empirical studies, that developing economies rely more on fixed capital and would benefit from inequality. Nevertheless, in order to complete the transition into developed a society requires widespread human capital and a strong middle class. His work, therefore, attempts to provide a joint view over the several channels discussed mainly in the 1980`s and 1990`s.

Despite further advancements, the original concept of the model is given at Galor and Zeira (1993). It is strongly defined by its two assumptions of (i) indivisibility of human capital investments and (ii) imperfect credit-markets. The nature of indivisibility of an investment will hardly be changed, therefore he aims the solution in bringing more efficiency to credit-markets or dividing wealth more equally.

Such wealth constraint generates path dependence and keeps dynasties at a poverty trap. Other concepts of path dependence are the subject of the next sub-chapters.

2.2.2.3.Path dependence – from parents to children

Path dependence theories deal with the concept of poverty trap. In their understanding, the environment that has led individuals to a certain level of human capital is not changed by itself, requiring some exogenous factor. These theories set out three main channels through which parental conditions gets replicated to their children; high fertility rates, low investment in human capital, low health conditions.

Path dependence theories reinforce the relevance of the introduction of exogenous factors to the development of individuals. Theories such as imperfect credit-markets and the institutional theory refer to exogenous factors shaping the environment so that individuals can escape the poverty trap.

2.2.2.3.1. Fertility rates

Perotti (1996), in his review of the literature on the fertility rates argument, relates fertility theory with that of imperfect credit-markets. In a simple way, imperfect credit-market theory states that lower income individuals do not have full access to credit and, therefore, forego human capital investments. Fertility rates theory would have a very similar effect as the one described above due to restrictions on the number of dependents. If in a given household total human capital expenditures is constrained by the budget, than controlling for the number of children will make for higher education expenditures per dweller. Quoting Perotti (1996), pp. 153, "In an optimizing model, investment in education and fertility would be strictly connected because they can be interpreted as two alternative uses of the parents` human capital: the former, in the quality of the immediate descendants; the latter, in their quantity".

For the argument on fertility rates it is important to investigate two theoretical frameworks that link fertility to a process of rational decision making.

The one developed in Becker and Barro (1988) defines a dynastic utility function – with the assumption of the existence of altruism from parents to their children. Their analysis is based on decision making which takes into account the individual`s own consumption levels as well as his successors`. The decision of how many children does a couple want to have is taken by the tradeoff between costs of raising the child versus expected consumption levels of that child. The costs are divided amongst direct costs and opportunity costs. Direct costs tend to be somehow indifferent to the parents` own level of human capital since they consist of living expenses. Opportunity costs, on the other hand, vary – being higher for more educated parents whose time is assumed to be worth more money due to better paid jobs.

Becker, Murphy and Tamura (1990) have developed a model where the tradeoff is the most important aspect in decision making of having children. Differently from Becker and Barro (1988), the utility function to be maximized takes into account solely individual inputs. The most relevant tradeoff present in their model is between the rate of return of child labor versus the rate of return on human capital investments. Therefore, not only human capital has to have a positive net present value, it must surpass the net present value of work considering,

also, uncertainties related to future income, mortality, etc. Below, Figure 5 reveals how fertility responds to human capital of the parents for a given scenario:
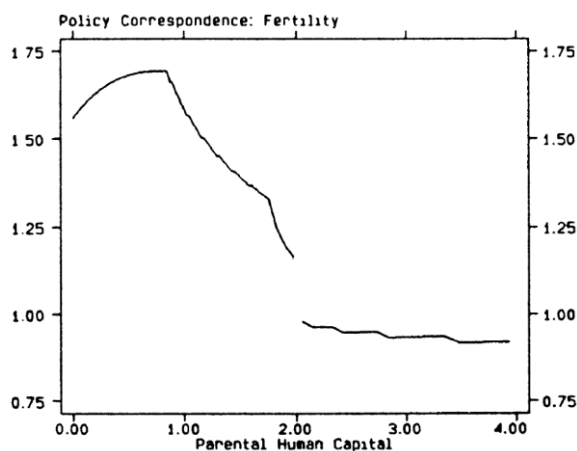
Figure 5: Fertility rates to different levels of parental human capital – source: Becker, Murphy and Tamura, 1990, pp. S31

Figure 5 reveals high fertility rates for parents with low human capital. This feature, if taken along with the budget constraint on household investments, reduces human capital investment per dweller. This graph is the result of the theoretical model, the gap in the middle is caused by the discontinuity between societies in a poverty trap and developed ones – they follow different equations when dynasties are capable of, by themselves, invest and obtain returns that increase their wealth unlimitedly.

In other words, fertility rates theory relates parental human capital to the decision of having children. This theory formulates that the tradeoff for low educated parents is higher by having more children, this fact ends up reducing human capital investments per child. This trend reinforces a poverty trap which bounds children`s human capital to that of their parents – generating path dependence.

2.2.2.3.2. Parental education level

An individual start forming its own human capital from early ages. In the period from childhood to adulthood the amount invested depends on decisions from parents or responsible adults. Parental educational level is one out of several reasons why a child does not receive enough investments in its own human capital. In a family where adults have very little education themselves, there might be a transmission of parental conditions to their offspring – causing path dependence.

The theoretical models by Becker and Barro (1988) and by Becker, Murphy and Tamura (1990) provide insight on how parental socioeconomic conditions can be replicated to their children. They have formulated intergenerational models with dynastic decisions of investment

and consumption. Becker and Barro`s (1988) model is the basis for the one developed by Becker, Murphy and Tamura (1990), the main difference is that the latter takes individual utility functions with parent altruism, while the former takes a dynastic utility function. Becker, Murphy and Tamura (1990) provide more insight on the effect of parental education levels and will, therefore, be used to exemplify this channel.

Becker, Murphy and Tamura (1990) set up a dynastic model with the main goal of analyzing trends on fertility rates and human capital investments. One of their main assumptions is of parental altruism towards their offspring. This assumption explains parental decision to forego own consumption in order to invest in their offspring. Altruism per child decreases with the increase of children per family.

Another crucial assumption is that human capital investments present increasing return rates. They justify that new knowledge benefits from old stocks of education, making it easier to acquire more human capital. Marginal returns are decreasing in very high levels of human capital. A completing relevant assumption is that investment in education "…uses relatively more human capital per unit of output than the consumption, child rearing, and physical capital sectors do." (Becker, Murphy and Tamura, 1990, p. S15). This means that human capital investments are relatively more expensive than the alternatives.

Both assumptions on human capital investments create two equilibrium points. One with high human capital and another with low, there is no equilibrium with average human capital. This indicates that individuals either continuously invest in education in an attempt to reach high levels or they do not invest in it.

Furthermore, as in many other models, skilled labor receives higher income. Therefore, this model predicts that parents with low levels of human capital do not invest in their children`s education. The reasoning is that they receive low wages, human capital investments are expensive, and at low levels of human capital marginal returns are low. These reasons explain why the payoff for parents with low levels of human capital is probably negative for investing in their children.
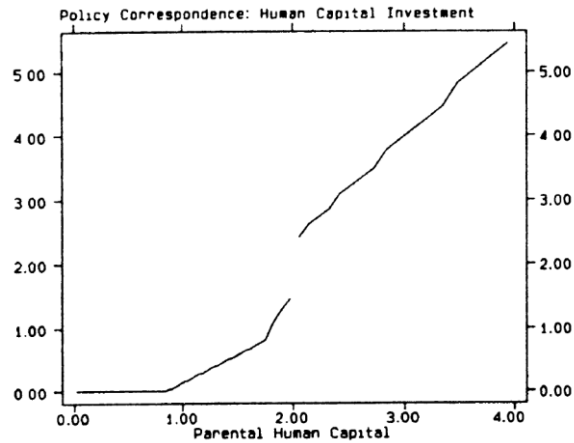
Figure 6: Human capital investments to different levels of parental human capital (Becker, Murphy and Tamura, 1990, pp. S31)

Figure 5 reveals the model`s expected human capital investment per child dependent on parental human capital. For a range of low parental human capital there is no incentive, according to their model, for investment in human capital to occur. Only from a certain level of parental education that an amount, inferior to parent`s own human capital, starts to be invested. In this section, the intergenerational model will find its equilibrium at 0 human capital investment since the parents invest less than their own human capital. The break in the middle represents the discontinuity caused by the double equilibrium found by Becker, Murphy and Tamura (1990). From that amount of parental human capital investment on child`s education is bigger than parent`s own level. Therefore, intergenerational equilibrium leads to highest human capital investment possible.

The results obtained in Figure 5 are independent of other specifications. This model has as fundamental aspect parental human capital. This feature will than determine wages, fertility rates, consumption and investment decisions.

This channel portraits how rational individuals with low levels of education might have incentives to not invest in human capital even if they are altruistic and responsible.

2.2.2.3.3. Health, nutrition and basic conditions for human development

Basic health conditions are necessary for individuals to perform productive activities. Exogenous factors are commonly the cause for increases in life expectancy and reduction in child mortality, amongst other indicators. Parental and sanitary conditions are transferred from parent to children unless institutions break that path dependence.

Health conditions significantly affect overall economic performance. The impact of health indicators on productive activities is not exposed in formal theories. Logical arguments link those indicators to specific impacts on economic performance – both individual and aggregate. Bhargava, Jamison, Lau and Murray (2001) have grouped the main arguments present in the literature.

One indicator commonly used in the literature is adult survival rate for a period of 5 years. The relevance of such indicator lies on the impact caused by the loss of the human capital gathered in that adult if he dies. In the individual perspective, the dependents of this individual have a significant decrease in expected income which will redefine investment and consumption with a limited budget constraint. Taking the aggregate perspective, this individual had gathered human capital over the course of a lifetime. Such capital is required for the economy to grow and is necessary for the introduction of new technologies which generate economic growth. Besides, his death causes the loss of whatever he produced.

Child mortality is one possible indicator of general health conditions that surround the development of an infant. Such conditions affect the individual capacity to perform his work effectively, several diseases leave the individual handicapped and unable to perform manual labor. Furthermore, poor nutrition lead to lower learning capability and reduces returns to human capital investment in that individual.

Life expectancy is the broadest indicator mentioned in Bhargava, Jamison, Lau and Murray (2001). It encompasses both adult survival rate and child mortality. It, however, loses explanatory power by disregarding the conditions in which individuals live. Bhargava, Jamison, Lau and Murray (2001), p. 8, give an example on how such indicators do not give all information required to understand the impact on production: "For example, suppose that due to poor childhood nutrition, ability of individuals to perform productive tasks diminishes at an early age but, because of easy access to medical care, life expectancy is high. Then productivity loss will be underestimated if life expectancy was used as the sole indicator of health."

Sen (1997) is concerned with this same notion. Under what he calls economic equality is the idea that income equality is not sufficient to guarantee equal conditions to two individuals in different settings. A handicapped individual requires a different attention in order to have similar utility as a healthy individual. Furthermore, this argument leads us to understand that low health conditions end up demanding more resources. As noted by Bhargava, Jamison, Lau and Murray (2001), underdeveloped countries generally present worse health conditions in all

indicators. This factor occurs due to poor economic performance which, in turn, causes poor health and sanitary conditions.

In order to escape such vicious cycle of path dependence exogenous interference is required. Public institutions or international aid might be two alternatives.

2.2.2.4.Empirical evidences

This section will give an overview of empirical evidences mainly of the influence of institutions on path dependence and the theory of imperfect credit-markets.

When testing institutions, Isaksson (2008) has verified the relation between social divisions and the institution of property rights. She uses the index of protection against risk of expropriation, developed by the International Country Risk Guides (information on the composition of this index is provided in chapter 2.2.3.3.), as a proxy for the strength of the institution of property rights. For inequality she uses the Gini index provided by the World Bank. There is also control for ethnic divisions, international economic integration, occurrence of civil wars, colonial influence and political tradition, amongst others. Her sample groups 93 countries, developed and underdeveloped, and ranges from 1960 to 1999.

She found strong evidence of social division causing institutional weakness in private property. The linkage to economic performance is also tested and found positively correlated – strong private property enhances production. Regional dummys, such as those of Europe and Africa, indicate those regions to be respectively strong and weak on private property. These dummys were found to be accurately explained by social division, with Africa having much higher social segregation, both from ethnical and income sources, than Europe. Therefore inequality, expressed through social division, is found to cause institutional fragility.

On the topic of incomplete credit-markets, Benabou (1996) starts his empirical review stating that not many tests have been done on this topic due to the difficulty in finding data that can accurately indicate the imperfections in credit-markets.

He does mention some studies that use alternative measures in order to attempt a relation between those market constraints and human capital investments. One of them is through the link of an increase in government spending in education with a reduction in private expenditures in human capital. If households are not constrained by little credit availability, an increase in government education expenditure should reduce private spending in it – this should reveal that public outlay is a substitute and there is no repressed demand for education. On the other hand,

if such public investment does not reduce private spending, than there is evidence that there was a constraint that the credit-markets were not attending to.

One possible comment on Benabou`s (1996) alternative described above is that even if there is no "crowding-out" of investments, representing the existence of hidden demand, there is still the case where credit-markets are "perfect". This is the case when such investments do not present a positive return rate. In such cases, the low payoff on human capital investemnts can be explained by the institutional framework. An alternative is when the returns on human capital are too low due to a lack of human capital in the society as a whole, therefore, there is not much productive initiatives that require highly skilled labor (Galor and Zeira, 1993).

Perotti (1996) has tested secondary school enrollment rates as an indicator of human capital investment. He uses GDP per capita, Gini coefficient and the percentage of individuals in middle and rich classes (poor class is not inserted not to cause an integration issue since middle, rich and poor classes sum up to 100%). His sample is obtained from World Bank Data for GDP and Gini. The classes of income is constructed from data obtained through household surveys gathered by past studies. His sample is a cross-section from 1960 or the closest data found to that date.

He finds income and inequality to reduce secondary school enrollment. Overall lower income per capita reduces enrollment. Furthermore, higher inequality (which increases the existence of lower income individuals) is found also to reduce enrollment. His research does not test the channel, credit-market imperfections, but find evidence that low income is correlated to lower human capital investment.

This short review indicates that empirical studies have had trouble finding ways to test the channel of imperfect credit-markets. Budget constraints are easier as a theoretical construct, however the testing of it is subject to many variables that have to be controlled for. The same issue in testing goes for path dependence. Aggregate variables, when grouping in average and variation, tend to lose the individual information necessary for such tests. The institutional approach indicates that payoffs for individuals do cause poverty traps which is worsened under high income inequality. Overall, the impact of inequality in human capital is individualized and not aggregate, it becomes aggregate through the sum of individual impacts. This fact indicates that household surveys or other source of micro data might be better to test for the effect of inequality on human capital formation.

2.2.3. Fixed Capital formation

Inequality might also affect economic growth by influencing the formation of fixed capital. In a second moment, fixed capital formation also influences other production factors, however the direct impact measured through the channels exposed here is that of inequality and fixed capital.

Theory on average savings rates is based on the concept of different marginal savings rates by different income classes. The main assumption is that wealthier individuals save a higher percentage of their income. Many empirical studies have tried to test such assumption with some finding evidence to support this assumption and other who question it.

Rent-seeking behaviour is another channel through which polarization caused by unequal income or wealth can impact economic growth. It influences all production factors given that it occurs through social influence and, most of the times, through political institutions. Nevertheless, the theory emphasizes the harm it poses on private property rights. Such insecurity damages mainly fixed capital investments.

Chronologically, average savings rates was one of the first formal theories that links inequality and growth through a channel. Therefore, this theory will be revised first.

2.2.3.1.Average savings rates

Average savings rates is one determinant for a country`s capacity to invest. External savings can also be used to promote growth, however they oscillate with external factors being less reliable than internal savings. Therefore, the amount saved by individuals is relevant for the replacement of depreciated capital and investment into new fixed capital.

Kaldor (1956) has formulated the theory of average savings rates based on the argument that high income classes save a higher share of their income. He concluded that higher inequality enhances economic growth through the increase of total savings.

Going through Kaldor (1956) it becomes clear that much has been added later under the name of Kaldor`s hypothesis. His work consists of reviewing four schools of economic thought under their understandings of the impact of inequality in growth (or the theories of distribution) – Ricardian; Marxist; Marginalist and Keynesian.

Kaldor`s hypothesis – as it is known the assumption of higher savings rates for higher income individuals – was formulated in his review of inequality through the Keynesian perspective. His work was pioneer by making use of Keynesian theory in order to study the multiplier effect under different distributions of income. He is focused at how increased aggregated savings, induced by the distribution of income, can have a multiplier effect on GDP.

To do so, he aggregates all national income into two categories: profits (property owners and entrepreneurs) and wages (manual work and salaries). Soon thereafter, he makes use of the assumption that savings rates for income that derives from profits to be higher than that of wages. He justifies such hypothesis because he considers a great part of profits – which, in his model, is the income gained by high income individuals – to be accrued by companies which keep these resources saved for future investment (Kaldor, 1956, pg. 95).

His assumption has been later interpreted by other studies and his theory evolved from its initial understandings. Nowadays it is commonly exposed as wealthier individuals savings a higher share of their own income, while Kaldor`s formulation had the firm as a catalyzer of such behavior. It gave birth to conclusions that higher shares of profits in an economy would lead to higher aggregate savings.

The final structure of this hypothesis is that higher income population earn more of their income in profits. Profits are subject to higher savings rates since they are, many times, formed and retained by companies. Therefore, higher income population form higher savings. This is known as the savings rate argument pointed out by Barro (2000) or the classical approach according to Thorbecke and Charumilind (2002).

With higher aggregate savings an economy should present higher GDP growth. This is the classical view which is supported by development theories such as Solow (1956). In his theory, Solow uses a production function where GDP is dependent on capital and labor. He tries to determine the path of a country towards high per capita GDP.

Some variables – such as population growth and capital depreciation – reduce GDP per capita. They make necessary for fixed capital to be formed in order to maintain per capital levels. The way to maintain and increase GDP per capita in the original formulation is by investing more in fixed capital which is dependent on aggregate savings. On further versions, human capital investments are added, but they remain determined by the amount of savings.

This argument is one of the few to find a positive link between income inequality and economic growth.

2.2.3.2. Rent-seeking

The theory on rent-seeking relies on the fragility of property rights under what Keefer and Knack (2000) call of polarization of income. This term is used to denominate the polarization that can occur in a society due to highly unequal income distribution and is widely used in the theory and empirical testing of rent-seeking.

Polarization can incentivize rent-seeking behavior. In its turn, this behavior endangers private property. A specification of the link between rent-seeking and private property is given in Keefer and Knack (2002), p. 129, they say property rights are endangered when there is "…the risk that governments will repudiate contracts with firms or in other ways make decisions that have the effect of devaluing firm assets. Insecure environments are those where governments are more likely to make large departures from previous commitments to firms.".

The theoretical framework used by the empirical research of Keefer and Knack (2002) has divided polarization by two sources; ethnical divergences and income inequality. The first form of division is not in the scope of this work. The second form has received the support by many studies that point out to lack of political legitimacy and consensus for public policies as a consequence of the polarization caused by inequality.

A more complete theoretical explanation is laid out by Benhabib and Rustichini (1991). Their work formulates a theoretical game between two players with similar and interacting utility functions where their goal is to maximize consumption along several periods. They must find balance between the decisions of saving, increasing wealth, investing and consuming.

Their model allows for individuals to spend wealth in order to acquire political benefits. These benefits consist rent-seeking activity. They are costly but increase the economic success of the individual without the need to invest in other production factors. These activities act by establishing upper or lower bounds to other`s investment or consumption. Their model also allows for sanctions and other ways to alter the initial settings that led to certain investment decisions. This is comparable to the definition of endangered property rights by Keefer and Knack (2002).

An economy following the theoretical development of their model reaches sub-optimal economic growth. Individuals having incentives to spend wealth in order to manipulate the "rules of the game" constrain growth prospects by investing in non-productive activities.

This theory is not easily tested because inequality data has to be clustered to investigate by polarization between different groups. This data is not commonly available with only a few sources being capable of providing information on social polarization.

