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A Country Case Study on Brazil

Naércio Menezes-Filho and Ligia Vasconcellos

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For further information, please contact:

AFD: Jacky Amprou Amprouj@afd.fr

BMZ: Birgit Pickel Pickel@bmz.bund.de

DFID: Manu Manthri M-manthri@dfid.gov.uk and Christian Rogg C-rogg@dfid.gov.uk

GTZ: Hartmut Janus Hartmut.Janus@gtz.de

KfW Development Bank: Annette Langhammer Annette.Langhammer@kfw.de

World Bank: Louise Cord Lcord@worldbank.org and Ignacio Fiestas Ifiestas@worldbank.org

Has Economic Growth Been Pro-Poor in Brazil? Why?

FINAL VERSION

Naércio Menezes-Filho

Ligia Vasconcellos

University of São Paulo

Executive Summary

In this paper we examine whether economic growth has been pro-poor in Brazil. In order to do that we describe several indicators of the Brazilian economy, examine the variables associated with poverty levels and changes, calculate the growth-elasticity of poverty, examine the determinants of pro-poor growth in a panel of Brazilian States and investigate the possibility of trade-offs between growth and pro-poor growth. The results indicate that:

1) Growth is good for the poor in Brazil, with the evidence across states suggesting that a 10% rise in income reduces extreme poverty by about 8% on average. As in Bourguignon (2002), the growth-elasticity of poverty depends positively on the initial level of income and negatively on initial inequality. This means that poorer and more unequal states have to growth more to achieve the same level of poverty reduction. The model could predict quite well the evolution of poverty in the Brazilian states over time.

2) The micro data reveal that poverty in Brazil is associated with having children, being non-white, having less education, no access to infrastructure, being unemployed or working in an informal agricultural job. Education, access to infrastructure and sector of activity are more important in rural areas. Over time, poverty has become more common amongst the more educated and employed individuals.

3) Decomposition results suggest that the reduction of poverty in Brazil between 1981 and 2001 occurred mainly in rural areas, especially within the less educated. Poverty reduction in urban centers was mainly the result of human capital upgrade, which out-weighted the rise in unemployment and informality.

4) The Growth Incidence Curves (GIC) reveal that growth benefited most percentiles of the initial income distribution, except for those up the very bottom, but was more beneficial to those in the top, which raised income inequality. The Datt-Ravallion decompositions reveal that most of the poverty reduction was due to growth and very little due to reductions in inequality.

5) The main factors that changed initial conditions in the states and therefore raised the growth-elasticity of poverty were investments in tertiary education, reduction in the share of households with children and reductions in the white/non-white and male/female wage differentials. Regression analysis highlighted the importance of human capital and infrastructure for pro-poor growth.

6) The results of growth regressions suggest that inequality may have positive effects on growth, which means that trade offs may exist between growth and pro-

poor growth. There are, however, no trade-offs associated with investments in human capital, infrastructure and with reducing the dependency ratio.

1) Historical Context and Growth-Poverty Trends

1.1. Historical setting for Brazil's growth experience

Brazil is one of the largest economies in the developing world, but it performs very badly in terms of social outcomes. Figure 1, for example, shows that while Brazil has the highest level of per capita G.D.P. amongst the countries included in this study, with more than two times the level of the second highest (Tunisia), it also is the most unequal. Therefore, poverty rates are quite high in Brazil as compared to other countries in the same stage of development.[1] The main objectives of this paper are first to understand why this happens and second to examine the role of growth in poverty alleviation.

Brazil was one of the fastest growing economies of the 20th century. The 1960s and 1970s embodied the well known 'miracle period'. According to figure 2, from 1960 to 1980 per-capita G.D.P. jumped from U$2,000 to about U$6,000.[2] Thereafter though followed a stagnation period, known throughout Latin American as the 'lost decade', and the recovery observed after the successful stabilization Real plan in 1994 brought rather disappointing growth rates.

The growth strategy of the 'miracle period' in the 1960s and 1970s, ran by a military dictatorship, involved import substitution and large investments, which relied heavily on external loans. After the oil crises Brazil's external debt increased so much that the country ended in a severe recession in the beginning of the 1980s. The economy stagnated throughout the 1980s. There was an extremely severe recession in 1981-82 due to the debt crises. The two years that followed were of a relative recovery, just before the first 'heterodox' stabilization effort, the C*ruzado* plan in 1986, which, by introducing a new currency (the *Cruzado*), eliminated inflation for a time and led to a boom in 1986-87. This boom relied on price controls and other restrictions that proved unsustainable and 1988 saw another recession, though nothing like as severe as that of 1981-82.

The period of 1989-93 followed the drafting of the new constitution of 1988, which paved the way for democratic elections in 1990. Inflation had returned in higher levels, and the Collor plan of 1991 was another failed attempt to eradicate it for good. A steep recession in 1991-92 preceded the impeachment of President Collor in 1992 and a leveling of the economy in 1992-93. In this period began the opening of trade after a long period of import substitution policies, and the privatization of public enterprises, such as

[1] Although differences in the methodology used to construct poverty lines make the comparison of poverty figures across countries complicated.