2.2.3.3.Empirical evidences

The test performed by Keefer and Knack (2000) provides a complete analysis of the argument of rent-seeking. In order to find a measure of inequality that would allow to test for polarization, they have used data from the Deinin-Squire data set which permits such clustering.

To test for rent-seeking, they have used the fragility of property rights as it is determined by the International Country Risk Guide.

The International Country Risk Guide for property rights` risk is formed by five sub indicators: Expropriation risk, Risk of repudiation of contracts by government, Rule of law, Quality of the bureaucracy and Corruption in government.

With property rights`s risk as dependent variable they found all forms of polarization to increase rent-seeking. Income and wealth polarization (measured by land ownership) have been found to significantly reduce the enforcement of private property with up to 0.1% significance level.

Kaldor`s hypothesis has been tested in several different formulations since its conception in 1956. Schmidt-Hebbel and Serven (2000) have performed an empirical study with recent data. Historically, empirical studies on the theory of savings rates have presented evidences both pro and against Kaldor`s hypothesis, leading to inconclusive results.

Schmidt-Hebbel and Serven (2000) use a data which they claim to bring more detail on income and savings patterns than former data sets. They have grouped data from 19 OECD countries and 33 developing. Other features, such as Gini coefficient, are taken from the World Bank.

They have selected three older empirical tests which found a positive relation between inequality and savings rates when they were performed. They re-tested them with a new data set. By using the same test specification as other studies they wanted to prove the conclusiveness of their results and the dependence of older empirical studies on a reliable data set. The three studies selected, did not find robust evidence on the effect of income inequality on savings rates when using the new data.

They also estimate their own specification. Their main contribution to older formulations is to use GNP (gross national product) and GNS (gross national savings) instead of GDP (gross domestic product) or GDS (gross domestic savings). They justify the use of such variables because they encompass income obtained abroad and exclude income formed locally but acquired by individuals abroad – obtaining a value which most likely becomes income in the selected countries.

Even with their own formulation they have found insignificant overall results not being able to link directly income inequality and aggregate savings.

Overall, fixed capital formation seems to be harmed by inequality when it damages social cohesion and political institutions. Rent-seeking presents itself as a true threat that occurs

in all possible forms of polarization – including income inequality. Savings rates, however, are not certainly affected by inequality. Therefore, fixed capital formation also seems to be majorly harmed by inequality.

2.3. Perspectives of inequality from Brazil

Brazilian theoretical studies on the impacts of inequality on economic performance do not commonly follow the theories discussed in the international debate. Empirical research more commonly present alignment with mainstream theories. The lack of data does complicate the task of empirical testing in Brazil. Furthermore, most empirical testing in Brazil attempts the direct link from inequality to economic performance. The international experience has revealed that testing the channels generally brings more insight on the effects of inequality than direct linkage.

This dissertation follows international the international theories. Given the lack of local theoretical studies aligned with the international framework, this review combines some theoretical and mostly empirical studies when presenting each topic. The goal is to provide an overview on local inequality and the paths taken by local studies on the topic of inequality and growth.

This chapter will review the origins of Brazilian inequality which many claim to have generated path dependence up to nowadays. The historical review, however, has very little link to the existing literature and not much can be done in terms of public policy. Therefore, even though of high historical relevance, this section will not have much depth.

From the point of understanding historical background, this section analyses the observed impacts of inequality on the factors of production – following the section outline from chapter 2.2..

2.3.1. Origins of inequality and historical dependence

Social divisions are a part of Brazilian society since it conception as a nation. The colonial past and the ethnical diversity has arranged a society based on the control of wealth by one ethnic group. In the study of culture and society performed in Brazilian literature we find the division of mainly three cultural matrixes; European, African and Native.

Such ethnical variability has been transmitted into the possession of economic resources – land, capital, human capital, etc. With the end of slavery in 1888 some wealth began to be captured by some individuals who, before that time, could not have any possessions. The social

organization in place at that time would replicate itself in the following years. Some inequality has been reduced over the years, however some of the old existing institutions might have promulgated path dependence. Recent years have seen both increases and decreases in inequality. Different aims for public policy and varied institutional arrangements allowed for it.

Brazil has experienced industrialization in intermittent moments in its history. Some governments, have emphasized fixed capital formation. These projects were never long lasting with some entanglement slowing down growth after a short period of fast economic progress. This growth pattern has allowed for some fixed capital accumulation and also the need for qualified workforce.

Fishlow (1972) has studied the period between 1960 and 1970 using data from the Census and other own estimations. He found the initial distribution of human capital, in 1960, to be an indicator of inequality in 1970. Therefore the initial endowment of human capital has had a predominant effect on future income. In this period he found that public policies focused at relaxing the minimum wage have had the effect of allowing for faster adaptation from differences in income to differences in education levels. He found average income of low income individuals to grow in this period. Therefore, a significant amount of social mobility had been experienced along with fast paced growth in the period studied.

After this period of high growth and social mobility, Brazil has experienced aggravating income inequality along with lower growth in the decade of 1980 as noted in Birdsall & Londoño (1997). Their focuses at pointing out inadequacies in the methods applied by the World Bank in the 1990`s which aim at stimulating economic growth. To make their argument they use the example of Latin America. They found that, despite the introduction of neoliberal policies in these countries in the 1990`s, GDP growth has been sluggish and income inequality remains at very high levels. We can say that, despite some periods of strong growth and reducing inequality, Brazil and other Latin American countries still present strong path dependence inherited from its historical origins.

In this last decade Brazil has presented economic growth combined with stronger reduction in income inequality. However, there still seems to be strong path dependence, low health and education conditions to poor individuals and social division, be it ethnical or income based.

2.3.2. Debates on the impacts of inequality on growth

This review will begin with the empirical study of Santolin and de Figueiredo (2010) on the impact of inequality on growth across different Brazilian cities. They used data for 1980, 1991 and 2000 taken by the IBGE and IPEA. Their study reveals that different regions in Brazil require different investments. For some cities he finds human capital to have higher return, in others fixed capital is favored. With knowledge of such and with the theories mentioned it is possible to expect different impacts of inequality on economic performance.

In municipalities where growth was led by industrialization, fixed capital played a major role and had a predominant effect. In others where services led the economic activity, human capital was crucial for the development of such activities. As it was contemplated by both political and institutional theories, exogenous policies can define payoffs which will define optimal investment allocation – either physical capital or human capital. Also, the marginal returns to capital and the existing stock define the payoffs.

Linking international theories with the empirical findings by Santolin and de Figueiredo (2010), municipalities with more reliance on the industrial sector depend more on fixed capital and, therefore, should benefit more from higher inequality. This profile of income distribution is related in theory to higher aggregate savings.

Alternatively, an empirical study by Dias and Dias (2007) found evidence of human capital investment dampening economic growth. They tested using data from Brazilian states where some form of redistribution took place – source was IBGE. They found that the short length of their sample – from 1992 to 1996 – was not enough to capture the effect of increases in education spending. Short term fluctuations tend to be more influenced by Keynesian mechanisms and reduce economic performance as well as measured worker productivity due to taxation. In the longer run, however, it is expected for public human capital investment to have a positive effect.

Furthermore, the study found evidence that more equal human capital, measured by the amount of human capital from employers to employees, as well as technological advances, to increase overall productivity in the long run when they occur together.

Risco (2011) provides many insights into inequality in Brazil. One concept he tested that differs from other studies is that of the frontier of inequality. This concept captures the maximum inequality possible when all individuals receive only subsistence wages and one receive the rest of the income (it is measured much as the Gini coefficient – 0 being complete equality and 1 complete inequality). The ratio between actual Gini and the frontier indicates how unequal that region is compared to how unequal it could be.

Using data from IPEA, he provides a good regional overview on inequality levels using the ration described above.

Ratios from frontier to actual inequality (Grey – subsistence income R$ 70/month. Black – subsistence income R$ 130/month):
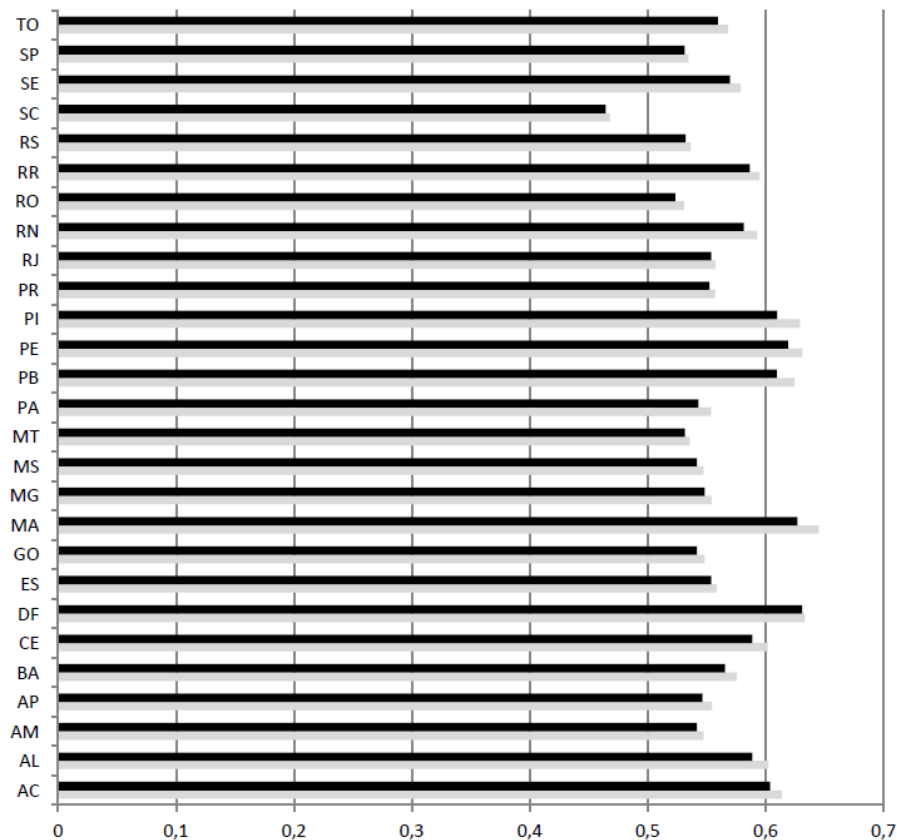
Figure 7: Ratio from frontier of inequality to Gini. - source: Risco, 2011, p.64

The ratio above, as mentioned, portraits inequality as it is in comparison from as it would be in the worst case scenario. Therefore, it indicates how close are these regions for being as unequal as they could be. There is significant regional discrepancy with Santa Catarina presenting less than 0.5 on this ratio Gini index and Maranhao at near 0.65.

Other studies, such as those of Castro (2006) and da Cruz and Teixeira (2008), test the direct links between inequality and growth finding that it reduces economic performance. This approach, however, has been proven to be inconclusive in international studies. It does provide some evidence, but the many channels through which inequality is linked to economic performance interfere in obtaining clear causality. It can be said that the channels must be tested given their logical and theoretical link to causes such as economic performance.

Therefore, the next steps are to take a look at what Brazilian literature has exposed on both the impact of inequality on human and fixed capital.

It is usual for debates concerning education in Brazil to follow local perspectives and not be integrated in the international debate. Hoffman (2001) says that the need for better education for overall population is a consensus in Brazilian academia. Some studies point out to the relevance of this topic due to the benefits to economic performance. Others, on the other hand, find them relevant in itself, as a matter of social justice.

Some strong ideological dispute has led several studies to debate on the quality of education, instead of how to offer it to the entire population. Some examples are studies such as Rodrigues (1997) and Machado (1998) which focus on how to promote "employability" and the purposes of education. Despite the topic`s relevance for the debate, one issue that is prior to "which" education to provide is that of allowing for education to reach all individuals. This dissertation focuses at the focus of human capital investment independent on its form or goal.

De Souza (2012) takes a different perspective from the studies pointed above, focusing on the reach of economic equality. His study provides evidences of the positive perspective which has been predominant about Brazil in the beginning of the 21st century. He compares it to the gloomy scenario of the early 1990`s and presents five reasons for the quick shift in expectations. The first being favorable external factors, the other four are local measures taken by local government; public education, minimum wage law, social security pensions and social assistance transfers.

His analysis is based on data from household surveys (PNAD) and indicates that strong redistribution in its several forms allowed for the improvement in Brazilian future prospects. The results indicate a reduction in inequality which began already in the 1990`s. One of the most insightful data presented by him was the evolution of years of education and its inequality.

Mean years of Schooling and Gini Index of Years of Schooling for the Economically Active Population – Brazil, 1995/2009
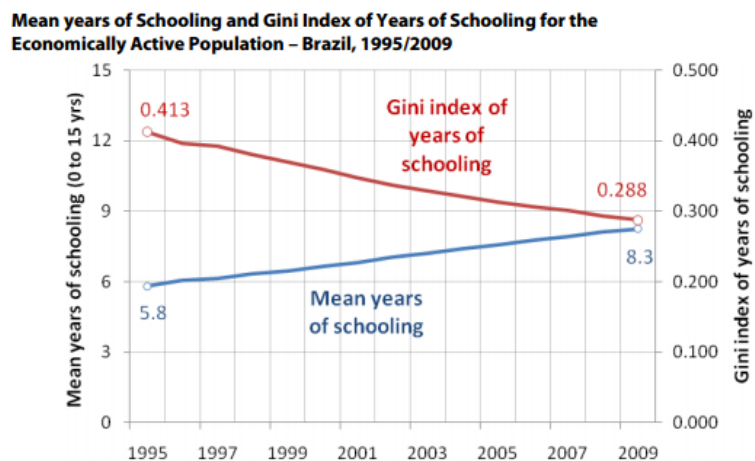
Source: Pesquisa Nacional por Amostra de Domicílios, 1995/2009.

Figure 8: Evolution of education in Brazil - de Souza (2012), pp. 10

Two positive trends towards education have been observed. The first that average schooling years have increased, nevertheless, this could have been caused by augmenting education in high income classes. The second trend solves the question raised above, schooling years have become more evenly distributed. Data from the IBGE on education, which was used by de Souza (2012), captures features of male adults because it focuses on the representative agent in family earnings which is majorly taken to be the man. Relating to the standard of data collection laid out by Kuznets (1955), we see the IBGE have adjusted some specificities for the Brazilian reality, nevertheless the main features are kept (household income is still the main unity of income). Furthermore, these rules laid out by the IBGE also follow Sen (1997) when he considers social capital and social environment in order to discuss economic inequality.

This reduction in inequality in education has happened also due to redistribution efforts in income – de Souza (2012). He points out the new minimum wage law from 1984 to have helped in impacting education equality. Old legislation lacked necessary adjustments in order to maintain real value in the face of inflation, salaried workers would see their purchase power decrease with time. He mentions an argument by Fishlow (1972), where he points out the military government`s decision to depreciate the minimum wage as a cause for increased inequality (de Souza, 2012, p. 11).

Castro (1971), in his theoretical study, provides one hypothesis specific to investments in human capital in Brazil. He claims that there might be a network for those who control economic and education assets. Higher income individuals would have higher availability of high quality education also due to influences in the selection process for high quality education institutions. Even if this network is not affecting access to education, he claims this network to affect also the job market. The difficulty to get highly paid jobs influences individual decision making to invest time and resources into education – if the payoff is constrained there is little incentive to pursue it. This effect seems comparable to the definition of institutions as they influence individual payoffs.

The payoff settles the expected return for an investment, credit-markets help reduce the costs related to them. Parente (2003) analyses the reach of Brazilian financial sector into lower income population. She found credit to be limited due to bureaucratic requirements such as minimal income confirmation, and collateral. A big percentage of low income Brazilian workers are not hired in the formal market or perform autonomous activities to earn an income, therefore they cannot present minimal income confirmation. Credit gets even more constrained when we add to this factor their lack of assets to work as collateral – given Brazilian high levels

of wealth inequality. As it has been presented by the credit-market imperfections theory, the lack of wealth might aggravate credit-market inefficiencies. Parente (2003) provides us with good insight that credit-markets are highly flawed as a distributer of resources in Brazil.

Kroth and Dias (2012) empirically explore the impact of human and fixed capital on growth in cities of the South of Brazil. To test for human capital they have constructed an index using measures of schooling years and age – their source was taken from RAIS. They argue that region to have reached a threshold in basic education, meaning that the effects of further investment have to be redirected to superior levels of education or with higher quality. This conclusion is not reached directly from their estimations. They have found human capital contribution to production to be at similar levels as other studies which took the whole country into consideration. However, the South region present a much higher schooling rate than the national average. In order to explain such fact they have raised the threshold theory.

They have also found that most private investments in education in the South region use personal savings (Kroth and Dias, 2012, p. 647). This is an argument that might indicate that, if there are credit-market imperfections in place, individual investment to education should rise even more predominantly over public investments.

Up to this point some features of inequality in Brazil have been revealed. The first is that there is a lack of human capital, the trend is, however, positive as it has been revealed by de Souza (2012). Debates on the quality of education are existent, nevertheless, education does not yet reach all individuals as it has been pointed by Hoffman (2001) and Castro (1971). Credit markets seem to be constrained as found by Parente (2003). The return of human capital investments is found to be positive and investments seem to justify both public and private investments as shown by Kroth and Dias (2012).

2.3.2.2.Fixed Capital formation

Fixed capital formation is another pillar of economic prosperity. Historically, Brazilian public policy has been more emphatic in fixed capital investments than in human capital. International flows help to balance the need for it as long as good institutional framework is in place.

Strong institutions are necessary for investments and for the well-being of individuals. The same conditions that Sen (1997) uses to describe economic well-being are relevant for an environment that promotes fixed capital investments. Institutional failures in bringing security,

contract enforcement and public infrastructure affect not only individual satisfaction but also investor`s will to invest.

Investments require savings. There is evidence that private savings are generally low in Brazil and that there is a persistence of high consumption rates as noted by Além and Giambiagi (1997). They developed theoretical scenarios for the path of future economic growth. Their model indicate that Brazilian historical low savings rate will act as an impediment for future economic growth. Due to the characteristic of low savings by Brazilians, they find to be necessary for GDP to advance first in order for savings to grow, and not the other way around. Therefore their model finds a dependence on public savings for Brazil to have higher investment capacity.

Private savings rates might be improved in a different institutional setting. Sarmento (2011) has studied the relation between the formation of mandatory public retirement plans and its impact to the formation of savings. He finds that the compulsory retirement plan, as it is in Brazil, to be inducing lower private savings rates. He advocates for a change in the system to allow for better creation of savings, recommending a capitalization system. This would mean forming savings with the individual`s contribution going to a fund which will be returned later to these individuals.

Mandatory public savings policies, such as public retirement plans recommended by Sarmento (2011), help form savings. These end up in the banking system and help lowering interest rates. However, these savings would not revert into investments in education if credit-market imperfections are in place – Perotti (1996) and Galor & Zeira (1993). Nevertheless, the current Brazilian retirement plan not only does not form savings but it increases public spending by redirecting taxes into retirement payouts.

Savings formation is crucial for fixed capital investments. Furthermore, it is important to understand the payoffs of different investments. The next studies evaluate the dependence of GDP on fixed capital in different regions in Brazil.

Barreto, Barros and Manso (2007) performed an estimation of the impacts of inequality on economic growth. They have used a sample from 1987 to 2002 using variables of production and inequality – Gini index, share of individuals below poverty line, share of individuals by study years and others, all divided by regions – the source used was IPEA and PNAD. They have found higher inequality to be related to higher subsequent economic performance in the Northeast region. In all the other regions higher inequality led to lower economic growth.

They have argued that the Northeast region might be benefiting more from the savings effect of higher inequality. Other international studies (Scmhidt-Hebbel and Serven, 2000) have not found evidence to confirm this theory, therefore other explanations could be attempted. For other regions, they have not specified which of the many channels might be making inequality harm growth. Nevertheless, they do point these theories as the probable cause for the result found.

This review on fixed capital formation in Brazil has been focused on empirical works. As it has been mentioned in the beginning of section 2.3., local theoretical works do not commonly follow the international developments in the field. Furthermore, empirical studies present more connection to the global discussion on inequality and provide more insight on the socioeconomic conditions in the region.

2.4. Conclusions from the Literature review

This review has emphasized on the possible channels through which inequality might affect economic performance (Figure 3). It has not paid attention solely to channels where formal theories have been developed, those which have a logical argument but lack formal linkages have been explored. Channels such as social unrest do not find academic theories. Nevertheless, there are studies that have provided evidence of those events, so the trend on this review has been to pay attention to all of them.

All studies reviewed have more depth than what was presented here. It is common to find more than one formal theory for those channels which have had been academically formalized. However, the general framework of all of those models follow roughly the same trends or assumptions. In order to be able to review all the possible channels, this review has focused on these assumptions that are common or preponderant in the literature. This way providing enough information to understand the concept of those studies.

Empirical studies have been used to bring some evidence into the debate. They aim to reveal some difficulties found in which proxies or data sets to use. The results, as it is common, vary from one study to the other. The aim was not at bringing studies that could settle the debate, the goal was to inform how these tests have been performed, what are some issues found and, using the most cited studies, what has the evidence told – but not with a conclusive goal.

Some studies in Brazil follow the international literature. However, local cultural specificities cause many studies to diverge from internationally accepted frameworks. On the empirical side, many articles still try to test the direct linkage from inequality to growth. This

was common in the international literature in the recent past, though the trend nowadays is to test for the channels since they can provide better results.

3. Research motive and value for current literature

The research question from this dissertation is:

"Are there evidences of credit-market imperfections and low human capital investments for Brazil?"

The hypothesis supported here is that credit-markets are imperfect and education investments are constrained by low income in Brazil.

The motive for such interest is found in the literature. Brazilian theoretical studies do not commonly follow internationally accepted frameworks. Empirical works in Brazil lack in number, some insights can be drawn but we do not have a complete picture. One reason for the lack of empirical studies is the scarcity of data, a factor which has been improving with the consolidation, still in progress, of the works by the IBGE in household surveys. There is still some standardization to be done, nevertheless, there has been much improvement in the availability of data. Another reason for a limited picture of Brazilian inequality is that many studies still test the direct link from inequality to economic growth. This formulation provides insight on general features, however, current literature allows for a more accurate distinction of the channels where to focus public policy.

Much of recent international theoretical works has been focused on exploring such various channels. They have been explored in the literature review; savings rates, social and political unrest, median voter, credit-markets imperfections, etc. These theories have brought the need for empirical works to test for the theoretical links they have developed. Different theories might find evidence of them in different countries or using different samples. The little time lapse between their formulation and nowadays reduces the number of tests made, creating the need for more evidence to base the debate even at an international level.

Brazilian economy has experienced strong fixed capital investments in some periods of its history. Even though this factor would still benefit from more investments, the need for human capital is mentioned in several studies and indicated by low education indicators (e.g.: average of 7.6 years of education – IPEA). Persistent high Brazilian inequality can be related to low levels of human capital, according to the theory of credit-market imperfections.

One particular motivation in looking for evidence of credit-market imperfections comes from increasing the freedom of individuals. Capital availability allows for individuals to pursuit their own life goals. If it can be recognized that wealth and income are constraining investment possibilities than some policy can be aimed at increasing private investment potentials. Individual entrepreneurship might increase personal responsibilities and, maybe, re-shape old institutions. This motivation is formed by a mix of evidence and personal beliefs.

Therefore, finding evidence of credit-market constraints, and its relation to human capital investments in Brazil, should be valuable for both national and international debates. The first profits from the extra evidence brought towards a recent theoretical framework. The second benefits from extra detail in the picture of inequality in Brazil.

Data from household survey, POF, is the source in the search for evidence of credit-market imperfections. Two types of data will be used for the purpose of providing relevant proof. The first is expenditure profile; this will allow for some comparison between income classes and consequent evidence of investments being constraint or not. The second is access to credit-markets; this is measured in the ownership of credit or debit cards as well as having a bank account and it reveals the extent to which these markets have penetrated in different income classes.

The goal is to find a relation between constrained investments and low insertion of credit-market tools. In the occurrence of that, there is evidence that private investments are under some form of budget constraint.

4. Description of data collection

The literature reviewed has explored several different channels through which inequality may affect economic growth. The channel of imperfect credit-markets is the one of interest in this dissertation. To verify this argument, it is important to find evidence of both (i) expenditure patterns of individuals under different budget constraints and (ii) eventual signs of imperfections in credit markets.

To test both behaviors that would characterize the argument of credit-market imperfections it is possible to use data from POF (Pesquisa de Orcamento Familiar – Household Budget Survey).

4.1. POF

POF is conducted through household survey. It focuses on providing detailed information on consumption and quality of life. The sample is very broad, reaching all income classes. The goal is mainly to provide information on the consumption patterns of households.

The survey of the POF has started in 1991. IBGE (Instituto Brasileiro de Geografia Estatistica – Brazilian National Statistics Institute) provides, in their website, data from 2002 and 2008 surveys. In between years, the survey occurs obtaining very little information. This is done not to over use the families who provide the data. POF`s methodology tries to maintain the same families across different years of research. This feature provides us with good insight when we compare the POF 2002 and 2008 since most of the sample will portrait behaviors from the same agents.

The data, collected in thousands of households, is exposed in simplified tables organized by the IBGE in their publication of the research. The layout of those tables vary year by year, not following the same headlines. This happens as the standardization process is still ongoing. Expenditure profile is divided in almost 1000 different classes in the questionnaire. Therefore, data is more trustworthy if taken in the aggregate terms organized by the IBGE.

For the POF 2002, there is no aggregate expenditures divided by income classes. This information is available on the Microdata. However, many "blanks" or categories without values were found in it. In order to maintain trustworthiness of the data used, the compiled tables, made by the IBGE, have been used. For 2002, it has been selected the compilation of expenditures per years of education of the person of reference[1]. Using Microdata it has been possible to find income averages per income class. This assessment, which will be exposed in the next chapter, allows for comparison between 2002 and 2008 data.

For the POF 2008 we find aggregate expenditures divided by income classes. This compilation provides better information and does not require any adjustments or further considerations in order to be used.

Income classes used to divide expenditures information by the POF 2008:

i)   Up to R$ 830.00 monthly;

ii)   From R$ 830.00 to R$ 1,245.00 monthly;

iii)   From R$ 1,245.00 to R$ 2,490.00 monthly;

iv)   From R$ 2,490.00 to R$ 4,150.00 monthly;

v)   From R$ 4,150.00 to R$ 6,225.00 monthly;

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[1] Person of reference is POF`s denomination of the "head" of the family. All data is obtained under the concept of families and unities of consumption.

vi) From R$ 6,225.00 to R$ 10,375.00 monthly;

vii) More than R$ 10,375.00 monthly;

For 2002, as mentioned before, there is no consolidation of expenditures by income classes. The compilation by years of education of population above 15 years old has been selected. Classes of years of education by the POF 2002:

i) Up to 1 year;

ii) From 1 to 3 years;

iii) From 4 to 7 years;

iv) From 8 to 10 years;

v) More than 10 years.

Expenditures are presented in categories as well as aggregated. These are divided as education, health, real estate assets, consumption, total expenditure, etc. There are subdivisions to these, providing enough detail for the analysis.

POF divides Total Expenditures in three classes;

i) "Despesas Correntes" (current expenditures) – divided into 12 subclasses detailed further.

ii) "Aumento do Ativo" (asset increase) – includes real estate acquisition; other investments.

iii) "Diminuição do Passivo" (liability reduction) – includes loan and mortgage payments.

Categories inside i) Current Expenditures:

a) Alimentação (food) – includes expenditures on buying food as well as eating out

b) Habitação (housing) – includes rent; condominium expenses; utilities; home maintenance; cleaning products; furniture; appliances and repairing of household appliances.

c) Vestuário (clothing) – includes men, women and child clothing; shoes; gems and jewelry; textiles.

d) Transporte (transport) – includes urban (public); petrol; alcohol (for fuel); maintenance; vehicle purchase; occasional travel; etc.

e) Higiene e cuidados pessoais (hygiene and personal care) – includes perfumes; hair care; soap; personal utensils.

f) Assistência a Saúde (health support) – includes medicine; health insurance; dental health; medical appointments; medical treatment; surgery; hospitalization; diverse exams; treatment material; etc.

g) Educação (education) − includes regular courses; superior education; other courses; books and technical magazines; school supplies; etc.

h) Recreação e Cultura (recreation and culture) − includes toys and games; cellphone and accessories; newspapers, magazines and books not recreational; recreation and sports; etc.

i) Fumo (smoking) − includes smoking related expenses.

j) Serviços pessoais (personal services) − includes hairdresser; manicure and pedicure; repair of personal items; etc.

k) Despesas diversas (varied expenditures) − includes gambling; communication; parties and ceremonies; professional services; real estate rent of occasional use; etc.

l) Outras Despesas Correntes (other current expenditures) − includes taxes; labor contributions; banking services; pensions, allowances and donations; private pension; etc.

These expenditures will be further divided in consumption and investment. The treatment of this data is explained in chapter 5.

4.2.POF Microdata

Microdata is the raw data before it is compiled or aggregated. It consists of all answers from the families concerning income, years of study, availability of credit cards, person of reference, etc. Each data input (e.g.: one purchase) is compiled in a line storing around 100 characters of data that determine who is the individual, what is the expenditure and its value amongst other information. Each line presents specific data from interviewed inhabitants. More than one line presents data for the same person.

The files are divided according to topic. However, this is not straightforward as some expenses take up to two files alone while others are mixed in one single archive. In order to find the information demanded it is important to follow the guidelines laid out by the IBGE.

Individuals are divided across the states (or federal unities). Within the states they are divided in sectors. And within the sectors they are divided in houses. In some houses we find more than one family. The smaller unity of consumption defined in the POF is the family, which is also called as consumption unity. Therefore, in the same residence there can be more than one consumption unit.

Microdata has been used to extract information to be used directly or to improve the detail of what has been captured from the compiled tables. The selected variables are:

i) Average Income per Class;

ii) Average Years of Education;

iii) Availability of Credit Cards (binary – yes or no);

iv) Availability of Debit Cards (binary – yes or no)[2];

v) Availability of Overdraft credit (binary – yes or no);

vi) Ownership of Current Account in a bank (binary – yes or no)[3];

vii) Years of education of person of reference;

viii) Region where the household is located (North – Northeast – Southeast – South – Midwest);

These variables have been selected out of the survey due to their link to the literature. Education of the person of reference (parents) is mentioned by several studies to be linked with further human capital investments (Becker, Murphy and Tamura, 1990; Becker and Barro, 1988). Imperfections in credit markets is characterized by individuals who cannot benefit from the resources allocated by financial organizations, constraining human capital investments. Regionalism is present in Brazilian literature as a source of diversity in behavior and economic performance (Santolin and de Figueiredo, 2010; Barreto, Barros and Manso, 2007).

These sources provide the data in its original state. In order to perform analysis it is necessary to adjust it. Next section will discuss the treatment given to the data.

5. Method, data treatment and general features

Data acquired from the compiled tables from POF 2002 does not present expenditure information divided by income classes. A good indicator of income is level of education, since it is widely mentioned how more education increases income. To allow for a comparison of expenditures across different levels of income, expenditures have been captured according to years of education for 2002. For the year of 2008 expenditure profile is given by income classes.

From the method used in this dissertation, it is important to make the distinction between consumption and investments which exists within individual expenditure. From the classes laid out in section 4.1., some are seen as a form of investment while others are purely consumption. The difference is laid out below.

Investment

Within the categories of expenditure laid out in section 4.1., the following are considered as investments:

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[2] only for 2008
[3] only for 2008

i)   Education

ii)   Health support

Also, *House Maintenance* (Manutenção do Lar) is considered as an investment. It is a sub-category within the category of "Housing" expenditures. Many of other expenses in it are of pure house use, and does not concern an asset investment. Therefore, only *House Maintenance* is added as an investment.

Classes ii) and iii) – *Asset Increase* and *Liability Reduction* – are also considered as investments.

Consumption

The categories within class i), as described above, are of consumption expenditures. The categories which compose consumption are:

a) Alimentação (food) – includes expenditures on buying food as well as eating out.

b) Vestuário (clothing) – includes men, women and child clothing; shoes; gems and jewelry; textiles.

c) Transporte (transport) – includes urban (public); petrol; alcohol (for fuel); maintenance; vehicle purchase; occasional travel; etc.

d) Higiene e cuidados pessoais (hygiene and personal care) – includes perfumes; hair care; soap; personal utensils.

e) Recreação e Cultura (recreation and culture) – includes toys and games; cellphone and accessories; newspapers, magazines and books not recreational; recreation and sports; etc.

f) Fumo (smoking) – includes smoking related expenses.

g) Serviços pessoais (personal services) – includes hairdresser; manicure and pedicure; repair of personal items; etc.

h) Despesas diversas (varied expenditures) – includes gambling; communication; parties and ceremonies; professional services; real estate of occasional use; etc.

Within category "Housing", the following items are considered as consumption:

a) Rent

b) Condominium

c) Services and taxes (utilities)

d) Cleaning material

e) Furniture

f) White line and household appliances

g) Furniture maintenance

h) Others

Some comments on the categories laid out above. Recreation and Culture could be claimed to add to human capital. Since POF created the category Education, there is no reason to expect books or magazines purchased under Recreation and Culture to be for education use. The consumption of these materials can be adding to the individual`s own human capital, however such definition reaches a level of complexity where it becomes impossible to distinguish what truly adds to human capital and what does not. Therefore, this category is placed under consumption in order to provide a more consistent analysis.

Some items such as Cleaning Material or Furniture Maintenance can be claimed to help maintain the value of assets, and should be considered as investments. The fast depreciation of those investments mean they lose value quite quickly and, therefore, do not remain into the future. Here as well, the concept of investment can be bent. In order to increase the consistency of the analysis these minor forms of investments are taken as consumption because they need to be re-invested quite frequently. Other forms of investment which can keep value even if no more resources are allocated into it are considered as investments.

In order to be able to use the data, it is important to have accuracy in some features of the classes. Since two classification types are in use it is important to be able to compare them. This is done by bringing average education per income class and average income by education class for both years.

Furthermore, some general information is portrait with the purpose of providing a picture of expenditure profile by each class.

5.1. Treatment and general features of 2002 data

Data from the year of 2002, in its original form, presents expenditure behavior compiled according to the years of education of the person of reference. This data has to be treated since the focus of this analysis is on expenditure behavior between income classes.

Using Microdata, the first step taken is to find average income, in Reais per month, inside each classification of education years.
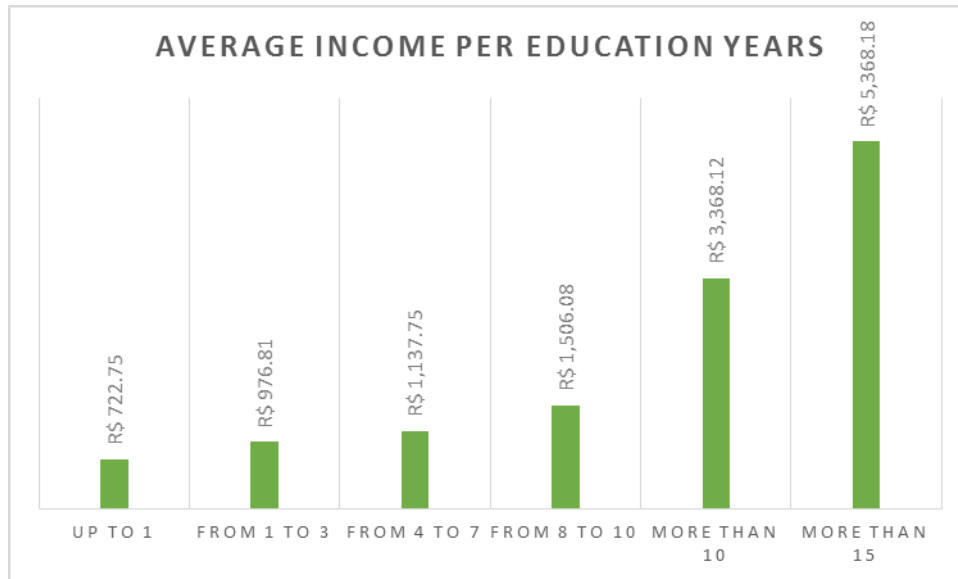
Figure 9: Average income divided by education years, 2002 - source: Own illustration

Figure 9 presents the average income, in Reais, per month of the person of reference divided according to the years of education. Education years are originally divided in 5 classes by the POF, the sixth was inserted to provide more detail. The graph reveals that the average income of individuals with no form of education is near the minimum wage. Wages grow with education, however the difference in wage between those who have no human capital and those with up to 10 years of schooling is of only R$ 783.33 – an increment of nearly 100% over the smallest salary. Education starts to really pay off when the individual reaches more than 10 years of education, achieving averages of R$ 3,368.12 and R$ 5,368.18.

These averages indicate that schooling years are a fairly good indicator to income. With expenditures divided by years of education we can extract behavior that relates to different classes of income. Another evidence presented in Figure 9 indicates the occurrence of low returns to initial investments in human capital.

The alternative analysis, dividing average years of education per income class, also has been done for the purpose of comparing the existing categorizations.
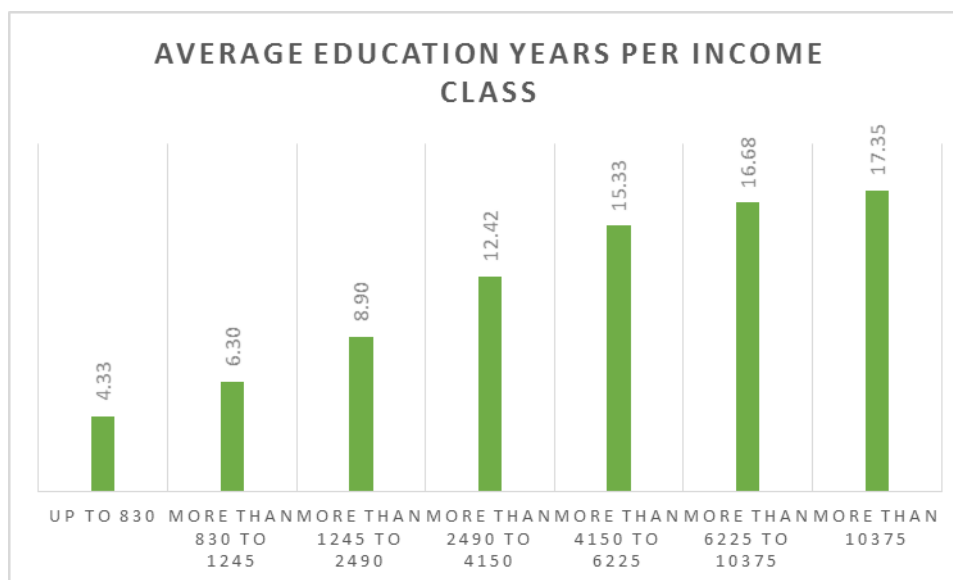
Figure 10, above, reveals the lowest income group to be formed by individuals with, on average, less than 5 full years of education. People with superior degrees average only at income from R$ 2,490.00 or more, a quite low salary when taking into account those individuals have reached the top in years of education. Amongst top earners there is very little difference in average education. Human capital seems to be less effective at raising income at that point, with income probably depending than on other factors.

The income division as it is given by POF 2008 (portrait above) divides income in 7 classes. This division seems to present a smoother path from low to high income, grouping individuals with similar economic features. Classes by years of education seem to group people who, in term of income, do not present similar features. Figure 10 divides income in a way that each class present more differences, providing more detail.

POF 2002 uses primarily the division by years of education, information will be portrayed following the original formulation. The averages we obtain from the Microdata will complement the picture. Table 1 below provides the first general overview on expenditures, investments and, therefore, consumption.