[2] US dollars in constant (96) prices.

telecommunication and energy. In 1994 the successful stabilization plan, the Real plan, introduced a new currency and a crawling peg system. 1994-96 was a period of expansion, which also saw an appreciable decline in the poverty rate. By 1998 the economy was entering a phase of stalling, owing to contagion effects from the events of 1997 in the East Asian economies. Growth continued to be positive, though at a lower pace than the early part of the *real* plan, until further deterioration in emerging market asset prices prompted by Russia's renegotiation of its debt forced the float of the *real* in January 1999.

The instability of growth in recent times is well depicted in Figure 3 that shows that the standard deviation of annual G.D.P. growth in Brazil is in the upper part of the sample. The most salient feature of the Brazilian economy in the 1980s and 1990s however, was the behavior of inflation. Figure 4 shows that average annual inflation in Brazil was the highest in the sample (and in the whole world) over this period. Figure 5 shows that Brazil was reaching hyperinflation in the end of the 1980s and again in the early 1990s, before the Real plan brought inflation down to civilized levels since the second half of the 1990s.

Since the 1950s, following the import substitution and growth episodes, the bulk of the economy moved from agriculture to industry and services, so that in the early 1990s, Brazil was a very urbanized country, with about 70% of its population living in urban areas in 1989. In the 1990s, as figure 6b and 6c make clear, there was a significant movement out of manufacturing and into the services sector. This structural change occurred all over the world but the magnitude and pace of the Brazilian case is related to the big recession and trade liberalization episode that took place in the early 1990s and destroyed many jobs in manufacturing, as we will see below.

Despite its high poverty levels, Brazil is not doing too badly in terms of human development indicators, relative to the other countries in the sample, as figures 7 and 8 show. Life expectancy at birth was about 66 years in the early 1990s and infant mortality dropped significantly from 50 deaths per 1000 live births in 1990 to 32 in 2000. It is interesting to try and reconcile the relative high levels of poverty observed in Brazil with the relative low levels of infant mortality in the same period. One possible explanation could be that the government health programs in Brazil are efficient in terms of reaching the poor areas, which helps reducing early diseases, while it is very difficult for people living in these areas to engage in market activities of any form. We provide further details about regional inequalities below.

In terms of measures of infrastructure, figures 9 and 10 again reveal contradictory features of the Brazilian economy. While the percentage of roads paved is one of the lowest in the whole sample of countries, which is clearly due to the size of the country and highlights the difficulty in reaching poor areas and in transporting food and other commodities through the country, the number of telephone main lines grew significantly between 1990 and 2000 when it became the highest of the sample, above the world average.

1.2. Growth trends

Growth is strongly related to poverty reduction n Brazil. There were 61 million people in poverty in Brazil in 1970 as compared to 33 million in 1999 (Rocha, 2003). A comparison between the behavior of per capita G.D.P. (Figure 11) with that of poverty (Figure 12) over the last 30 years clearly shows that the two are highly correlated over time. Between 1970 and 1980, when the country almost doubled its per capita G.D.P., poverty at the national level declined from 70% to about 35%. Brazil suffered a recession between 1980 and 1983 and poverty increased about 5 percentage points, accordingly. A period of growth was observed in the period leading to the "Cruzado economic Plan", between 1983 and 1987, and poverty also fell from 38% to about 25% in this period. Per capita GDP remained stagnant between the late 1980s and early 1990s and so did poverty levels. From 1992 a period of growth started again. Interestingly, the poverty reduction in the 1990s was concentrated in the years between 1993 and 1995, the period of the "Real Economic Plan", which occurred in 1994. Since then, poverty has remained relatively stable.

There is, however, a great deal of heterogeneity in the poverty trends across different regions and between urban and rural areas. Figure 12 also presents the evolution of poverty for the metropolitan and rural areas, as well as for the northeast (NE) region, the poorest region in the country. The incidence of poverty in the NE declined from 90% in 1970 to about 30% in 1999, while, in the metropolitan regions, poverty declined from 52% to about 20% in the same period.

In 1970 more than 50% of the poor were living in rural Brazil, where poverty levels reached 80%. The number of poor in rural areas dropped 75% between 1970 and 1999, while the number of metropolitan poor dropped by 58%. This can in part be explained by the fact that the share of the population living in rural areas declined from 51% in 1970 to about 20% in 1999, if those that migrated were the ones in worse condition, as one would expect.

In sum, while it is clear that growth is good for the poor, its effect on poverty depends on various factors. We will try to explain the reasons behind the different trends of poverty reduction in the following sections.

1.2.1. Poverty in the last two Decades

In order to examine the more recent poverty impacts of growth, we will use data from Brazil's Annual National Household Survey (*Pesquisa Nacional por Amostra de Domicilios*: PNAD) from Instituto Brasileiro de Geografia e Estatística – IBGE, between 1981 and 2000. The rural area of the North region is not surveyed. There is no survey for the Census years: 1980, 1991 and 2000, and there was also no survey in 1994.