IBGE Class – Education years	Income *(Average)*	Expenditures	Investment
More than 10	R$ 3,368.12	R$ 3,117.06	R$ 812.77
From 8 to 10	R$ 1,506.08	R$ 1,513.72	R$ 288.63
From 4 to 7	R$ 1,137.75	R$ 1,227.32	R$ 217.47
From 1 to 3	R$ 976.81	R$ 932.93	R$ 151.14
Up to 1	R$ 722.75	R$ 736.36	R$ 124.12

Table 1: General features of population expenditure and income 2002 - source: POF 2002, own design

For this table individuals with more than 15 years of education have not been inserted because they do not constitute a class in POF`s division.

Expenditures on Table 1 include all expenses, both consumption and investment. Investments include only what has been laid out on chapter 5. In this table, people with less than 1 year of education receive the smallest average income and still invest, on average, R$ 124.12. Investments, average income and expenditures grow in a somewhat linear trend up to individuals with up to 10 years of education. For those with more than 10 years there is strong increase in income, expenditure and investments.

From this table it is possible to extract the savings rates as the difference between income and expenditures.
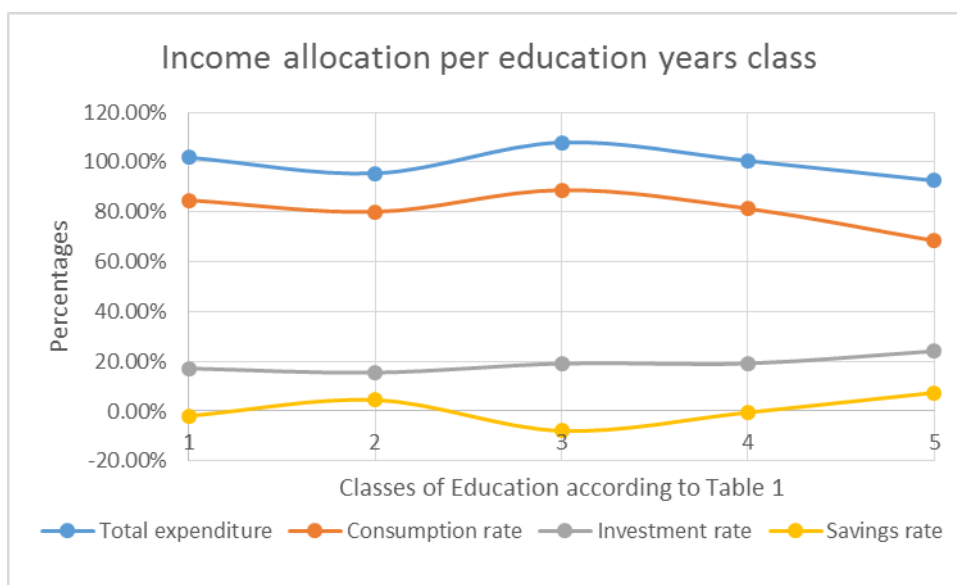
Figure 11: Income allocation - source: Own illustration

Figure 11 portraits the general allocation of income per education class. It reveals the overall picture of expenditures between classes of education. The investment and consumption rates, put together, form total expenditure. Savings rates are only what is deposited and enters the financial system, therefore it is the difference between income and total expenditures.

Figure 11 seem to present low variance between classes, some hypothesis can be raised to explain it. The classification by years of education does not allow for a good grouping of behavior by income. This division does not present much consistency intra groups, with possible significant heterogeneity. This causes that investment and consumption behavior do not present much variance between groups, neither the forming of a trend. Overall it seems that savings occur at a very low level for all classes, averaging near 0%. Direct investments lie around 20% for all classes.

One factor which deserves to be mentioned is that some individuals present total expenditures higher than income. One possible reason for such is that IBGE`s methodology

takes the income from the person of reference – according also to guidelines laid out by Kuznets (1955). It is common for lower income to have other family members working to complement income. Therefore it is possible to expect some savings formation even for very low income and education. Furthermore, government support is not included here – another possible source for this divergence.

These distortions can be relevant for income and savings measurements, yet, expenditure behaviour can be taken from the POF the way it is answered from the survey. For the purpose of investigating human capital investments there is no reason to believe in mistakes in calculation caused by POF`s methodology of data collection.

This section has gone through the adjustment made in order to make classes comparable between years. Furthermore, general features of the classes have been laid out, providing an overview after the inclusion of average income per class for the year of 2002.

5.2. Treatment and general features of 2008 data

Similarly to the analysis laid out for 2002 data, this section will cover the main aspects of the classes selected to extract expenditure behavior. Differently from 2002, POF 2008 portraits expenditure by income class. This organization is preferable, however, for the sake of comparison with data from 2002, the same type of overview is given to this data.

The first important feature is average income by years of education according to the classes laid out by POF 2002.
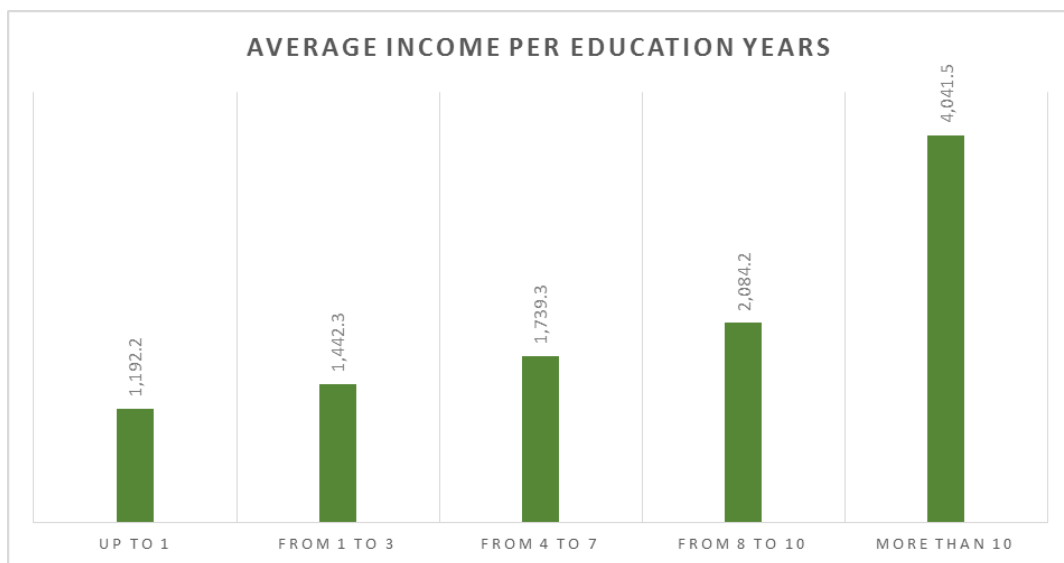
Figure 12: Average income (R$) divided by education years – source: Own illustration

Figure 12 above divides education years in 5 classes, following the division by POF 2002. One distinction from Figure 9 is the lack of the class *More then 15 years*. Microdata from

2008 does not present any education higher than 15 – this have happened due to a change in the survey. Therefore this class has not been included in here.

In Figure 12 we find a trend of growing income from individuals with no education up to those with 10 years of schooling – with the lowest average income at R$ 1,192.20 and income for those with education between 8 and 10 years at R$ 2,084.2. In this part of the curve we see little payoff to years of education. Average income for those with more than 10 years of schooling reaches R$ 4,041.50.

In complement to Figure 12, the average education per class of income provides some insight.

YEARS OF EDUCATION - AVERAGE

UP TO 830	MORE THAN 830 TO 1245	MORE THAN 1245 TO 2490	MORE THAN 2490 TO 4150	MORE THAN 4150 TO 6225	MORE THAN 6225 TO 10375	MORE THAN 10375
4.8	5.5	6.7	8.7	10.2	11.1	12.7
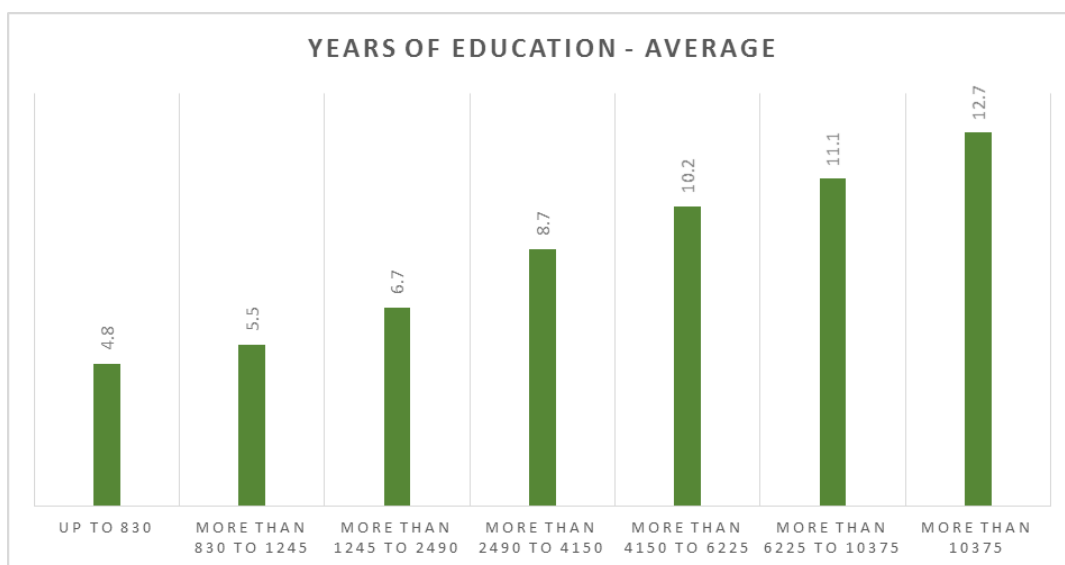
Figure 13: Average education years divided by income classes – source: Own illustration

Average years of education follow what is expected in terms of the relation between human capital and income. Figure 13 reveals that average years in the schooling system grows with income. Average education for those in the lower class of income – below R$ 830.00 per month – reaches 4.8 years. The growth of average human capital per income class follows an almost linear trend through all classes. Differently from the division of classes according to years of education this division provides more detail on the behavior of individuals. As it can be seen in Figures 10 and 13, the trend grows steadily in this layout while it has an exponential behavior in the division present in Figures 9 and 12. This is one other reason why classes of income are preferred.

An overview of expenditures and investments is provided below.

IBGE Class – Income Classes	Income *(Average)*	Expenditures	Investment
More than R$ 10,375.00	R$ 16,918.18	$ 12,274.04	$ 3,703.51
From R$ 6,225.00 to R$ 10,375.00	R$ 7,812.62	$ 6,623.38	$ 1,602.96
From R$ 4,150.00 to R$ 6,225.00	R$ 5,014.97	$ 4,299.38	$ 1,100.36
From R$ 2,490.00 to R$ 4,150.00	R$ 3,183.55	$ 2,909.57	$ 597.85
From R$ 1,245.00 to R$ 2,490.00	R$ 1,719.27	$ 1,721.04	$ 284.65
From R$ 830.00 to R$ 1,245.00	R$ 1,024.20	$ 1,084.34	$ 157.29
Up to R$ 830.00	R$ 585.11	$ 722.20	$ 96.84

Table 2: General feature of expenditure and income – source: POF 2008, own design

In the overview in Table 2 we can observe a growth of investments and overall expenditures in accordance with growth in income. Expenditures encompass both consumption and investment. The classification by income class seems to better divide different expenditure behaviors. Differently from data from 2002, here we find a smooth upwards trend with growth in income, expenditures and investments. Higher income present more savings with an average income of R$ 16,918.18 and expenditures of R$ 12,274.04. Lower income do not present saving, with average income at R$ 585.11 and expenditures at R$ 722.20.

The factor of negative savings can be explained. As mentioned in section 5.1., POF does not include earnings by other family members, following the notion of head of family. This extra pay is preponderant for lower income classes who need more sources of income. Furthermore, government aid is not included. These reasons help explain how negative savings are possible in this data set.

The behavior of savings and other general features of the allocation of income can be seen below.
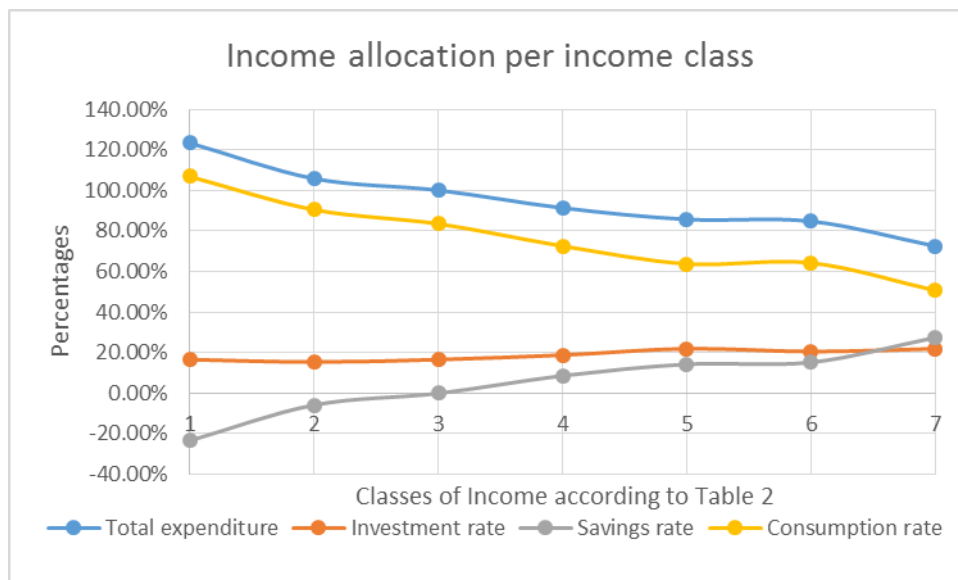

Figure 14: Expenditure and Income - source: Own illustration

Figure 14 portraits general features of the allocation of income per income class. The division by income found in POF 2008 provides more detail of the behavior between classes, as can be noted in the graph above. It is noticeable how consumption reduces from lower income

classes to higher ones. Direct investment, performed with own income, is kept constant in income percentage across different classes of income. Savings grow accordingly to the reduction in consumption in terms of income percentage.

Individuals in the two lowest classes present negative savings, factor which was explained above and follows the methodology of data collection by the IBGE. Investment rates are steady in terms of income, one feature of interest for this thesis. Total expenditure in income percentage falls into explainable levels – less than 100% of income – with higher income. The fact of higher savings for higher income can occur due to actual higher savings or due to a smaller reliance of households, present at median income class, on the income of children or other individuals who are not the head of the family.

Data from 2008 present more insightful features. These evidences will be explored in more depth in the next section, bringing the behavior towards human capital expenditures. Data from 2002 will also be explored, however, as it can be noted, the distinction by years of education does not allow a good differentiation between classes in terms of expenditure behavior. Data analysis will be looking at evidence of credit-market imperfections and constrained human capital decision making.

6. Data analysis and results

This chapter undergoes the exposition of main aspects of human capital investments and credit-market imperfections found in the data set.

From compiled tables and raw data a multitude of features can be obtained. This dissertation focuses on the credit-market imperfections theory and, for that purpose, some essential features that can be obtained from out data set are going to be explored in this chapter.

Looking for evidence of credit-market imperfections is not a standardized procedure. In the literature many different forms have been found or speculated. The main goal is to find whether human capital investments are being constrained due to a lack of access to credit-markets.

With POF`s data set at hand, it makes sense to look for human capital expenditures across income classes in order to identify if these investments are constrained. Even though this analysis might reveal a budget constraint, it is impossible to assure that this constraint occurs due to lack of credit-market efficiency. For that reason, it is important to find evidence of the reach of those financial markets.

With the data set used here it is possible to find out which households own credit cards, debit cards, have current accounts or have overdraft credit available. These variables indicate whether individuals have access to credit or not.

With both evidences, of human capital investments being constrained and of low access to credit-markets, it is possible to infer that such theory fits the Brazilian reality. This would mean that inequality is restraining human capital investments in an environment of imperfect credit-markets.

The evidences found are exposed in an order that starts with individual budget constraint, it follows budget constraint comparisons between income classes and finishes with evidence of credit-markets imperfections.

6.1. Expenditure profile per income class in income percentage

This section analyses some selected expenditures as a percentage of income across different classes of income, classes of education, different years and different regions of Brazil. This form of organizing expenses, as a percentage of income, allows for an understanding of the relevance of each expenditure inside the budget constraint.

Expenditures selected to be analyzed here are education, home maintenance and medical expenses. These three form direct investments made out of own income. Asset increase and liability reduction also form investments and are laid out in the following analysis. Furthermore, consumption and savings (income which is not spent) are included.

This section will bring evidence of the emphasis each income class gives to each form of expenditure, not only to human capital.

6.1.1. National analysis

The analysis has been divided in national and regional analysis. Both explore the same features, the distinction occur due to the wide regional discrepancies present in Brazil and the relevant magnitude of each region.

The first table portraits expenditure behavior in income percentage for 2002. As it has been explained, data from 2002 is compiled according to years of education, therefore, table 3 provides expenditures per year of education in comparison to average income per class.

EXPENSES IN INCOME PERCENTAGE - 2002

	Up to 1	From 1 to 3	From 4 to 8	From 8 to 10	More than 10
Education	1.23%	1.43%	2.11%	2.78%	5.35%
Home Maintenance	3.38%	2.88%	3.38%	3.16%	4.22%
Medical Expenses	7.56%	6.09%	6.83%	5.73%	6.17%
Asset Increase	4.05%	3.84%	5.11%	5.60%	5.59%
Liability Reduction	0.95%	1.24%	1.68%	1.89%	2.80%
Savings	-1.88%	4.49%	-7.87%	-0.51%	7.45%
Consumption	84.71%	80.04%	88.76%	81.34%	68.41%
Total Expenditure	101.88%	95.51%	107.87%	100.51%	92.55%

Table 3: Expenses in income percentage, 2002 - source: POF 2002, own elaboration

Table 3, above, provides expenditure as income percentage. Starting from the bottom of the table, total expenditure happen to be more than total income for some classes. This has been explained in section 5, IBGE`s methodology takes the income of the person of reference (main individual of the family), therefore, families where other individuals have income can present more expenditures than income. Total expenditure varies from 107.87% for families where education years reaches from 4 to 8 years (for the person of reference) to 92.55% for those with more than 10 years of education. Other classes present intermediary results.

Consumption rates – expenses that does not include direct investments – vary more than total expenditures, reaching 88.76% of income for those from 4 to 8 years of education and 68.41% for those with more than 10 years of education. Medical expenses see a reduction in its weight in the budget constraint with rise in income and education. Lowest education class (which presents the lowest average income seen in section 5) spends 7.56% on it while highest education class spends 6.17%.

Education expenditures present one of the biggest variations amongst the direct investments. It goes from 1.23% of income for the lowest education class to 5.35% to the highest. There is a somewhat exponential trend in education spending, with a small rise in its share of income between the first classes and higher rises between the last classes.

This emphasis in education spending for higher classes might occur due to a lessening of the budget constrain due to higher average income. However, since classes are divided here according to years of education, it is likely that the theories of path dependence are more strongly evidenced than the one on credit-market imperfections. These theories indicate that parents with higher education provide more human capital to their children.

The next table portraits evidence for the year of 2008. Furthermore, the division here occurs by income classes, helping to link expenditure behavior with budget constraint.

EXPENSES IN INCOME PERCENTAGE - 2008

	Up to R$ 830.00	From R$ 830.00 to R$ 1,245.00	From R$ 1,245.00 to R$ 2,490.00	From R$ 2,490.00 to R$ 4,150.00	From R$ 4,150.00 to R$ 6,225.00	From R$ 6,225.00 to R$ 10,375.00	More than R$ 10,375.00
Education	1.17%	1.26%	1.69%	2.35%	2.90%	3.69%	2.42%
Home Maintenance	4.52%	3.51%	3.27%	3.59%	4.05%	3.89%	4.03%
Medical Expenses	6.97%	6.61%	6.39%	5.83%	5.44%	5.61%	4.65%
Asset Increase	2.76%	2.53%	3.34%	4.78%	7.33%	5.15%	8.75%
Liability Reduction	1.14%	1.44%	1.88%	2.24%	2.22%	2.18%	2.04%
Savings	-23.43%	-5.87%	-0.10%	8.61%	14.27%	15.22%	27.45%
Consumption	106.88%	90.51%	83.55%	72.61%	63.79%	64.26%	50.66%
Total Expenditure	123.43%	105.87%	100.10%	91.39%	85.73%	84.78%	72.55%

Table 4: Expenses in income percentage, 2008 - source: POF 2008, own elaboration

Table 4, above, reveals expenditure as income percentage for the year of 2008 divided by classes of income. Starting the analysis from total expenditure, the variation in behavior seen here is much wider than that for 2002. Lowest income class present 123.43% of total expenditure over income while the highest income class present 72.55%. Consumption follows total expenditure in trend, with a difference in magnitude. It goes from 106.88% for lowest income to 50.66% for highest income class. The behavior of total expenditure, reaching more than total income, has already been explained.