Each PNAD questionnaire contains a range of questions about the individuals and the household: regional location, demographic composition, quality of dwelling, ownership of durable goods, etc. The individual questions include age, gender, race, educational attainment, labor force status, sector of activity and incomes. The income refers to the reference week in September of each year and encompasses the monthly earnings from all jobs, pensions and others (interest gains, donations and rents). For the entire period of analysis, there is income information for individuals that are 10 years old or more.

PNAD has a stratified sample design that makes it representative at the state level and for the metropolitan/non-metropolitan and urban/rural areas. This is useful in itself: it is interesting to compare growth in household incomes across different states to assess aspects of state performance. Using household data to compile income growth measures also allows one to focus on income growth among the poor (as well as among the whole population).

The survey has some fairly well documented shortcomings (see Ferreira, Lanjouw, and Neri (1998) for the most complete discussion of this topic). In particular, its income measure is rather partial, since the questionnaire does not pay much heed to assessing home production and non-market income (important in rural areas). However, one overriding advantage for present purposes is its comparability across time.

We use the poverty lines (indigence and poverty) based on the PPV survey from 1996, calculated by Ferreira et al (2003). The income deflator used is the monthly INPC (Índice Nacional de Preços ao Consumidor) from IBGE[3]. To take account for regional differences in cost of living we deflate income using the index calculated by Azzoni et al (2003). Income is measured as per capita household income, including all sources of income, corrected by a rent value for dwelling owners. We consider as members of the household all relatives as well as individuals that neither pay rent nor work for the household.

Table 1 describes the evolution (for selected years) of the poverty measures used in this paper, related to the indigence and poverty lines. These are the 3 FGT measures: headcount ratio (FGT0), poverty gap ratio (FGT1) and squared poverty gap (FGT2); and the Watts index. Besides, the evolution of mean income and the Gini coefficient are also described in the table. Mean income refers to the household per capita income, including individuals with zero income.

It is clear from Table 1 that headcount poverty declined substantially over our sample period, from 32% in 1981 to about 26% in 2001, but that most of the decline occurred between 1993 and 1997. The other poverty measures, which take into account the distance from the poverty line and the income distribution among the poor, also declined, but less markedly. The use of a less stringent poverty line, which includes non-basic needs, does not change this overall pattern, although the level of poverty itself is much higher, as one would expect. Mean income rose over the sample period, especially between 1981 and 1989 and between 1993 and 1997. Inequality also rose between 1981 and 1989, but it declined between 1989 and 1997, which is probably due to the fall in inflation rates. Figure 14 provides a graphic description of the poverty trends in Brazil using our data and confirms the findings of the long-run trends described in section 1

1.3. Inequality in Brazil

As we saw above, the level of poverty observed in Brazil can in part be explained by the width of its income distribution. It is widely known that Brazil is one of the most unequal countries in the world. Figure 13, for example, shows that the top 1% appropriate about 15% of all income generated in Brazil, whereas the top 10% earn about half of all income. In the other extreme, the 50% in the bottom of the distribution receive only 10 %

[3] See Corseuil and Fogel (2000).

of the income. Moreover, the figure makes clear that this pattern has remained pretty much stable over our sample period. With such an unequal pattern of distribution, it is not surprising that a relatively rich country like Brazil can have very high levels of poverty.

Barros and Mendonça (1997) summarize several papers on the determinants of inequality in Brazil and conclude that education is the variable with the highest explanatory power. Wage differentials would drop by 35 to 50% if all education inequalities were eliminated. The labor market can also generate inequality through segmentation and discrimination. After reviewing several studies, the authors decompose the contribution of segmentation and discrimination as follows: 15% due to sector of activity segmentation, 7% due to formal and informal markets, and 2 to 5% due to regional segmentation. Gender discrimination would explain 5% and race 2% of inequality. Experience in the labor market explains 5%, while tenure about 10%.

Regional Inequality

The different development pattern observed across the Brazilian regions is reflected both in their living conditions and in their output. Concerning living conditions, an overall improvement was observed in all regions in recent decades, but more intensely in the more developed regions, increasing the relative differences among them in time. Table 2a shows some indicators for 2000. A huge disparity can be observed between the northeast and north regions and the other regions in terms of child mortality and basic sanitation. The south region has a mortality rate of 18.3 (for each 1000 children born alive) up to the age of 1, while in the northeast this figure more than doubles, hitting the mark of 47.79. In the south and southeast regions, over 90% of the population has piped water in their households, while in the north and northeast regions this percentage is less than 60%. Table 2.1 also shows the average of municipal human development indices (IDHM) for the regions, which summarize income, education, and longevity measurements. The northeast and north regions also have the lowest IDHM (municipal human development index).

Table 2b shows the per capita GDP of each region and the contribution of each region to the total GDP, in addition to the Gini index, which measures the income inequality. In the period between 1985 and 2000, the per capita GDP grew in all regions, except in the northeast region, where it remained virtually the same. The northeast region had the lowest per capita GDP over this period, lower even than the one registered in the north region, which despite its low living condition indices and low participation in the total GDP has a low demographic density. The southeast region has the highest per capita GDP and it is the one that contributes most to the total GDP, followed by the south region. In terms of income distribution, the disparities among the regions are even more marked, since the poorest regions are also the most unequal ones, as shown by the Gini index (the closer the index is to 1, the more unequal the income distribution is).