One effect of the behavior of total expenditure is on the savings rates, resources saved for future consumption or investments. It becomes positive only for individuals with income from R$ 2,490.00 to R$ 4,150.00. This indicates that up to this income level it is likely to find several alternative sources of income – be it from unregulated jobs or owned by children or other family member. This evidence, even though brings support to the theory of higher marginal savings for higher income individuals, is inconclusive because it does not include income by other family members.

Liability reduction receives roughly similar levels of expenditure in income percentage for all classes of income. The two lowest classes invest 1.14% and 1.44% of their income respectively in reducing their liabilities while the two top classes invest 2.18% and 2.04%. Asset investments, on the other hand, vary widely with income. The lowest class invest 2.76% in increasing its assets while the two top income classes invest 5.15% and 8.75%.

On education spending, there is an increase. However not as strong as that observed for 2002 (keeping in mind the different classification between both years). Interestingly, it reaches the top in income percentage for the class of income between R$ 6,225.00 and R$ 10,375.00 and for the highest income class. There is an increase in spending in education across income classes, from 1.17% for lowest income class to 3.69% in the second highest income class,

however this growth is not the strongest. Asset investment presents a higher growth in income percentage than education investments.

There is an interesting relation between asset and education investments. Both grow up to the income class from R$ 4,150.00 to R$ 6,225.00 where asset increase reach 7.33% of income and education spending reach 2.9% of income. The next income class witness a reduction in asset increase participation in income to 5.15% and an increase in human capital investments to 3.69%. The highest income class see an increase in asset investments to 8.75% of income and a decrease in human capital investment participation in income to 2.42%.

Nationally there is evidence that human capital investments are constrained by the budget up until upper middle classes. On the other hand, the institutional framework or the cultural aspects seem to favor asset increases or savings formation over human capital investments.

6.1.2. Regional analysis

Regional analysis will explore the same factors presented up to now however dividing the analysis into the five regions which divide Brazil – North, Northeast, Southeast, South and Midwest.

The tables present here are all from 2008 since this allows for comparison between income classes, which is preferable due to increased budget information. The income used is the average per class in each region, calculated using Microdata.

NORTH REGION EXPENDITURES IN INCOME PERCENTAGE - 2008

	Up to R$ 830.00	From R$ 830.00 to R$ 1,245.00	From R$ 1,245.00 to R$ 2,490.00	From R$ 2,490.00 to R$ 4,150.00	From R$ 4,150.00 to R$ 6,225.00	From R$ 6,225.00 to R$ 10,375.00	More than R$ 10,375.00
Education	0.94%	1.10%	1.52%	2.27%	2.20%	2.93%	2.05%
Home Maintenance	4.23%	3.76%	2.58%	2.96%	2.57%	2.81%	3.09%
Medical Expenses	5.11%	4.73%	4.15%	4.40%	4.00%	3.25%	2.43%
Asset Increase	4.17%	3.23%	4.45%	4.67%	6.65%	4.35%	7.51%
Liability Reduction	0.81%	1.07%	2.20%	2.17%	3.28%	2.28%	3.53%
Savings	-31.46%	-8.43%	4.22%	13.04%	19.57%	23.74%	41.02%
Consumption	116.27%	94.55%	80.89%	70.52%	61.73%	60.66%	40.44%
Total Expenditure	131.46%	108.43%	95.78%	86.96%	80.43%	76.26%	58.98%

Table 5: Expenses in income percentage, 2008 / North region - source: POF 2008, own elaboration

The North region present some divergences from the national picture. Total expenditures rise up to 131.46% of income, indicating more presence of income from other sources. Also, highest income class in this region present a strong savings rate, 41.02% of income.

In this region, liability reduction present differences between income classes. The lowest income class spends, on average, only 0.81% of income in paying off debts while the highest

income class spends 3.53%. Asset investments receive strong emphasis, being constant at around 4% of income up to the third highest income class. On the third highest income class it increases to 6.65% following a fall in income participation to 4.35% in the next income class.

Education spending also varies widely. Lowest income class invests, on average, 0.94% of income in education. The amount invested in income percentage grows steadily up to levels at 2.93% for the second highest income class and 2.05% to the highest.

NORTHEAST REGION EXPENDITURES IN INCOME PERCENTAGE - 2008

	Up to R$ 830.00	From R$ 830.00 to R$ 1,245.00	From R$ 1,245.00 to R$ 2,490.00	From R$ 2,490.00 to R$ 4,150.00	From R$ 4,150.00 to R$ 6,225.00	From R$ 6,225.00 to R$ 10,375.00	More than R$ 10,375.00
Education	1.06%	1.36%	1.88%	2.79%	3.22%	3.39%	2.58%
Home Maintenance	3.42%	3.14%	3.31%	3.47%	3.88%	3.99%	2.74%
Medical Expenses	5.27%	6.11%	5.55%	5.74%	5.27%	5.38%	3.88%
Asset Increase	2.25%	2.50%	3.26%	4.05%	3.31%	4.71%	11.54%
Liability Reduction	1.21%	1.84%	2.41%	2.69%	2.11%	2.08%	2.09%
Savings	-7.65%	1.90%	9.35%	7.97%	14.61%	19.82%	26.75%
Consumption	94.37%	83.15%	74.24%	73.24%	67.60%	60.63%	50.28%
Total Expenditure	107.65%	98.10%	90.65%	92.03%	85.39%	80.18%	73.25%

Table 6: Expenses in income percentage, 2008 / Northeast region - source: POF 2008, own elaboration

Table 6, above, present investment patterns in income percentage for the Northeast region. Total expenditure reveals here the lowest value in all regions for the lowest income class, 107.65%. There is no evidence of this region been formed by savers, the highest income class save less than in any other region, 26.75%. The best possible explanation for the low level of total expenditure is due to all income coming from the person of reference, it is likely that other family members in this region do not bring in extra income, keeping the budget constraint close to the actual value measured by the IBGE.

Education expenditures grow with income finding the highest investment in income percentage at the second highest income class, 3.39%. It falls on the highest income class to 2.58% of income, this does not mean that the absolute value has fallen. Overall provides a very small variance for education spending across income classes.

Consumption rates, which take into account only consumption expenditures, fall from 94.37% in the lowest class of income to only 50.28% in the highest income class. House maintenance is kept almost constant at around 3.5% of income for all classes with some variation. This is evidence that individuals increase their living standards at home proportionally to their income. Buying more expensive houses the more income is available.

SOUTH REGION EXPENDITURES IN INCOME PERCENTAGE - 2008

	Up to R$ 830.00	From R$ 830.00 to R$ 1,245.00	From R$ 1,245.00 to R$ 2,490.00	From R$ 2,490.00 to R$ 4,150.00	From R$ 4,150.00 to R$ 6,225.00	From R$ 6,225.00 to R$ 10,375.00	More than R$ 10,375.00
Education	1.36%	1.73%	1.64%	1.71%	2.54%	3.20%	1.66%
Home Maintenance	7.36%	4.58%	3.96%	4.31%	3.61%	5.07%	2.33%
Medical Expenses	8.99%	7.27%	6.53%	6.50%	5.37%	5.35%	3.35%
Asset Increase	4.31%	2.69%	3.30%	6.45%	11.17%	8.34%	14.01%
Liability Reduction	1.48%	1.42%	1.92%	1.84%	1.78%	2.21%	1.44%
Savings	-49.05%	-16.77%	-1.42%	4.03%	14.21%	15.59%	36.98%
Consumption	125.78%	99.19%	84.35%	75.08%	61.35%	60.27%	40.42%
Total Expenditure	149.05%	116.77%	101.42%	95.97%	85.79%	84.41%	63.02%

Table 7: Expenses in income percentage, 2008 / South region - source: POF 2008, own elaboration

The South region presents (table 7) the highest total expenditure in income percentage than all other regions, 149.05% of declared income. Total expenditure goes down in a linear trend with growth in income, reaching 63.02% of income for the highest income class. Consumption follows the trend in total expenditure, going from 125.78% of income for lowest income class to 40.42% of income to highest income class. Liability reduction is constant across income classes at around 1.7% of income percentage spent at paying back debts.

This high level of total expenditures in income percentage indicate that many other family members must undertake some paid activity in this region, adding to the family income.

Asset investments are emphasized in the South region. With 4.31% of income spent on asset formation for the lowest income class this region`s lowest income class invest in asset formation the same percentage of income as the national average for the class with income from R$ 2,490.00 to R$ 4,150.00. This behavior is very positive for the reduction of wealth inequality and future reduction in income inequality.

Education investments in the South region are in accordance with the national average, peaking at 3.2% of income at the second highest income class. This indicates that the budget constraint for human capital investments occur up to the abovementioned income class.

SOUTHEAST REGION EXPENDITURES IN INCOME PERCENTAGE - 2008

	Up to R$ 830.00	From R$ 830.00 to R$ 1,245.00	From R$ 1,245.00 to R$ 2,490.00	From R$ 2,490.00 to R$ 4,150.00	From R$ 4,150.00 to R$ 6,225.00	From R$ 6,225.00 to R$ 10,375.00	More than R$ 10,375.00
Education	1.18%	1.02%	1.68%	2.50%	3.06%	4.12%	2.63%
Home Maintenance	5.15%	3.23%	3.07%	3.42%	4.40%	3.52%	4.69%
Medical Expenses	9.17%	7.06%	6.86%	5.99%	5.71%	6.17%	4.94%
Asset Increase	2.70%	2.11%	2.96%	4.51%	6.61%	3.81%	6.67%
Liability Reduction	1.06%	1.29%	1.52%	2.26%	2.28%	2.24%	1.94%
Savings	-31.74%	-5.77%	0.07%	8.51%	13.49%	12.42%	30.54%
Consumption	112.79%	91.12%	83.99%	72.78%	64.44%	67.72%	49.13%
Total Expenditure	131.74%	105.77%	99.93%	91.49%	86.51%	87.58%	69.46%

Table 8: Expenses in income percentage, 2008 / Southeast region - source: POF 2008, own elaboration

The Southeast region presents total expenditure behavior ranging from 131.74% of income for lowest income class up to 69.46% of income for highest income class. Consumption

rate also follows this trend ranging from 112.79% of income for lowest income class to 49.13% of income for highest income class.

Medical expenses in the Southeast region present a wide variation with lowest income individuals spending on average 9.17% of their income on health while highest income class spends 4.94% of their income. Home maintenance starts high for lowest income class, at 5.15% of income, it lowers to 3.07% of income for third lowest income class and it rises to 4.69% of income at the highest income class.

Education spending presents a linear trend from 1.18% of income percentage for lowest income class reaching 4.12% of income for the second highest income class. It then drops in income participation to 2.63% of income for highest income class.

MID WEST REGION EXPENDITURES IN INCOME PERCENTAGE - 2008

	Up to R$ 830.00	From R$ 830.00 to R$ 1,245.00	From R$ 1,245.00 to R$ 2,490.00	From R$ 2,490.00 to R$ 4,150.00	From R$ 4,150.00 to R$ 6,225.00	From R$ 6,225.00 to R$ 10,375.00	More than R$ 10,375.00
Education	1.82%	1.53%	1.52%	2.10%	2.66%	2.70%	2.12%
Home Maintenance	6.02%	4.47%	3.38%	3.60%	3.85%	4.22%	4.83%
Medical Expenses	7.98%	6.61%	5.33%	4.46%	4.75%	3.81%	3.59%
Asset Increase	1.88%	3.44%	3.89%	4.25%	9.20%	8.21%	5.10%
Liability Reduction	0.71%	0.83%	1.71%	2.63%	2.49%	1.81%	1.63%
Savings	-27.49%	-7.16%	4.81%	11.25%	15.96%	23.02%	34.39%
Consumption	109.28%	90.32%	79.43%	71.73%	61.03%	56.27%	49.11%
Total Expenditure	127.49%	107.16%	95.19%	88.75%	84.04%	76.98%	65.61%

Table 9: Expenses in income percentage, 2008 / Midwest region - source: POF 2008, own elaboration

Table 9 presents expenditure per income percentage for the Midwest region in Brazil. Total expenditure in this region ranges from 127.49% of income for the lowest income class up to 65.61% of income to the highest income class. Consumption also presents the same behavior, with lowest income class spending 109.28% of income and highest income class spending 49.11%.

Medical expenses present a linear trend downwards with lowest income class spending 7.98% of income in health while highest income class spends 3.59%. Home maintenance presents a U-shaped behavior with lowest income class spending 6.02% of income. It reaches the minimum investment in income percentage at the third lowest income class, 3.38%, and it rises to 4.83% of income for the highest income class.

Education expenditures are generally low for the Midwest region. Lowest income class spend 1.82% of income on education. The highest investment in income percentage is found at the second highest income class, 2.7% of income. Overall, individuals in the Midwest region invest around 2% of their income in education.

Regional information provided up to now is laid out in tables in order to provide a wider variety of information. This format, however, does not facilitate the visualization of general features. A graph provides better visualization of the comparison between regions.
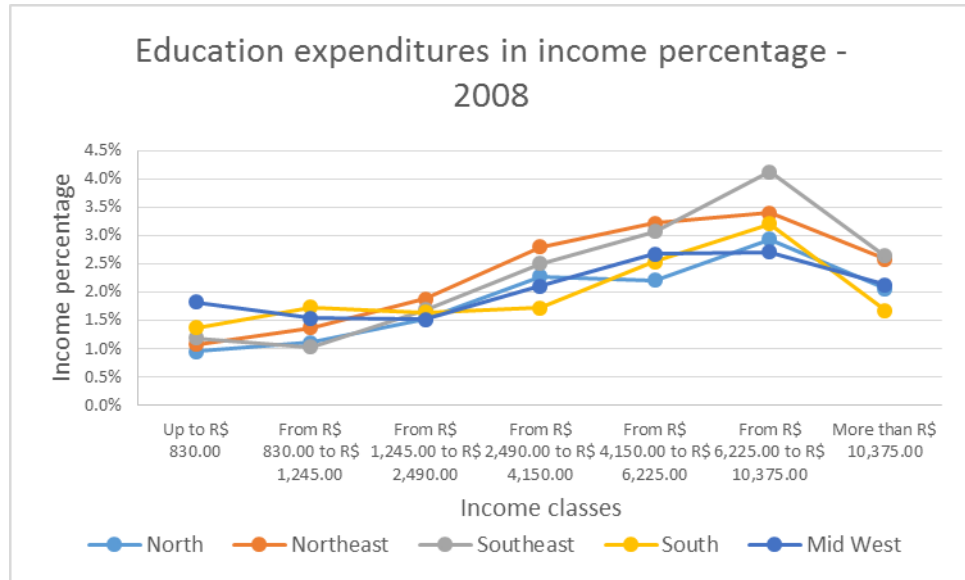

Figure 15: Education expenditures as a percentage of income in diferente regions, 2008 - source: POF 2008, own elaboration

Figure 15 reveals education expenditure per income class for the different regions of Brazil. A general trend can be observed with individuals investing the highest share of their income in education when they reach income between R$ 6,225.00 and R$ 10,375.00. This is evidence that the budget constraint must exist up to this income class, with this expenditure gaining relevance in detriment of others up to this point.

Other interesting features of education spending in income percentage per class is that the Midwest lowest income class invest more than even mid income class from other regions – including Midwest themselves. The Southeast region, second highest income class, presents the highest investment rate in education in income percentage for all classes in all regions, reaching 4% of income.

Overall, the most relevant feature found is that investment in education peaks at the second highest income class. Evidencing that the budget constraint might exist up to that class, but not higher.

Besides the evidence that investment decisions take into account the budget constraint, it is relevant to investigate how such investments vary, on average, with increases in income. This analysis can indicate which forms of spending are giving room to others, indicating preference. The next section will make that attempt in order to improve the overall picture taken so far.

6.2.Variations of expenditure profile between income classes in income percentage

This section will undergo the attempt to investigate how income increases change expenditure allocation. In order to do so, the variations in income and spending between income classes are taken to represent theoretical increases in income. The variation of investment is divided by the variation in income. The outcome is a percentage that indicates this class` percent investment in the selected expenditure in comparison to the last income class.

The formula used to calculate the results in this section:

$$\frac{(Expenditure_c/Expenditure_{c-1})}{(Income_c/Income_{c-1})}$$

Therefore, the final result is a percentage. When it marks 100% it means that expenditure allocation has not changed in income percentage in comparison to the percent invested in the last class. Below 100% means that it has reduced in income percentage. Above 100% means that it has increased in income percentage.

To exemplify. Education expenditures in lowest income class for Brazil in 2008 are 1.17% of their income. Education expenditures in second lowest income class for Brazil in 2008 are 1.26% of their income. The measure explained above, used in this chapter, will mark 107%, which is the variation 1.26%/1.17%.

This section will also explore the national and the regional features.

6.2.1. National analysis

The national analysis of the variation in expenditure profile follows the measurement of percent allocation of extra income in a selected expenditure. Therefore, values above 100% represent that such expenditure increases its participation in the budget constrain, while below 100% means a reduction. The value of in this analysis 0% would mean elimination of such expenditure both in absolute as well as income percentage.

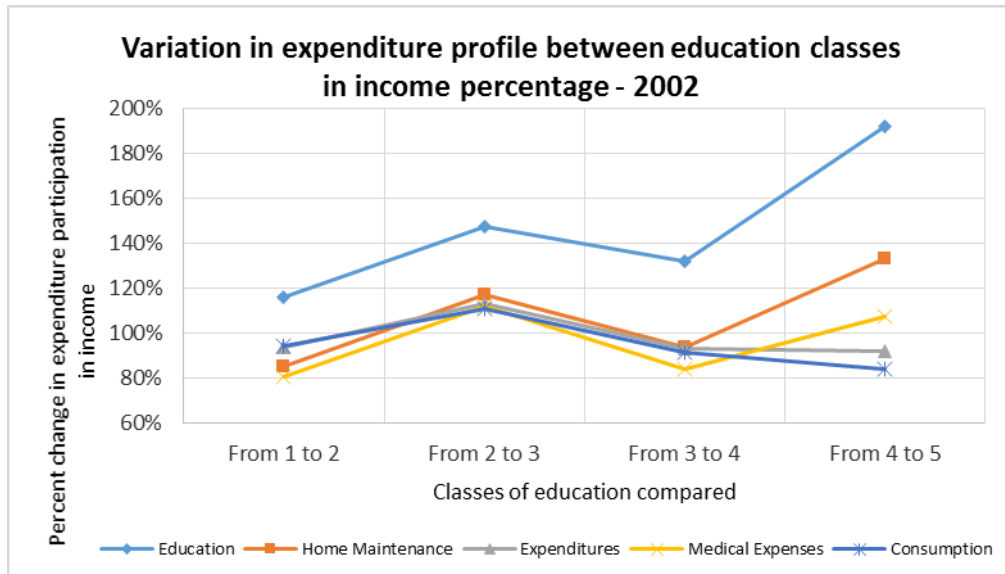The national analysis will start by reviewing the behavior extracted from POF 2002.

Figure 16: Variation in expenditure per income percentage between education classes - source: POF 2002, own elaboration

Figure 16 portraits the variations between classes of education laid out in section 4. Education investments presents strong increases when comparing lower education to higher education classes. The effect of such variation is that education spending raises its participation in the budget constrain the higher the education level of the reference person, increasing the share of income used for education investments.