Gender and Ethnic Inequality

Another important dimension of inequality is that associated with gender. But this aspect of inequality is clearly getting better over time. Figure 15, for example, shows the rise in women's labor force participation over time, which occurs in all states, while male participation remains quite stable. There was also a rise in female schooling over time, as shown in figure 16 that plots the male/female education differentials. Interestingly enough, female education is rising more quickly than male education recently, as the education differentials are becoming negative in most states. The same thing is happening in terms of the male/female wage differentials over time, as shown in figure 17. These differentials are clearly declining over time, and approaching zero in some states. One must be careful when comparing wage differentials across states, however, since composition effects may be an important force here.

In terms of ethnic discrimination, however, things are not becoming better over time. Figure 18 plots the evolution of the white/non-white education differentials in different states and show that they are pretty much constant over time. Figure 19 shows that the same pattern can be observed in the behavior of the white/non-white wage differentials. Clearly something more has to be done with respect to the ethnic discrimination in Brazil.

2) Has economic growth in Brazil been pro-poor?

2.1 - Sources of Growth

Before investigating whether growth has been pro-poor in Brazil it is worth investigating what were the sources of Brazilian growth in recent times. Figure 20, taken from Pessoa et al (2003), describe the behavior of total factor productivity from 1950 to 2000. It is clear that TFP rose substantially between the early 1950s and the late 1970s, and is behind the period of high growth that took place in the same period. Table 3 (also taken form Pessoa et al, 2003) decomposes Brazilian growth into its several sources, using a growth accounting methodology. Over the period as a whole, Brazil grew at a rate of 5,1% per year. Population growth accounts for about 46% of this growth, while labor force participation (L/N) accounts for another 16%. Total Factor Productivity is responsible for 10% of overall growth, while capital intensity explains about 17%. Finally, human capital accounts for about 8% of growth, but it share rises to 25% if one considers only the last two decades.

Figure 21 documents the evolution of GDP by sector of activity and clearly shows that, since 1980, manufacturing has lost ground with respect to agriculture and especially the services sector. This maybe the result of trade liberalization and of the changes in the consumption pattern of the economy, but more research clearly must be carried out to shed more light on this important issue.

Trade Liberalization

Prior to 1990, the Brazilian economy was highly protected and regulated, and public sector companies dominated a variety of infrastructure activities, among other industries. Successive administrations followed a vigorous import substitution industrialization strategy expanding trade barriers not only through tariffs, but especially through import licenses, different exchange rate regimes for imports and exports, among other measures such as taxes and subsidies, aimed at protecting the domestic market. More than 50% of industrial products were in the “Anexo C”, a list of items that could not be imported. This large range of policy instruments gave the government the discretion to impose barriers in order to protect sectors at will.

The government decided to change the trade policy in 1988 lowering modestly the tariffs and lifting some redundant barriers, but it did not affect significantly the international trade. Kume (1989) argues that the reforms of the time were limited due to strong opposition from producer interest groups. It was from 1990, under the president Collor administration, when the efforts to contain inflation were combined with a drastic trade liberalization constituting a major break with the import substitution strategy. The new government introduced a four-year schedule to reduce the protection, but in practice it was completed in the third year. Up to the middle of 1993, most of the complex and bureaucratic set of non-tariff barriers was removed, and a new tariff structure was imposed, which substantially reduced the degree of protectionism.

Figure 22 shows that the nominal tariffs and effective tariffs[4] dropped very rapidly in a few years. In 1987, the national weighted average nominal tariff was 55 percent and by 1992 it had been reduced to 14 percent. This was accompanied by a sharp reduction in the modal tariff, bringing the standard deviation to about a third of the previous figure. The weighted average effective tariff, which remained unchanged in the 1980s, dropped from 68 percent in 1987, to 18 percent in 1992, while the standard deviation declined from 54 percent to 17 percent (Kume et al, 2000). As a result of the new economic policy and the overvaluation of exchange rate from 1990 to 1996, imports increased by 257 percent, while exports increased by 151 percent. By 1995, trade balance started to have increasing deficits.

Table 4, taken from Arbache and Menezes-Filho (2000) presents the results of panel data regressions, using data from the Annual Industrial Surveys (PIA-IBGE), relating changes in some performance indicators and changes in tariffs across sectors. The results show that trade liberalization improved product market performance, with a decline in tariffs being associated with a rise in quasi-rents, productivity and profitability. These results were also found in several other studies of this kind (see Ferreira and Rossi, 2003, and Muendler, 2002, for example).

2.2 – Correlates of Poverty

Table 5 examines the correlates of poverty in 1981, the beginning of our sample period. Columns (1) and (2) present the mean of the variables for Brazil as a whole, columns (3) and (4) restrict the sample to the rural areas, and columns (5) and (6) to the urban areas. In terms of household income and structure, it is firstly very clear that average per capita household income for the poor was very low in 1981, in turn of R$38 per month, which is equivalent to U$12. Among the non-poor mean income was also low, reaching R$269 per month, equivalent to U$86. Column (3) to (6) show that the same pattern is true in urban and rural areas, and they also show that the poor earn more or less the same, on average, in the two areas.