The increase in education expenditure is subtle from lowest education class to second lowest. It becomes strong from the second lowest to the third. There is a reduction in the strength of the increase in education investment from third to fourth education classes. And the strongest increase in education spending in income percentage occur from the fourth to fifth highest education class, almost doubling education investment in income percentage.

Consumption and total expenditures maintain a stable share of income than starts to drop at slow rates.

Medical expenses present an erratic behavior. Investments in them fall from lowest education class to second lowest. It increases from classes 2 to 3, with a consequent reduction from classes 3 to 4. Finally, from the fourth lowest education class to the fifth it experiences growth again in participation in income share.

This analysis for 2002 provide little possible inferring since it compares classes by years of education in the person of reference. Average income per class laid out in section 5 provide the possibility of some inference considering budget constraints, however, this data set is not recommended for such.

The analysis for 2008 data follows the division by income class, improving the possibility of drawing conclusions on the effect of budget constraints.
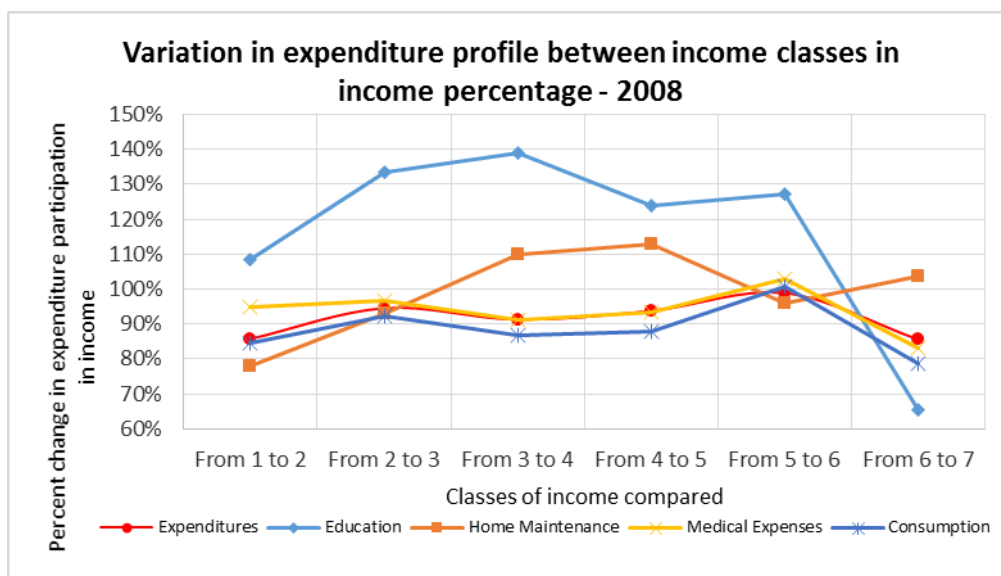
Figure 17: Variation in expenditure per income percentage between income classes - source: POF 2008, own elaboration

The analysis of data from 2008, in figure 17 above, follows the division by income classes laid out in section 4. The value portrait in it reveals variations in expenditures in income percentage between income classes.

This graph is very revealing. The steady variation in education spending in income percentage between income classes indicates this to be the expenditure most affected by a possible budget constraint. Education expenditures grow in share of income spent in all compared classes but that of highest income. The growth is little from the class of lowest income to the second lowest. It grows at considerable levels from classes 2 to 3, from 3 to 4, from 4 to 5 and from 5 to 6. From the class with sixth lowest income to that with highest income investment in education drops as expenditure percentage.

Medical expenses, total expenditures and consumption show a consistent reduction in their share in the budget constraint across income classes. This drop is small, with values around 90%. Highest income class reveal a more significant drop at around 80%.

Home maintenance oscillates in terms of its share in income percentage. Home maintenance expenditure in income percentage drops from the lowest income to the third lowest income classes. From classes 3 to 5 this value increases, representing an investment in a family asset. It remains constant between classes 5 and 6, growing again from class 6 to class 7 divided by income.

The national analysis provides evidence of a national budget constraint for investments in education. The regional analysis can provide more detail to the topic indicating possible regional specificities in the search of budget constraining human capital.

6.2.2. Regional analysis

The regional analysis allows more insight into the differences between the North, Northeast, Southeast, South and Midwest regions. The variable studied here is the same used for the national analysis which was described in section 6.2..

This analysis will start by seeing results from the North region. In the sequence, the Northeast, Southeast, South and Midwest regions will, in this order, be analyzed. The measures here identify variations in expenditure between income classes.
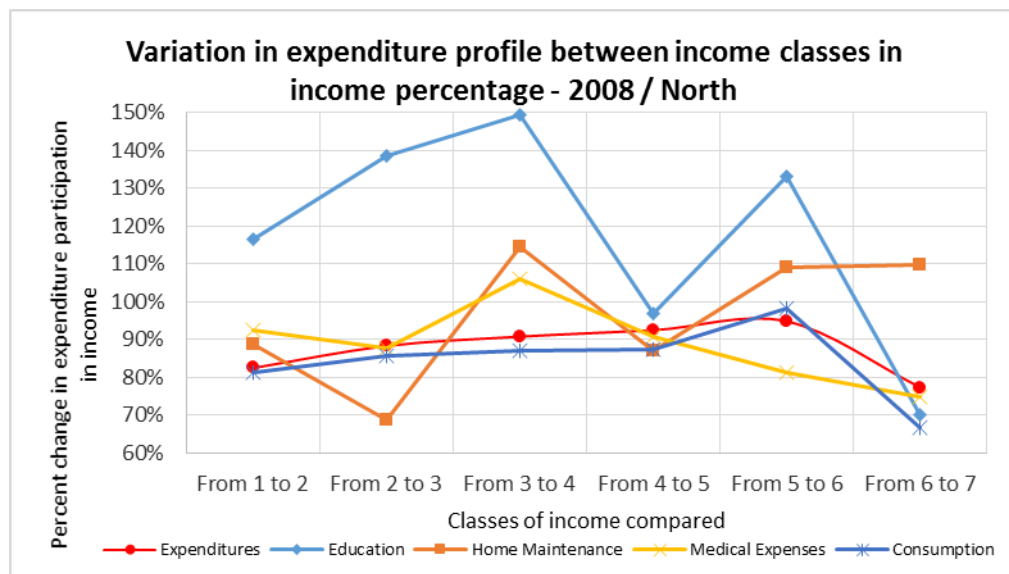

Figure 18: Variation in expenditure per income percentage between income classes / North - source: POF 2008, own elaboration

Results from the North region of Brazil is portrayed in Figure 18, above. Data reveals a lot of variability in the responses of expenditures to raises in income from one income class to the other. The only variables that reveal a stable trend are total expenditures and consumption. Both variables present a steady reduction in their participation in income percentage, with values from 80% to 95% between income classes from 1 to 6. This behavior indicates a slow reduction in these variables` participation in the budget. From the sixth lowest income to the highest income the drop in total expenditures and consumption is much stronger, with values around 80% and 70% respectively.

Home maintenance spending varies erratically and no trend is visible. From classes 1 to 3 its share in household budget is reduced – from classes 2 to 3 it is strongly reduced. From classes 3 to 4 its share increases, however it reduces again from classes 4 to 5. It than gains share from classes 5 to 7. Only some study focused at this behavior could provide a reasonable explanation for such. Health expenses bring a downward trend in its share in the family budget, with the exception from the third lowest income class to the fourth.

Education expenditures in this region present some similar features to those at a national level. The first noticeable fact is the strong predominance of increase in education investments in the share of income. From the lowest income class to the fourth lowest income class there is a strong increase in the share of the budget that goes to education investments – reaching up to 150%, revealing that the extra amount invested in education from classes 3 and 4 is 50% higher than the extra amount in income from the third lowest income class to the fourth.

The peak in education investments sensibility to income, reached from classes 3 to 4, indicates a budget constraint up to that income class, R$ 2,490.00. This value is relevant for the discussion of inequality constraining human capital investments in the North region of Brazil. After this point, from the fourth lowest income class to the fifth the amount invested in education as a percentage of income is maintained, revealing an increase in the absolute value. From the fifth lowest income class to the sixth there is a strong increase. The last income class is the only one to experience a reduction in the relevance of human capital investments to the family budget.
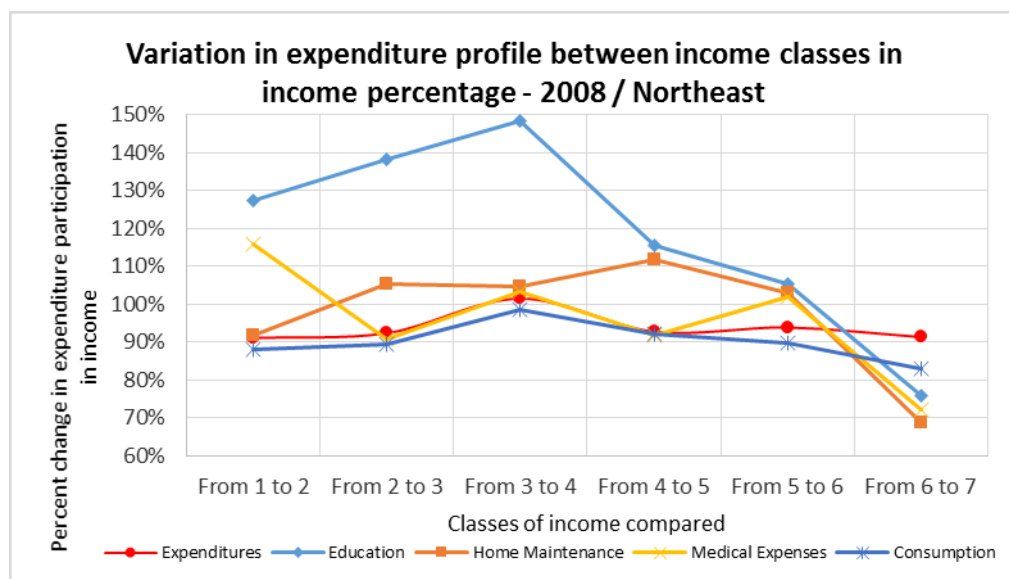

Figure 19: Variation in expenditure per income percentage between income classes / Northeast - source: POF 2008, own elaboration

Data from the Northeast region, presented in Figure 19 above, reveals steady diminishing in the share of total expenditures and consumption in the family budget. This reduction is small, with values around 90%. These variables maintain their share in income only from the third lowest income class to the fourth.

Home maintenance only have its share in the budget reduced in the lowest and highest income classes. For all transitions in intermediary classes of income this expenditure has found a bigger share of income being invested into. Medical expenses only augment its share of total

income from the lowest to the second lowest income classes. For all others this expenditure either drops in the share of income used for it or the value remains constant.

Investments in human capital in the Northeast region present a similar behavior to what has been seen in the national and North region. From the lowest income class up to the fourth lowest income class education spending strongly increases its share in the family budget, reaching values of 150%. Education spending still increases its share in income from the fourth to the fifth lowest income classes, reaching 115%. From the fifth to the sixth lowest income class education spending increases at a rate around 105%. These values indicate that the budget constrains human capital investment up to incomes around R$ 10,375.00 – the top threshold of the sixth class.
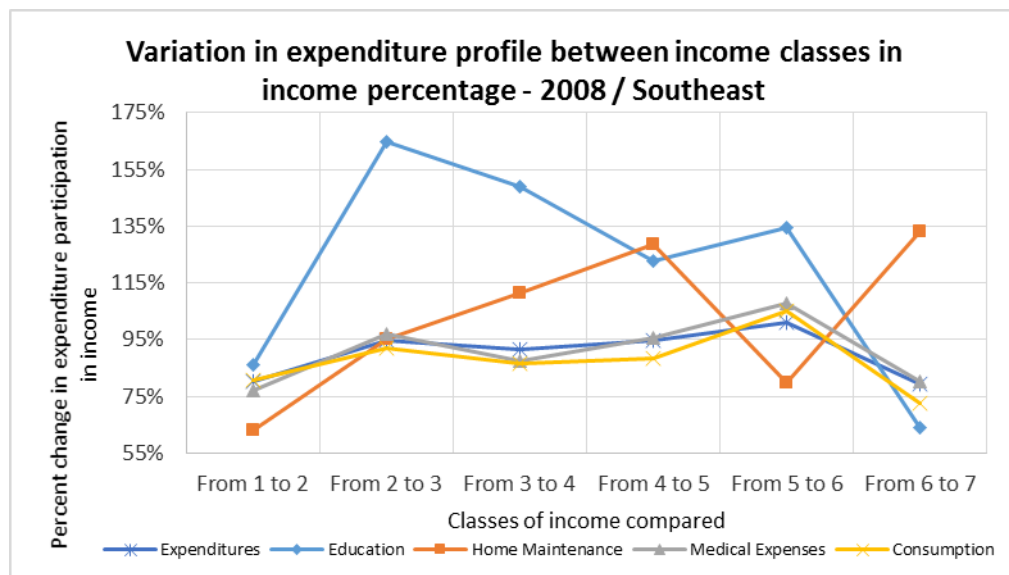

Figure 20: Variation in expenditure per income percentage between income classes / Southeast - source: POF 2008, own elaboration

The variation in expenditure profile in the Southeast region, figure 20, reveal the same overall behavior observed for in the national level and other regions analyzed. Total expenditures, consumption and medical expenses consistently have their shares of income reduced, presenting values below 100% but no lower than 75%.

Consumption and total expenditure have presented this type of behavior in other regions as well as in the national analysis, a slow trend in diminishing its participation in income share. Medical expenses commonly present higher variability, however, in the Southeast region this expenditure tracks the behavior of total expenditures and consumption. Medical expenses have their share in the budget constrain slightly reduced from one lower income class to a higher one.

Home maintenance expenditures present a highly variable behavior. The trend observed from class 1 to 5 can be divided in two groups. The one from the lowest income class

to the third lowest observes reduction in the share of income destined to home maintenance, at first a very strong reduction – 60% – and later a smooth reduction – 95%. From the third lowest income class to the fifth there is an increase in the income share destined to home maintenance, with values reaching up to 135%.

Education expenditures have their share in the family budget reduced when comparing the lowest with the second lowest income class and when comparing the second highest with the highest class. One possible explanation for the behavior in the very low income end is cultural, with education not being valued. Furthermore, some of the reviewed theories assume human capital to have increasing returns of scale up to a certain point, indicating that individuals with low human capital have a small payoff to invest in human capital. At the high income end it is likely that the budget constraint does not exert an impediment from the sixth lowest income class onwards. This might indicate that households have been able to reach desired levels of human capital investment, no needing to keep increasing investments in it.

Classes from the second lowest income up to the sixth lowest present increase in the share education expenditure takes from income. This is an indication that with higher income individuals are able to suffice more basic needs and can, therefore, use more of their acquired income into human capital investments. The values found in between the above mentioned classes are high, on average around 135% with hikes reaching 165% from class 2 to 3.
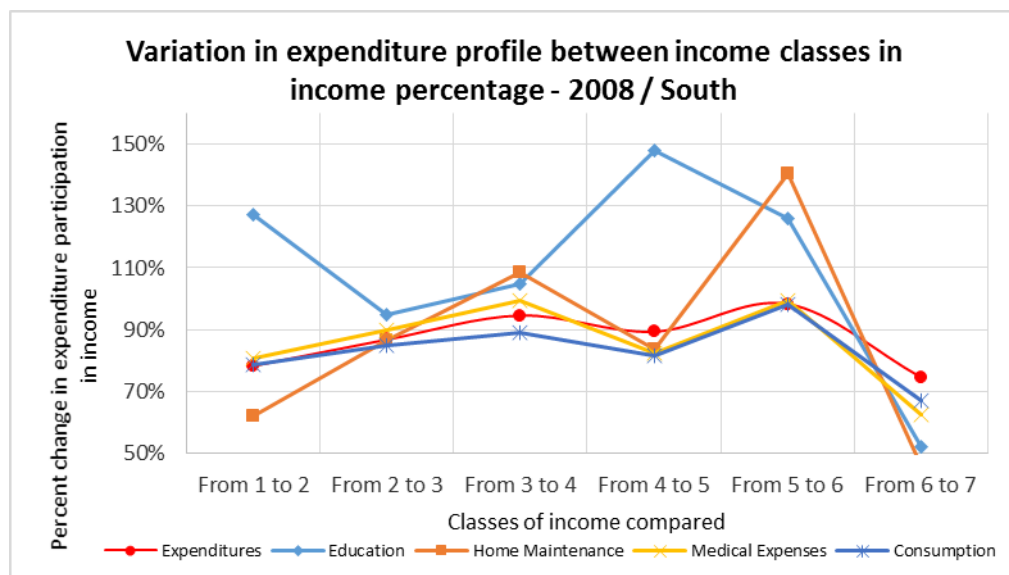

Figure 21: Variation in expenditure per income percentage between income classes / South - source: POF 2008, own elaboration

In the South region (figure 21) total expenditure, consumption and medical expenses present a similar behavior as in the Southeast region. They present a smooth reduction in the share of total income destined to them with values roughly around 85% of last class`

expenditure share of income. Only from the second highest income class to the highest that this reduction in income share is stronger.

Home maintenance present the wide variation seen also in other regions. In the second lowest income class the share of income destined to home maintenance is only 60% that of the lowest income class. From the second lowest to the third lowest income class the share of income is around 90%. From class 3 to 4 there is an increase in the share of income destined to home maintenance, however, this share falls from class 4 to 5. The last two classes compared – 5 with 6 and 6 with 7 – maintain the erratic behavior of home maintenance investments, with an increase in the share of income destined to it and consequent decrease.

Education expenditure in this region does not present an evident behavior or budget constraint. From lowest income class to second lowest there is an increase in the share of income invested in human capital. Between the two next classes, from 2 to 3 and from 3 to 4, there is a very smooth increase in the share, somewhere between 100% and 110% of the share of last income class. The next two income classes experience a strong growth in the share of income destined to education, reaching up to 150% of last classes share invested. The highest income class presents a reduction in the share invested in education.
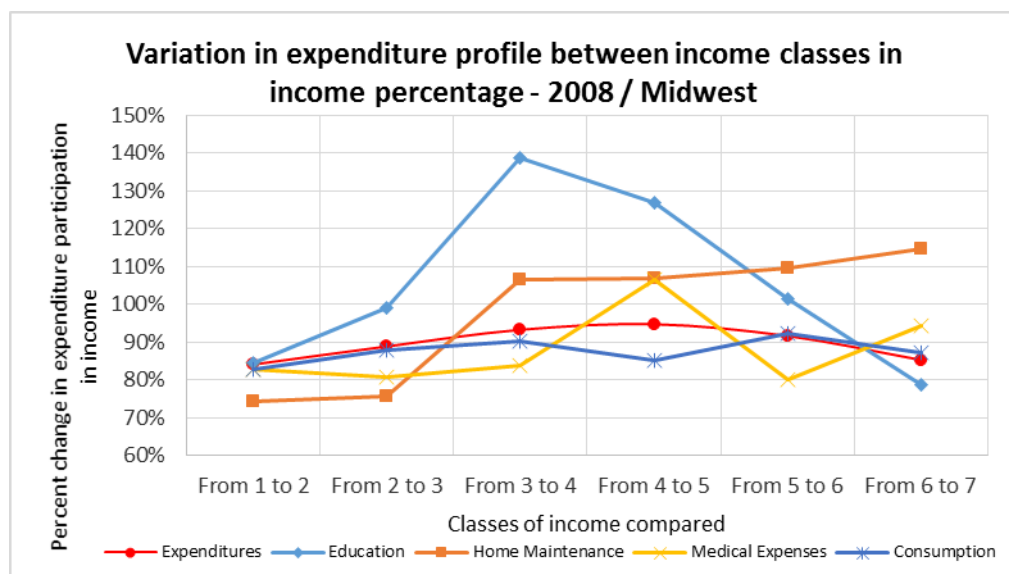

Figure 22: Variation in expenditure per income percentage between income classes / Midwest - source: POF 2008, own elaboration

Variations in the share of income destined to each expenditure for the Midwest region are exposed on figure 22, above. This region presents high variability for all types of expenditures with the exception of total expenditure and consumption. These two present a constant smooth reduction in the share of income destined to them, with the share at higher income classes around 90% of the share from the class immediately below in income.

Home maintenance`s share of income reduces for the first three income classes. From the third lowest income to the fourth it shifts from 75% to 110% and maintains this growth level up to the last income class.

Medical expenses have its share of income reduced between all classes, with the exception from fourth lowest income class to fifth, where the share of income destined to medical expenses is kept constant.

Education expenditure reveal the usual trend, middle classes increase the share of income invested in education in up to 50% higher than the directly lower income class. From the lowest income class to the second lowest we find a reduction in income share invested in education. This behavior changes from the second lowest income class upwards, with more income being destined to education. Reaching the second highest income class the share of income destined to education start reducing, not meaning that the total amount invested in education reduces.

6.3.Credit Market penetration across income classes

The results in section 6.1. and 6.2. help identify the existence of a budget constraint. Limited spending capabilities can be solved by financial markets if the expected investment has positive returns. Human capital investments, in a stable institutional framework, should bring positive payoffs in the long-run. If credit-markets are unable to provide capital for profitable investments it is not performing fully its task as resource allocator.

There are many ways in which financial markets can be inefficient. In the household survey used for this dissertation there is good quality data on the penetration of financial tools. The tools compared here are Credit Card ownership, Overdraft credit availability, Debit Card ownership and Current Account ownership.

If these tools cannot reach some individuals than there is evidence that these same people do not have access to the resources in the financial system. For this section the average penetration of these tools by income class, education class and region is going to be surveyed.

Both for the national analysis as well as for the regional data from 2002 and for 2008 is analyzed. This section uses only Microdata and can use both classifications by income and schooling years for both years. Therefore this section will expose the penetration of credit-markets tools per income class and per years of education classes for 2002 and for 2008, nationally and per regions.

6.3.1. National analysis

The national analysis exposes the results of the penetration of credit-markets for 2002 and 2008. The information will be presented by classes of income and classes of education. For 2002 only Credit Card ownership and Overdraft availability are obtainable. For 2008 we can investigate Credit and Debit card ownership, Overdraft availability and Current Account ownership.
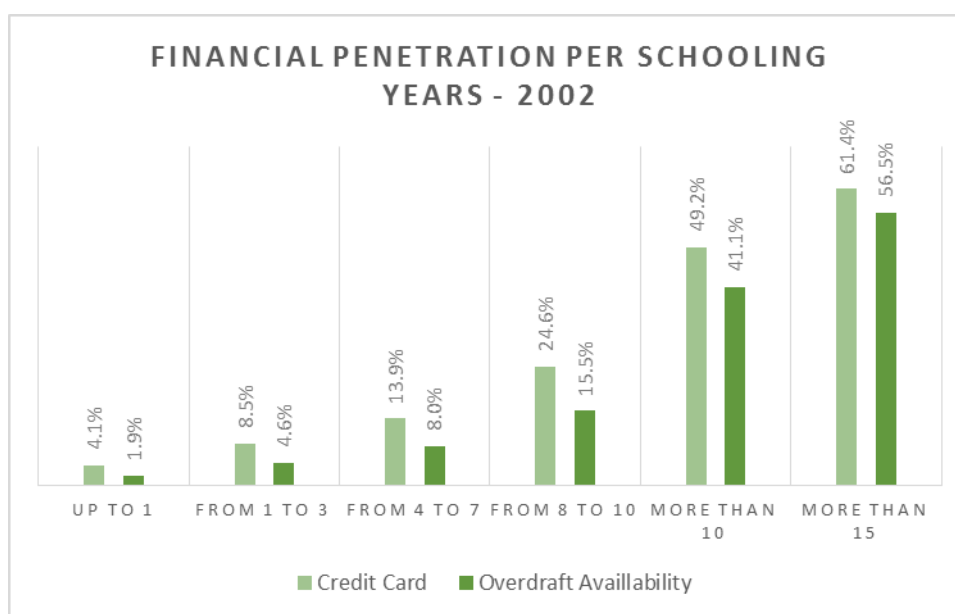

Figure 23: Penetration of credit-markets per years of education, 2002 - source: POF 2002, own elaboration

Figure 23 shows the ownership of credit cards and the availability of overdraft credit per classes of years of education in 2002 at a national level. These values are the average ownership for the total sample of each class.

There is strong evidence of individuals with little education having a limited access to credit-markets. Only 4.1% of those with less than 1 year of schooling have credit cards and 1.9% have access to overdraft credit. These figures grow slowly for higher classes of education. The access of more schooled individuals to credit cards rise to 8.5%, 13.9%, 24.6% reaching 49.2% and 61.4% for the two highest education classes.

In POF expenditures, compiled tables for 2002, the classes of years of education go only up to *more than 10 years,* as it has been mentioned in section 4. Microdata allowed the insertion of one higher education class. This inclusion makes sense when analyzing that less than 50% of households with more than 10 years of education have credit cards, a very low amount. The different features of middle class and higher income should be better detailed in the division by classes of income.
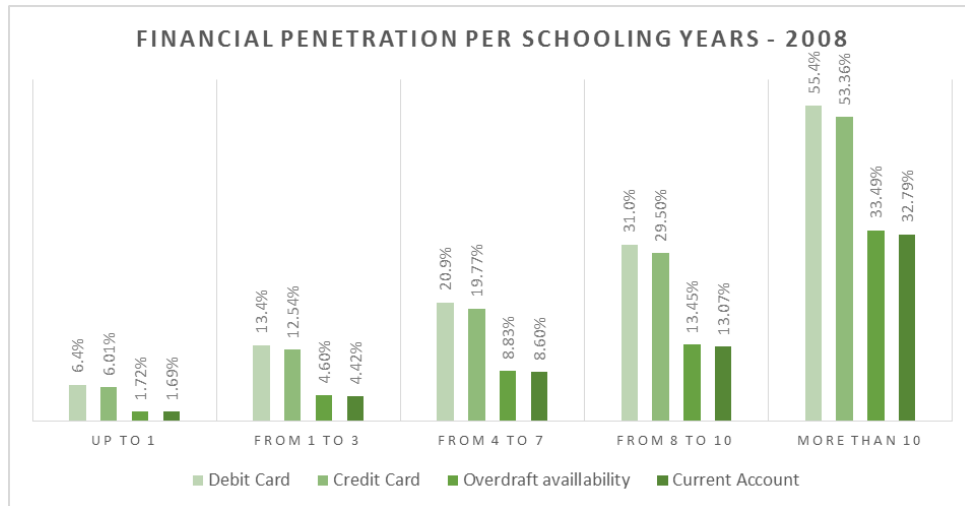
Figure 24: Penetration of credit-markets per years of education, 2008 - source: POF 2008, own elaboration

Figure 24 has the information for 2008 divided by years of education. This has been made for the sake of comparison between years. The class of *more than 15 years* of education is not present here because, due to a change in the survey, there are no individuals with more than 15 years of education in POF 2008 Microdata.

It is important to note that credit and debit cards can be issued by retail stores or other financial agents such as the post office. This explains how can there be households without current accounts but with ownership of credit and debit cards.

The relevance of education to the access to credit-markets is evident also for this year. The more years in the school system more access households have to the financial tools. Credit and debit cards are owned in a very similar proportion. Credit card possession go from 6.4% of households, measured by the person of reference, with less than 1 year in the schooling system to 55.4% to those with more than 10 years rising in an upward trend.

Comparing 2008 with 2002 there are two trends. From one year to the other, credit card ownership present a small increase of about 5% for all classes. On overdraft availability there is a small reduction mainly for households with higher education. This can be a consequence of the financial crisis that struck on that year. Credit card supply is harder to contract than overdraft supply, since once they are issued it is difficult for them to be recalled. Overdraft is credit the bank can make available or not, making it more adjustable.

Next graphs will compare the penetration of these tools by classes of income, which will provide insight closer to what has been seen so far in this dissertation.
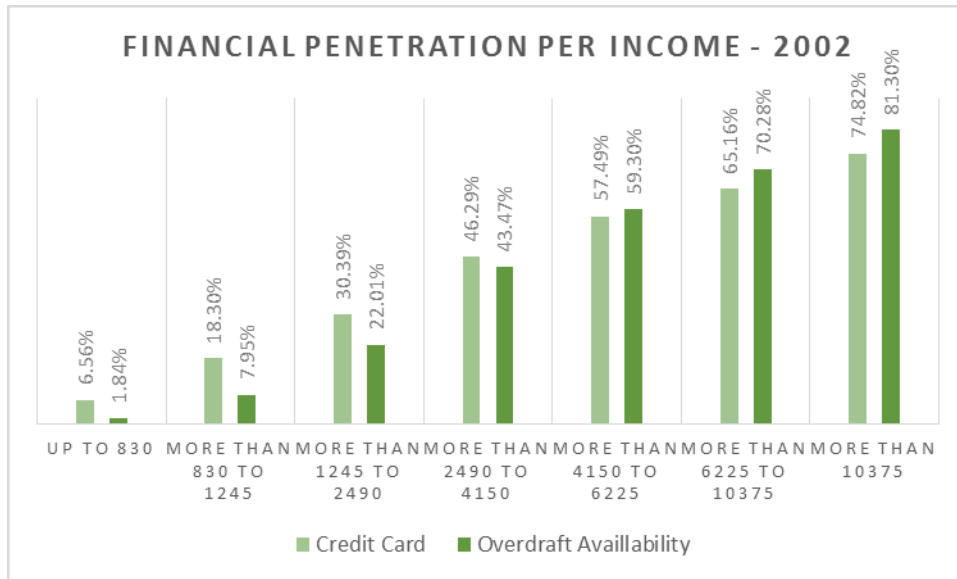
Figure 25: Penetration of credit-markets per income class, 2002 - source: POF 2002, own elaboration

Data of the penetration of financial tools divided by income classes allows a more detailed picture of the access to credit-markets. While lowest income class has only 6.56% of credit card ownership, highest income class experiences 74.82%. Highest education class, *more than 10 years*, showed 49.2% of credit card ownership, equivalent to a middle class average. Despite the averages by years of education revealing that more schooling brings more average income (revealed in section 5) this graph indicates how education by itself does not ensure high income and access to credit markets.

Overdraft availability per income class reveals an interesting feature. This type of credit has more flexibility since the bank can approve expansion or retraction of the credit limits in its own system. Credit cards issued cannot be easily taken out of possession, therefore are more risky to be distributed and resistant to a recall. Overdraft credit availability, therefore, starts at almost inexistent levels while credit card ownership present better penetration, 1.84% vs 6.56%. In the end, it has surpassed credit card ownership, with the highest income class experiencing more availability of overdraft credit than of credit card ownership, 81.3% vs 74.82%.

Overdraft availability indicates more accurately which individuals the banking system wishes to reach. Nevertheless, both variables indicate that having low income significantly reduces the access for credit-markets in 2002.
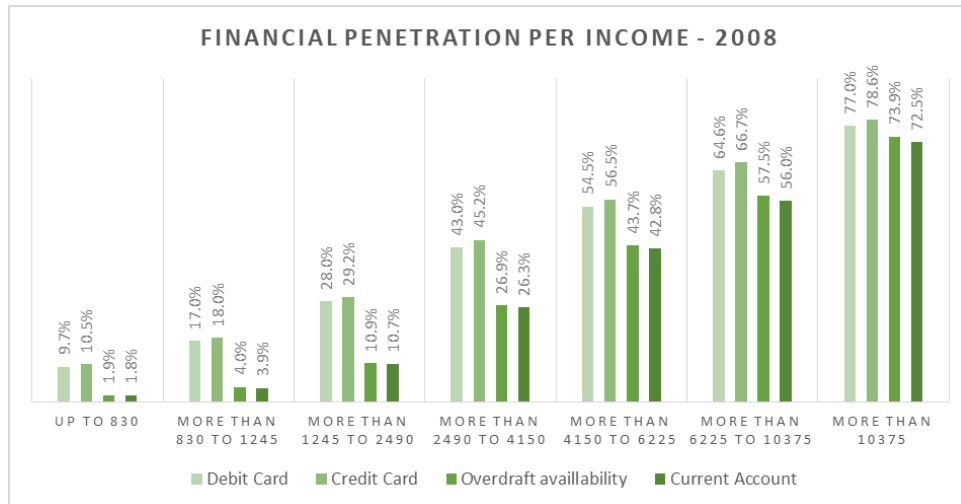
Figure 26: Penetration of credit-markets per income class, 2008 - source: POF 2008, own elaboration

Figure 26 reveals the penetration of financial tools for households by income class for 2008. With the insertion of debit cards and current accounts to the data set it is possible to see how they relate to credit cards and overdraft credit.

Debit card ownership tracks credit card ownership. The requirements by the financial system must be very similar for both financial tools. The same occurs for overdraft credit and current account ownership. The difference between these two groups reveal two different requirement standards affecting different income groups.

Similar to the 2002-2008 comparison by education classes, here we see a reduction in the availability of overdraft credit in all income classes. This is probably an effect of the financial crisis that hit the world economy that same year. Credit and debit card penetration see a clear linkage to income, with the access to credit being much constrained for low income classes.

It is relevant to mention that even for high income classes there is evidence of imperfection in credit-markets. These households, however, did not present a behavior compatible with being limited by a budget constraint when analyzed in sections 6.1 and 6.2.. Therefore, despite the flaws in credit-markets for these individuals, they have own income to perform the investments they consider to be required.

Below, correlations between information laid out for 2002 are presented. These can indicate whether the average behavior of financial tool penetration per class, indicated in the graphs, suffers from strong variability or not.

Correlation Matrix - 2002				
	Income	**Years of Education**	**Credit Card**	**Overdraft Availability**
Income	1	0.182280012	0.285827791	0.374459231
Years of Education		1	0.23925689	0.241528131
Credit Card			1	0.523760463
Overdraft Availability				1

Table 10: Correlations between financial tools, income and schooling - source: POF 2002, own elaboration

The correlation analysis allows for the consideration of the effect that variability might have on the averages presented up to now. Despite the clear evidence that income affects the access to credit-markets, high variability might make the relation between the access to these tools and income and education less evident.

Table 10 reveals that, despite a strong evidence that higher income and education lead to higher access to credit-markets, the correlation is not as strong as it could be supposed. This difference might be due to high variability. In that case, the descriptive power of averages is reduced and behavior becomes more erratic. Higher variability does not diminishes the fact that lower income have less access to credit-markets.

Income seems to correlate better to access to credit markets and overdraft credit. Education, even though present a positive correlation, is weaker linked to higher access to financial tools.

Correlation Matrix - 2008					
	Income	**Years of Education**	**Credit Card**	**Debit Card**	**Overdraft Availability**	**Current Account**
Income	1	0.204285	0.304317177	0.303676616	0.409059757	0.405866328
Years of Education		1	0.209487512	0.206671251	0.193075993	0.191202818
Credit Card			1	0.969164771	0.45592242	0.451782666
Debit Card				1	0.458359593	0.460612251
Overdraft Availability					1	0.986406091
Current Account						1

Table 11: Correlations between financial tools, income and schooling - source: POF 2008, own elaboration

Correlations for 2008 reveal similar features as from 2002. The main similarities are correlations around 0.3 between income and credit cards, as well as 0.4 for overdraft availability. Still in similarities, education seem to correlate positively, however less than income – 0.2 for both credit card and overdraft credit. Again, overdraft credit correlates higher to income than credit cards. This factor could be seen in the graphs and is also present in the correlation.

Some new information that can be obtained from this correlation analysis refers to the close relation between credit cards and debit cards. These variables present a correlation of

0.96, revealing how similarly they behave. Overdraft availability and current account also show close behavior with a correlation of 0.98.

Furthermore, these correlations reveal how income and education, even though related to the access of credit-market tools, suffer from significant variability lowering the measured correlation between these variables.

Correlation information comes to confirm evidences found in the graphs and correct some notions where averages are not enough to settle the topic.

6.3.2. Regional analysis

This section undergoes a regional comparison divided in the same manner as the national analysis. Differently from other regional comparisons, this section has graphs divided by each financial tool. In each one of them, all regions are presented. This form improves regional comparison and reduces the number of graphs needed.

Initially the two graphs with data from 2002 – credit card ownership and overdraft availability – are portrayed. The four tools available for 2008 data are exposed in the following graphs. In the national analysis there was evidence that the division by years of education does not provide as much information as the one by income classes. Therefore, the regional comparison is done only by income classes.

In the figure below data has been laid out to reveal the penetration of credit cards in different classes of income for Brazil in 2002.
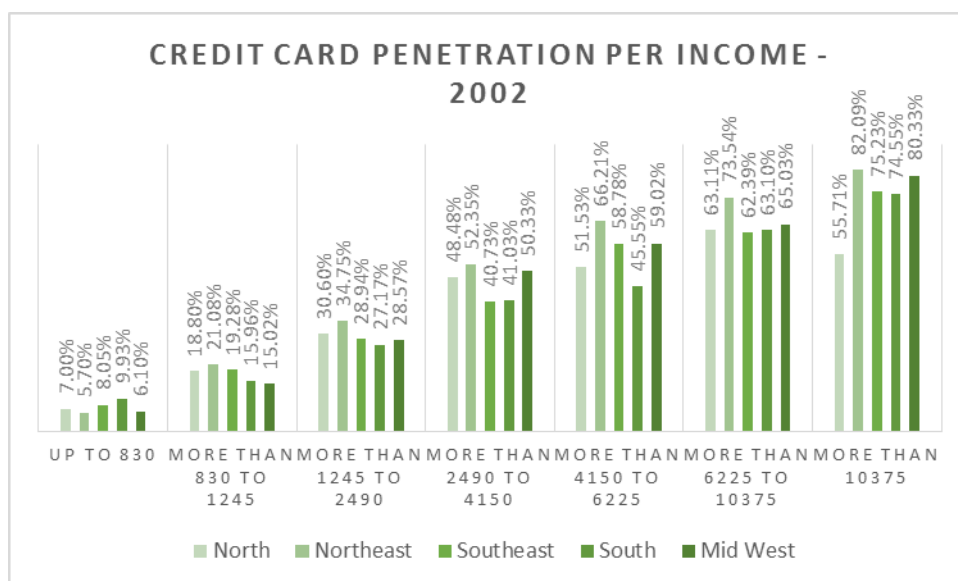

Figure 27: Credit Card penetration per income class by region, 2002 - source: POF 2002, own elaboration

The regional analysis of credit card penetration per income class for the year of 2002, figure 27, does not bring evidence of one region having more or less penetration than the

average for all income classes. All regions seem to present similar behavior between the classes of income.

Despite the overall similarity, some differences can be noted. Highest income class for the North region experiences significantly lower credit card penetration than other regions. With only 55.71% of its households owning credit cards while other regions average around 78%.

Another difference very relevant is in the South region penetration of credit cards presenting low penetration in middle income classes – from R$ 1,2450.00 to R$ 6,225.00. For the second, third and fourth lowest income classes the South region presents, respectively, 27.17%, 41.03% and 45.55% while the average for other regions is located around 30%, 48% and 58% respectively.

These differences have local explanations. Some possibilities are, for example, the low need of credit by high income North region and middle income South region households. Therefore, they would not seek to acquire a credit card. Some aspects of low financial penetration can be caused by little interest of individuals in acquiring them. Nevertheless, these possible explanations would need a specific analysis to prove or disprove them.