The proportion of poor living in urban areas in 1981 was quite smaller than amongst the non-poor, which shows that poverty was much lower in urban areas. In terms of the presence of children in the household, in 1981 95% of the poor lived in households with

[4] The effective protection rate of a product is the percentage excess of value added measured at domestic prices of output and non-factor inputs over value added measured at international prices.

children, whereas amongst the non-poor the share was smaller (78%). In terms of the presence of older people, the situation is the reverse, as 16% of the poor lived in households with older people, while only 21% of the non-poor did so. The numbers are pretty similar in rural and urban areas, meaning that poverty is associated with fertility all over Brazil. There are no significant differences between the proportion of male headed households amongst the poor and the non-poor, while the differences in terms of race are quite pronounced, as only 37% of the poor are headed by whites, while 60% of the non-poor are so.[5] Again there are not significant differences in this pattern across urban and rural areas.

In order to assess the distribution of education among the poor and non-poor, we created four categories, according to the level of education of the head of the household.[6] The results of Table 5 show that in 1981 79% of the poor live in households whose head has not completed primary education, whereas amongst the non-poor the share is much smaller (40%). The picture is more dramatic in rural areas, where almost 94% of the poor haven't got a primary degree, although the differences between the poor and non-poor are much higher in urban areas. In terms of completed high school and college, only 0,7% of the poor are in this situation, as compared to 16% of the non-poor. Therefore, we believe human capital is the main asset that can move the poor out of poverty.

Access to basic infrastructure is also important to escape poverty. In 1981 only 13% of the poor had access to a sewage system, while 54% of the non-poor did so. Access to electricity was more common among the poor, while garbage collection and drinkable water were quite restricted among the poor. The differences in access to sewage, garbage collection and water are more striking in urban areas, while electricity is the main divide between the poor and non-poor rural areas.

In terms of labor market, there were no significant differences in the early 1980s in the working status among the poor and non-poor, especially in rural areas. But unemployment was already quite higher among the poor, even before the big rise in unemployment that tool place in the 1990s.

In terms of sector of activity, half of the poor work in agriculture, as compared to only 16% amongst the non-poor, but there are no dramatic differences between the poor and non-poor within the rural and the urban areas. Interestingly, the majority of the non-poor is working in the services sector. In terms of access to formal jobs, there is marked difference between the poor and the non-poor, especially in rural areas. In terms of position in the occupation, the biggest differences occur in terms of self-employment that is more common among the poor and employer, which is much more common among the non-poor.

It seems therefore that in 1981 most of the differences between the poor and the non-poor are related to education, access to infrastructure and sector of activity. In terms of

[5] Bairros, Paixão and Cunha (2001) emphasize the whole of race as a determinant of inequality in Brazil.

[6] Edu1 = Incomplete primary school (until 3 years of education); Edu2=Complete primary school (4 to 7 years); Edu3= Complete secondary school (8 to 10 years); Edu4 = Complete high school or more (11 to 16 years).

these variables, there are more differences between the rural NE and the urban SE than between the poor and the non-poor in rural NE. In urban SE poverty is associated with education and labor market status.

Table 6 presents the results (in terms of the marginal effects) of probit regressions, to examine the conditional effect of the determinants of poverty in 1981 and 2001, on average and separately for urban and rural areas. It is interesting to note firstly that living in urban areas became a positive predictor of poverty in 2001, as compared to a negative effect in 1982, which confirms that poverty also became an urban phenomenon in the new century. One can also note that poverty became less associated with the presence of children in the household (although still positively associated with it) and with the presence of older people as well, as compared to households with neither of them, especially in rural areas.

The table also shows that male-headed households are less likely to be poor overall and in urban areas, while the reverse occurs in rural areas and increasingly so. In terms of ethnicity, whites are less likely to be poor than non-whites, a phenomenon that is becoming more important in urban areas, but less so in rural areas. Education is clearly negatively related to poverty, but its effect lost importance over time, especially in urban areas, despite remaining one of the most important factors associated with poverty, in quantitative terms, together with demography. Our measures of infrastructure are also negatively related to poverty, but their effect lost importance over time, with the exception of access to electricity that became more associated with poverty in urban areas in 2001.

In terms of the labor market, head unemployment was the single most important determinant of poverty in 1982, but there was a marked drop in its coefficient between 1982 and 2001, meaning that poverty became more common among the employed as well. Those living in a household whose head is inactive are less likely to be in poverty. With regard to sector of activity, it is very clear that those in agriculture are more likely to be poor, as compared to manufacturing and services, and that informality is also associated with poverty, especially in rural areas. There was no qualitative change in these effects over time. Finally, in terms of position in the occupation, both the self-employed and the employers are less likely to be poor, but this effect became less important over time, with the exception of the employer in rural areas, which can be thought of as the owner of the land and became less likely to be poor in 2001.

2.3 – Decompositions of Poverty Change

The exercises above give only a static picture of poverty, in the beginning and end of our sample period. We now consider decompositions of the *change* in poverty across broad demographic and labor market groups. The change in poverty between two points in time will be decomposed into three components. The intra-sector component shows the contribution of poverty changes within the group, allowing for their population share in the base period. The population-shift component tells us how much of the initial poverty was reduced through the changes in population shares across groups. The interaction component arises from the possible correlation between within-groups gains and population shifts and its sign tells us whether people tended to switch to the sectors where poverty was falling or not.

Tables 7 to 12 present some results of this decomposition exercise. In all decompositions we use the change in the headcount rate (indigence line) between 1981 and 2001 as the poverty measure. The change in poverty (%) within-groups measures the poverty change in each group multiplied by its participation share in 1981. The total intra-sectoral effect, adding-up the groups effects, measures the percentage of poverty change that would have occurred if the population share of each group remained the same as in 1981. The population-shift effect measures percentage of poverty change due to population shift among groups, maintaining the poverty rate on 1981. The interaction effect is the residual.

Table 7 shows the geographic distribution of the change in poverty. As we saw above, poverty is most prevalent within the Northeast region (NE), where 52% of the population was poor. Poverty dropped between 1981 and 2001 for all regions (except in the North), and the contribution of the NE is higher because of its higher initial share. Overall, all the poverty reduction occurred within regions (110%), with migration across regions contributing to a rise in poverty, mainly because population rose more in the NE region.

Table 8 performs the same exercise for the urban and rural areas. It is interesting to note that most of the poverty reduction occurred within the rural areas, *with a small reduction within the urban regions*. The poverty reduction in rural areas could be related to the safety net for old people in Brazil, where rural social security plays an important role. This was extended in 1988 to all rural workers, had they contributed or not, and there was also a significant increase in the value and scope of the rural social security. The small reduction in poverty in urban areas contributed significantly to the overall poverty reduction (25%), however, because most of the population was already living in urban areas in 1981 (77%). Migration to urban centers was still high between 1981 and 2001, which means that the population shift effect also contributed to poverty reduction (44%).

The results in Tables 9 and 10 explain the importance of human capital to poverty reduction in the urban southeast and rural northeast, respectively. It is important to note that education level of the head of the family were attributed to all household members and the decomposition, therefore, is calculated for the entire population. In the southeast (Table 9), the only education group to have its poverty levels reduced was the lowest education one, which is related to the poverty reduction in rural areas, as we saw above. Poverty rose within the more educated groups, which is related to the rise in unemployment and inactivity in urban areas. *The shifts to higher educational levels (population shift effect), however, explain more than the overall poverty reduction (145%) that occurred in Urban Southeast*. Therefore, the shift between groups (where the difference in poverty rates still remain high) out-weighted the higher levels of poverty within the more educated groups.

Table 10 shows that most of the poverty reduction in the rural NE occurred mostly within-groups (93%), because the rise in human capital accumulation in this region was much smaller than for the rest of the population and it therefore had to rely on specific policies (like rural pension) to decrease poverty.

In terms of labor market conditions, Table 11 shows that in the southeast poverty was reduced among the employed, the unemployed and the inactive, but the decline was higher among the unemployed, which could be related to the introduction of the unemployment benefit system in 1984. The increase in unemployment between 1981 and 2001 however, meant that the population-shift effect contributed to a rise in poverty. Table 12 shows that in the rural NE, most of the poverty reduction occurred within the unemployed and inactive, due to labor market policies, but with a very small population shift effect.

2.4 – Growth Elasticity of Poverty

The total growth-elasticity of poverty, ε, may be defined as the relative change in the poverty headcount between two periods for a one percent growth in mean income (assuming that the poverty line remains constant in real terms).[7]

$$\varepsilon_H = \frac{\partial H}{\partial \mu}\frac{\mu}{H} \tag{1}$$

where H is the headcount index and μ is the mean income.
Brazil comprises 26 states, which are spread in the 5 macro-regions. The analysis presented in this section does not consider the North region (7 states), since most of its rural part is not included in the PNAD surveys, which could lead to misleading inferences about the comparison among states.[8] To calculate growth elasticity of poverty in Brazil we gathered income (y) and poverty (pov) data for the 17 States over five 4-year intervals (81-85, 85-89, 89-93, 93-97, 97-01), totaling 95 observations, and use the following specification:

$$\Delta \ln(pov)_{it} = \alpha + \beta \Delta \ln(y)_{it} + \delta_t + \varepsilon_{it} \tag{2}$$

The results of the Table 13 show that, using the headcount measure FGT(0), the growth elasticity of poverty is Brazil is –0.89 when we use the indigence line, and –0.52 when we use the poverty line. The elasticities obtained when we use the FGT(1), FGT(2) and the Watts index as poverty measures are all higher, in the range of –1 for the indigence line and -.8 for the less stringent poverty line, indicating that growth impacts the intensity of poverty more strongly than it does to the number of poor in Brazil.

Bourguignon (2002) points out that the reduction of poverty in a given population is analytically linked to growth of mean income and the change in the distribution of relative incomes. More precisely, the growth-elasticity of poverty is an increasing function of the level of development and a decreasing function of the degree of relative

[7] In contrast, the partial growth elasticity of poverty as defined by in Bouguignon (2003), is the relative change in the poverty headcount for a one percent growth in mean income holding inequality constant.