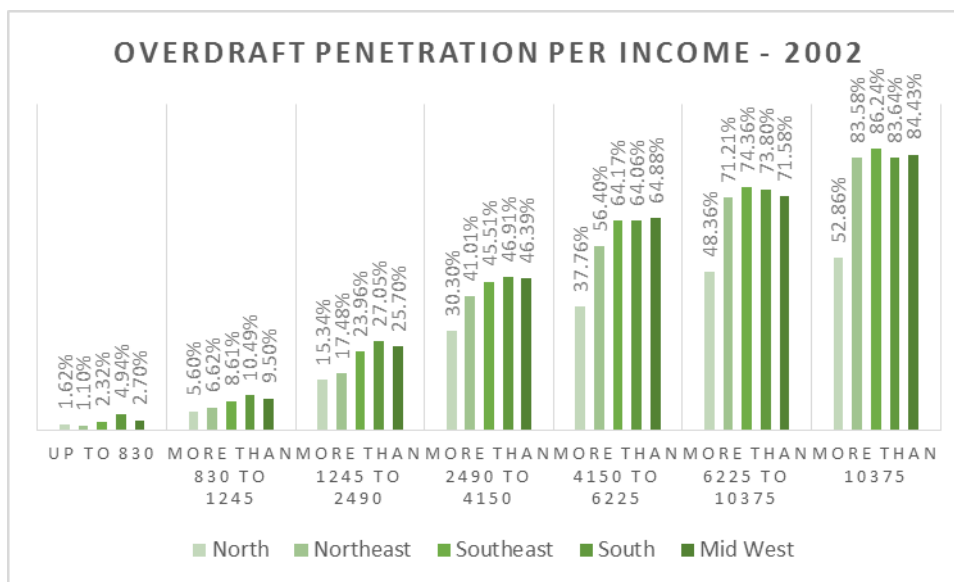Below there is the regional comparison for overdraft credit penetration across income classes for 2002.

Figure 28: Overdraft penetration per income class by region, 2002 - source: POF 2002, own elaboration

The comparison of overdraft credit penetration across different regions of Brazil, differently from the analysis of credit card penetration, reveal the North region to have overall less overdraft credit available independent of income. As mentioned before, there are reasons

to believe that overdraft credit can be more easily managed by banks and they behave closer to what is optimum banking risk allocation.

The North region present overdraft credit constantly under the average of other regions for all income classes – 1.62%, 5.6%, 15.34%, 30.3%, 37.76%, 48.36% and 52.86% for all classes from lowest to highest income. The regional averages lie around 2.4%, 8%, 24%, 43%, 62%, 72% and 83% for all classes from lowest to highest income. The low overdraft availability for this region can be related to low infrastructure or low population density which might make default collection procedures more difficult.

All other regions present very similar behavior, with income being influential on the access to credit-markets.

Below starts the analysis of the results obtained from data from 2008. They follow a display by financial tool where all regions are compared in the same graph.
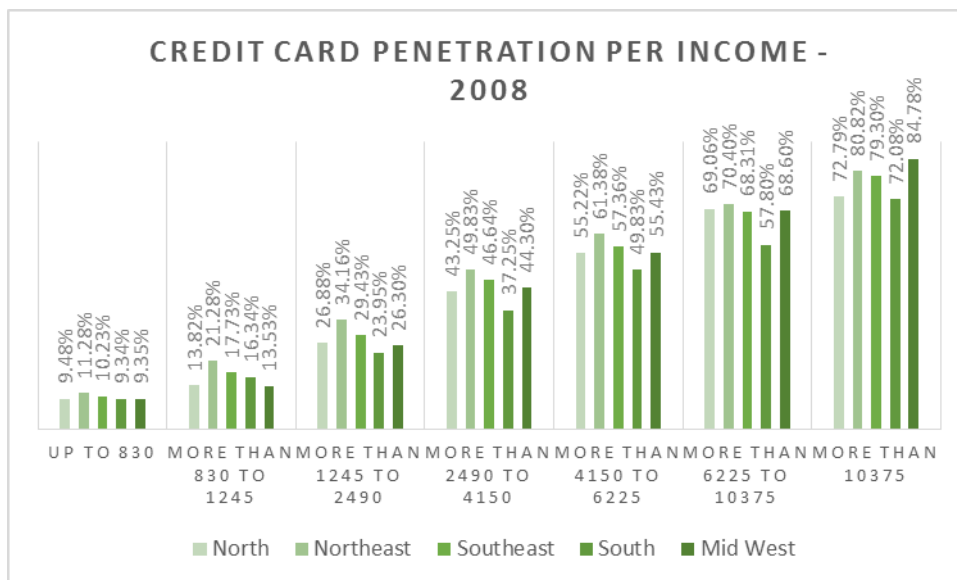

Figure 29: Credit Card penetration per income class by region, 2008 - source: POF 2008, own elaboration

Credit card penetration per income for the year of 2008 reveal some similarities with the analysis made for 2002. South region present lower penetration than the average of other regions in almost all income classes. This little penetration is stronger in middle classes where households with credit cards reach only 23.95%, 37.25% and 49.83% and averages lie around 29%, 44% and 56%.

Here there is evidence that income is significant for the access to credit-markets for all regions. Despite the lower penetration for the South region, there is evidence of the impact of income on the access to financial tools.

Overall, the Northeast region present more access to credit cards than other regions` average. This behavior has an exception for highest income class, who present more credit card penetration in the Midwest.

Debit card penetration per region, analyzed below, should present similar results to that of credit cards, given their high correlation presented in table 11.
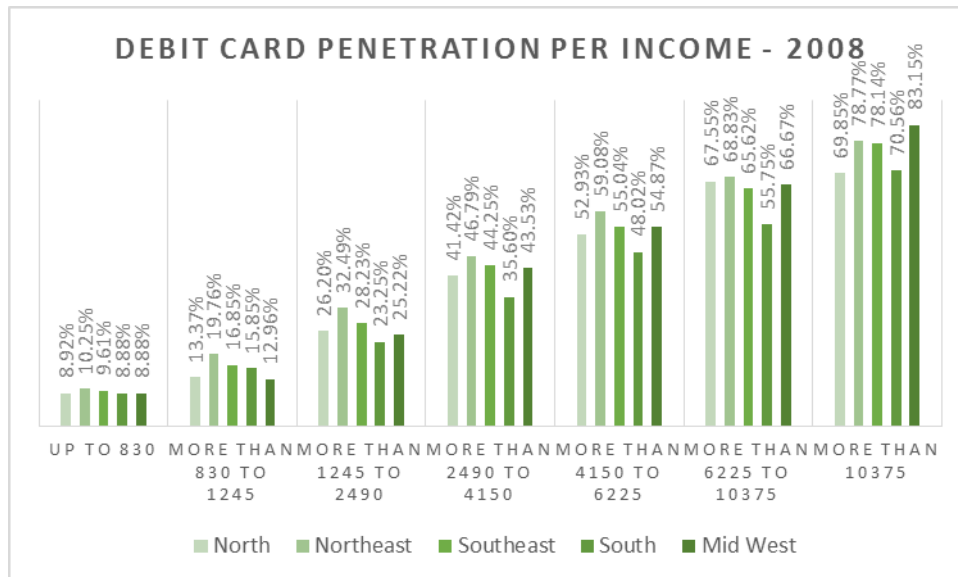

Figure 30: Debit Card penetration per income class by region, 2008 - source: POF 2008, own elaboration

Debit card penetration per region for 2008, figure 30, present a very similar behavior to that observed for credit cards. This behavior goes in accordance with the high levels of correlation found for the year of 2008 between credit and debit card ownership.

Here, the South region also present overall lower penetration of debit cards than the average for other regions. The exception is for highest income class, where the South region` averages 70.56% of debit card penetration and the North region averages 69.85%.

The Northeast region presents the highest debit card penetration for all income classes with the exception of highest income, where the Midwest region present 83.15% of penetration versus 78.77% of the Northeast. For other income classes the Northeast region present average penetration of 10.25%, 19.76%, 32.49%, 46.79%, 59.08% and 68.83% from lowest to sixth lowest income classes. Meanwhile, the averages of other regions lie around 9%, 15%, 26%, 42%, 53% and 65% from lowest to sixth lowest income classes.

This graph brings evidence in accordance to what has been seen so far, income seems to be relevant for the access to credit markets independently of the region.
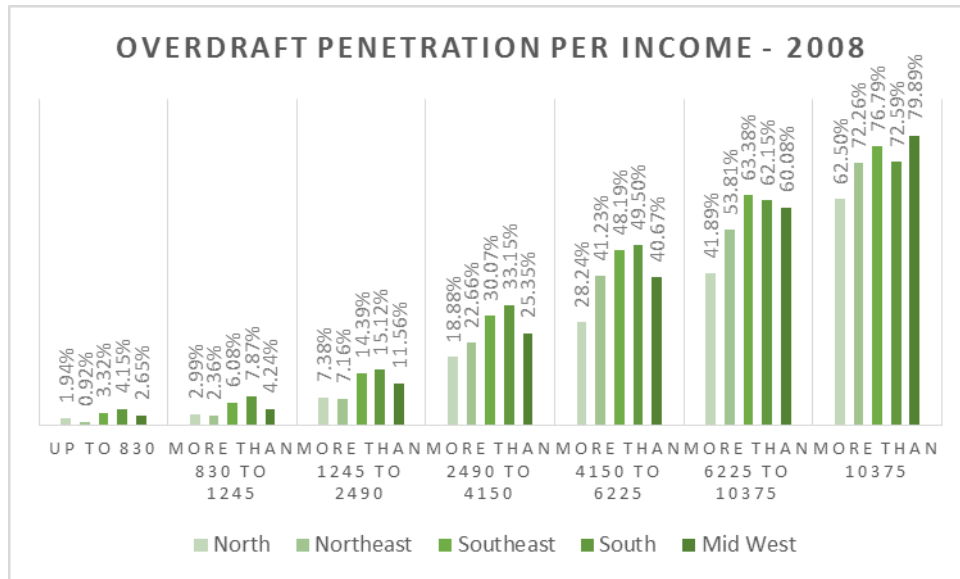
Figure 31: Overdraft penetration per income class by region, 2008 - source: POF 2008, own elaboration

Overdraft credit penetration across different regions per income class for the year of 2008 is exposed above in figure 31. As has been noted before, the availability of overdraft credit can be better managed by the bank. It can reduce or withdraw the availability to this form of credit in the short run, adjusting accurately its risk.

The North region present the lowest penetration of this form of credit for all income classes with the exception of the lowest, where it presents an average of 1.9% of population with income up to R$ 830.00 per month with overdraft credit available. For all other income classes it presents penetration of 2.99%, 7.38%, 18.88%, 28.24%, 41.89% and 62.5% versus averages of 5%, 11%, 26%, 59%, 73% from second lowest income class to highest income.

For middle income classes the South and Southeast regions exchange the highest penetrations with values around 15%, 31.5% and 49% for the three middle income classes.

In this graph there is evidence that income plays an important role independently of the region. Low income classes present significantly lower access to overdraft credit with rates averaging around 1.5% of access to this form of credit. Middle income classes, with income from R$ 2,490.00 to R$ 4,150.00 per month of the person of reference, present penetration of around 25% of this form of credit. High income classes, with monthly salaries ranging higher than R$ 10,375.00, average roughly 74% of access to overdraft credit. This trend is not only upwards with income, but present also an exponential type of behavior.
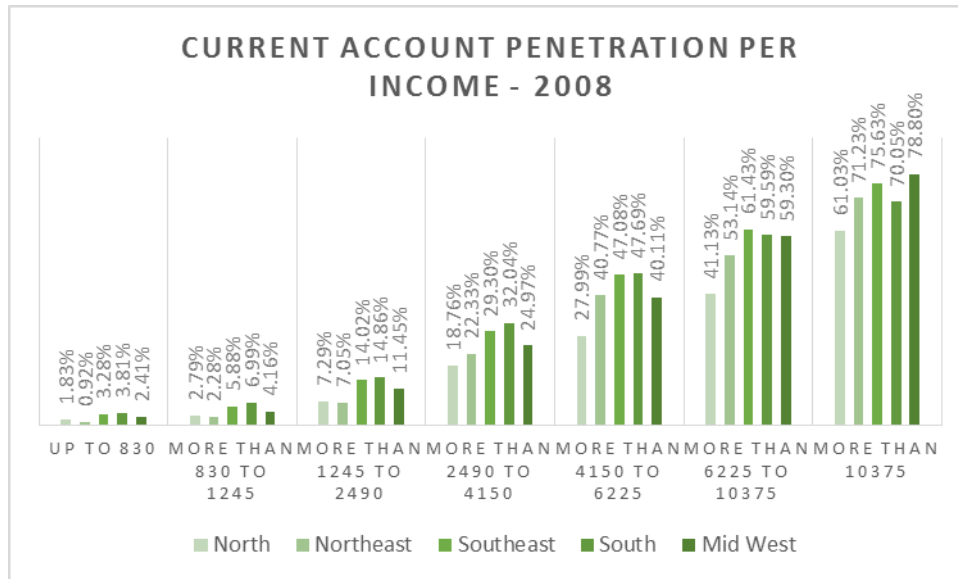
Figure 32: Current Account penetration per income class by region, 2008 - source: POF 2008, own elaboration

The last variable observed in this analysis is the percentage ownership of current account divided by income class across all regions of Brazil. As observed in the correlation analysis provided in table 11, this variable is closer linked to the availability of overdraft credit. Such connection might occur because of the requirement of owning a current account in order to obtain overdraft credit. Credit and debit cards, on the other hand, can be issued by retail stores and other agents, presenting a behavior that differs, although not significantly. Overall, all financial tools present meaningfully higher penetration for higher income population.

In this graph it can be noted that the North region, once again, present the lowest penetration of current accounts for almost all income classes with the exceptions of the three lowest income classes (although even at these classes it scores very low penetration values). This regions scores 1.83%, 2.79%, 18.76%, 27.99%, 41.13% and 61.03% for income classes from lowest to highest income. The regional averages lie roughly around 2.5%, 4.5%, 12%, 27%, 42%, 58% and 73% for the same respective classes.

The Southeast region presents high current account ownership for all income classes. The levels of penetration are not always the highest in each income class, however they are always amongst the highest with values at 3.28%, 5.88%, 14.02%, 29.3%, 47.08%, 61.43% and 75.63% for the same income classes, from lowest to highest.

This analysis has kept the understandings found on other graphs presented so far. Financial tools do not penetrate equally in different income classes. They present mostly equal behavior across different regions, indicating that the imperfections in credit-markets are not region specific, but very much dependent on income.

7. Concluding remarks

This dissertation has undergone a theoretical review and empirical evidencing for the case of inequality and underdevelopment in Brazil. The theory of credit-markets imperfection raises the possibility that low income individuals do not have access to resources for private investments, mainly those on human capital. Evidences, brought through household surveys performed by the IBGE, reveal the existence of the demand for education spending being constraint by income. Furthermore, the access to credit markets is found to be subject to income. These evidences confirm this thesis` hypothesis that Brazilian low income individuals have their human capital investments constrained by imperfect credit-markets and the lack of resources.

The topic of income inequality is of relevance for Brazil and the empirical testing serves as a link between Brazilian reality and international literature. This country experiences one of the highest levels of income inequality in the world. Such feature appears today as a consequence of centuries of path-dependence linking todays reality to colonial institutions. Development inducing policies, attempted in Brazil over the 20th century, have focused at increasing the stocks of fixed capital. There were attempts at increasing the levels of education, however, overall schooling remains very low in Brazil.

Studies on inequality of income began in the end of the 19th century with empirical studies from academics such as Vilfredo Paretto. By the mid 1900`s, with enough evidences to draw a general picture, some theories started to come about. From this surge of theories, some main fields started to be proposed. One branch focused on the social utility functions and the definition of what would be the fair level of inequality. Another aimed at explaining linkage between inequality and individual well-being – this field became the one to study how inequality affects economic performance. A third one, amongst others, began to study how economic growth shaped the income distribution in a society.

Therefore, theories linking inequality and economic growth are fairly recent. With the exception of Kaldor`s theory, most theoretical studies were developed in the late 1980`s beginning of 1990`s. Empirical works had been, up to that period, attempting to test the direct causality from inequality to economic performance. Some have found a negative relation while others have found the opposite. These studies have provided some important information, however, their generic specification does not specify the channels through which GDP is affected and ends up providing inconclusive results. Empirical studies in such format have found both inequality fostering growth as well as harming it.

These new theories have created the need for studies aimed at providing evidences of these channels. They are relevant for the consolidation of such theories as well as for the design of public policies.

For such reasons this dissertation has provided evidence that confirms the existence of the issues pointed by the theory of credit-market imperfections. There is no established form to look for evidence of the effects of imperfect credit-markets in education investments. The one chosen here takes into consideration the available data provided by the POF. Overall, the focus is on finding evidence of education investments being constraint by the budget of low income households and the coexistence of low credit-market penetration in those income classes.

Credit-market imperfections are harmful when they fail to provide capital to lucrative investments. In theory, poor capital allocation occurs due to the cost of default. In this dissertation, the lack of access to credit-markets by some individuals is taken as a measure of inefficiency. Income classes that do not have access to financial tools – such as credit or debit cards, current accounts or overdraft credit available – cannot reach credit-markets, therefore their investments, even if lucrative, will not receive capital. This inefficiency is measured by the data from POF.

To verify the budget constraint factor it is necessary to analyze whether individuals wish to invest more in education but cannot. If this is not true than the lack of access to credit is not constraining any investments, since there would be no latent demand. If it can be observed that extra income will be destined to education, than there is evidence that some individuals are under investing in human capital due to the imperfections in the credit-markets. It is important to say that these imperfections are only relevant as long as the individuals do not have their own income to invest. For this reason, high inequality might reduce overall economic performance of a country when credit-markets fail to provide capital to all profitable investments.

Evidences found in this dissertation reveal that both factors are true. Expenditures per income class indicate that low income households emphasize in education spending when there is growth in family income. The analysis was performed by comparing expenditure patterns in income percentage for each income class. The comparison was made in income percentage because income is, most of the times, a budget constraint.

Some features of Brazilian household expenditure choices became clear. Health expenses are mandatory independently of the budget constraint due to health conditions. This expenditure class consumes much of the budget for very low income classes. Consumption,

such as food and leisure, can take the entire budget for low income individuals. These expenses, however, become a smaller part of income the more income the household holds.

The reduction in the income share taken by these expenses gives room for mainly two new investment destinations, education and savings. These two fields receive a growing share of income the higher the income class. The growing share of income destined to education spending confirms the relevance given by families to human capital investments. Whenever more capital is available the tendency is not to maintain current expenditure profile, but to switch and emphasize in personal investment. Therefore, there is evidence that, with more capital available, low income individuals would spend more on education, improving overall national stock of human capital and improving economic performance.

The trend of increased human capital investments in income percentage is identified in a national level up to the comparison between the second highest and the highest income classes. This indicates that the budget constraint occurs for all households who earn less than R$ 6,225.00. All individuals under this level of earnings reveal that, on average, would invest a bigger share of their income into education than it was invested when they had less income. The analysis of the budget constraint threshold varies by region, with different regions finding different values for the budget constraint.

On the analysis of the efficiency of credit markets, data has indicated income to be substantially significant to the access to credit. For all four tested tools and for both years, independently of the region (North, South, Southeast, Northeast, Midwest), low income classes had significantly lower access to these tools than higher income. On average, only up to 2% of lowest income households held either credit or debit card, or had current account or overdraft credit available. In contrast, from 70% to 80% of highest income households had access to these same financial tools. The ownership or access to these tools present an upward trend from the lowest to the highest income class, indicating a continuous range of access to credit through the whole spectrum of possible incomes.

Evidence of both factors, constrained human capital investments and imperfect credit-markets, supports the theory of credit-market imperfections and diagnoses an issue for Brazilian economic development. The lack of resources for some families is a consequence of the high levels of inequality and overall mediocre existing GDP performance. Capital is not being perfectly allocated, impeding low income families to invest the desirable amount in education. This fact will generate future lowly educated individuals, a fact that can constrain future

economic performance due to lack of qualified workforce. Furthermore, this fact can reduce the well-being of the offspring of low income individuals, keeping them in a poverty trap.

Limited resources constrain human capital investments. From a cross-country comparison it is possible to recommend Brazil to reduce its inequality, given the disparity to other nations. An alternative solution for the problem diagnosed here is to improve the access to credit-markets. Reducing the cost of default would be the theoretical recommendation for improving credit-market efficiency. That solution would have to go through an institutional reform, which sometimes has a cultural factor as well. This dissertation`s diagnosis does not ask for a simple solution, nevertheless, it seems clear that the existing socioeconomic functioning of Brazilian institutions reinforce the existence of a poverty trap.

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