[8] We also excluded the Federal District, which is very peculiar for being the capital of the nation.

income inequality.[9] Table 14 empirically examines this relationship for the case of Brazilian states. Column (1) repeats the results of specification (1) as a benchmark. In figure 23 we plot the actual poverty change (over the whole period) against the change predicted by this model. One can note that while growth does a good job in predicting poverty reduction for some states, cases like Santa Catarina (SC) and Piaui (PI) are clearly outliers, with the first (SC) reducing poverty by much more than predicted by its income growth and the last doing the opposite.

In column (2) we include the change in the Gini coefficient as an additional control, which attracts a positive and highly significant coefficient, improves the R2 from 0.72 to about 0.81 and raises the growth-elasticity of poverty to –1. Figure 24, however, shows that the introduction of change in inequality in the model does not help us to predict the behavior of poverty reduction in S.C. and PI, for example. In column (3) we interact change in income with the initial level of income and the initial Gini coefficient, as in Bourguignon (2002). The interaction with initial income attracts a negative coefficient, while the interaction with initial inequality has a positive estimated coefficient, both statistically significant. Their inclusion raises the value of the income variable substantially and improves the fit of the model to 0.90. This means that the poverty reduction effect of growth is much higher when the initial level of income is high and lower when initial inequality is high. Moreover, Figure 25 shows that the inclusion of the interaction terms in the model explains the cases of SC and PI, as the poverty changes observed in these two states (and most of the other ones) are now completely explained by the model. The answer seems to be that, despite growing substantially, PI had a very low initial income level that was very unevenly distributed, which meant that its poverty reduction was much lower than in SC, for a given amount of growth.

Column (4) interacts the change in the Gini coefficient with initial income and the initial Gini coefficient. The coefficient of the interaction with initial income is positively estimated, meaning that a change inequality has a higher impact on poverty when income is initially high. The coefficient on the interaction with initial Gini, on the other hand, attracted a negative coefficient, though statistically insignificant. The change in the R2 after the introduction of these 2 variables is relatively small, however, and the predictive power of the model does not change significantly, as figure 26 shows. Column (5) includes state fixed effects in the regression, with no qualitative changes in the estimated coefficients, since the main variables are already in first-differences.

2.5 Pro-poor growth measures

There are different understandings about the concept of pro-poor growth. The definitions can be classified in two broad groups, summarized by Fiestas and Cord (2004). The *absolute* approach, which considers that growth is pro-poor if there is any reduction of poverty associated with growth poverty (Ravallion and Chen, 2003; Kraay, 2003). The *relative* approach considers that inequality must also be affected, i.e., that growth is pro-

[9] Bourguignon (2002) uses the poverty line divided by mean income as a measure of development, but since the poverty line is the same for all states of Brazil and over time, we use only mean income as a proxy.

poor only if the poor benefit more from growth than the rich, in relative or absolute terms (Kakwani and Son, 2003).

The Ravallion and Chen (2003) measure of pro-poor growth falls into the absolute approach: their pro-poor growth rate is defined as the mean of the growth rates of the percentiles under the headcount rate. This measure can also be derived from the growth incidence curve (GIC) that depicts income growth rates at different percentile points. The GIC is defined as (see Cord et al, 2003):

$$g_t(p) = \frac{L_t^{'}(p)}{L_{t-1}^{'}(p)}(\gamma_t + 1) - 1 \qquad (3)$$

where $g_t(p) = (y_t(p)/y_{t-1}(p)) - 1$ is the growth rate in income y of the pth percentile, $L_t^{'}(p)$ is the slope of the Lorenz curve at t, and the growth rate in mean is $\gamma_t = (\mu_t/\mu_{t-1}) - 1$. If $g_t(p) \geq 0$ for all p, then growth will always reduce poverty.

Ravallion and Chen (2003) define the "absolute" rate of pro-poor growth (RPPG) as the area under the GIC up to the headcount index *at the start of the period*. In particular, the rate RPPG is given by the ratio of the actual change in poverty over time (using the Watts index) to the change that would have been observed under distributional neutrality times the ordinary rate of growth (Ravallion and Chen, 2003; Ravallion, 2004). In short, equation (3) can be interpreted as the ordinary growth rate in the mean scaled up or down according to whether the distributional changes were pro-poor:

$$g_t^p \equiv \frac{dW_t}{dW_t^*}\gamma_t \qquad (4)$$

where, g_t^p is the rate of pro-poor growth in country p at time t, while dW_t is the actual change in poverty that occurred using the Watts index, and dW_t^* is the change in poverty that would have occurred with distribution neutral growth and γ_t is the overall growth rate at time t.
Figure 27 presents the Growth Incidence Curve for the Brazilian Case. Income growth was negative up to the 5th percentile, and positive everywhere else in the distribution. This negative growth is related to the rise in the percentage of households with zero income (from 0,71% of the observations in 1981 to 1,60% in 2001), which were given an arbitrary low income for the sake of the calculations. Ferreira and Barros (1999) analyze the increase in extreme poverty in urban Brazil in the period 1976 and 1996. Their simulations showed that individuals below the 12^o percentile were affected by a change in occupation, to unemployment or out of the labor force, which had a stronger effect than the positive effect of demographics (decrease of family size and of dependency ratio). This is a source of concern, because most individuals with low education and low

chances to get back to employment belong to this group.[10] The figure also shows that growth was almost monotonically increasing with the percentiles, meaning that income inequality rose over this period. This is consistent with Table 1 that showed that the GINI coefficient rose from 0.575 to 0.594. Actually, in the majority of percentiles income grew at a rate very similar to that of the median.

Figures 28 and 29 present the GIC for the urban and rural areas, respectively. The behavior in the urban areas is remarkably similar to that of the whole country (although the mean of growth rates was lower), while in the rural areas growth favored more markedly those in the top of the distribution, with a bigger rise in inequality.

Figures 30 to 33 show the GIC patterns for the sub-periods. As we saw in section 1 above, the "Cruzado" stabilization plan was launched in 1986 and the economy grew substantially in this period. This is reflected in the behavior of the GIC between 1981 and 1986, depicted in figure 30, which shows very high growth rates overall and higher growth in the bottom percentiles, perhaps because of the decline in unemployment rates that took place over this period. It is interesting to note, however, that from the 15th percentile upwards, growth also favored those in the top of the distribution.

The period between 1986 and 1989 was the period of fastest growing inflation rates in Brazil, reaching its peak in 1989. Figure 31 shows that during this period, growth was very small and had perverse effects in terms of inequality, as only those in the very top were able to maintain their real income levels. The period between 1989 and 1993 is very interesting from an analytical point of view. As we saw in table 1 above, in this period inequality declined (from a Gini of 0.63 to 0.60) but poverty increased (from a headcount of 0.31 to 0.34). Figure 32 explains why. Income growth was negative for all percentiles, which must have increased poverty, but it was more negative in the higher percentiles, which decreased inequality. Figure 33 then depicts the growth patterns in the last period, between 1993 and 2001. The "Real" stabilization plan was launched in 1994 and the economy grew at reasonable rates since then, so that income grew across all percentiles of the distribution. Unemployment rose in this period as well, which may explain the drop in lowest percentiles. Apart from that, and a drop at the very top, income growth was pretty much uniform across the distribution.

Table 15 reproduces the growth rates of Figures 27-33. Over the sample period as a whole (1981-2001), the mean growth rate was 30%, growth rate at the median was 27%, the mean of growth rates was around 22% and growth was against the poor up to the 15th percentile, becoming pro-poor from this percentile upwards. If we measure poverty by the indigence line (percentile 32) growth was pro-poor over the whole period (1981-2001) and in the periods of 81-86 and 93-01.

2.6- The Datt-Ravallion Decomposition (Datt-Ravallion –1992)

[10] Fiestas and Cord (2004), however, emphasize the problems associated with drawing conclusions based on either tail of the GIC, which may show high variability and dramatic changes between the two periods due to measurement error.

Changes in poverty rates can also be decomposed into changes due to economic growth (or mean income) in the absence of changes in inequality (or income distribution), and changes in inequality in the absence of growth (see Cord et al, 2003). Denoting by $P(\mu_t, L_t)$ the poverty measure corresponding to a mean income in period t of μ_t and a Lorenz curve L_t , the decomposition is:

$$\Delta P = [P(\mu_2, L_\pi) - P(\mu_1, L_\pi)] + [P(\mu_\pi, L_2) - P(\mu_\pi, L_1)] + R \qquad (5)$$

The first component is the change in poverty that would have been observed if the Lorenz curve had remained unchanged, while the second component is the change that would have been observed if mean income had not changed. The last component is a residual. Tables 16 to 18 apply this decomposition exercise to the Brazilian case. According to Table 16, almost all the poverty reduction that occurred in Brazil was due to the growth component. The redistribution effect was small and associated with a rise in poverty, with the exception of the Watts index applied to the more stringent poverty line. These results confirm that growth was very important for poverty reduction in Brazil and that poverty could be reduced faster had inequality contributed to it.

Table 17 decomposes poverty reduction in urban and rural areas separately. It firstly confirms that the reduction of poverty was much more pronounced in rural areas as compared to the urban ones. Moreover, it shows that this occurred both because the growth component was higher in rural areas and because the redistribution component was higher in urban areas.

Table 18 reports the results of the same exercise for different sub-periods. The results are consistent with the GIC analysis performed above. Between 1981 and 1986 poverty was reduced in Brazil mainly because income grew substantially over this period. Between 1986 and 1989 poverty rose mostly because of the rise in inequality, but the recession contributed as well. Between 1989 and 1993 the growth and inequality components went in different directions, with the recession contributing to the rise in poverty, which was in part out-weighted by the fall in inequality. Between 1993 and 2001 the fall in poverty can be attributed almost completely to the growth component.

3 Factors Affecting the Participation of Poor People in Growth

Section 2 above showed that a model that includes income growth, changes in inequality and interactions between income growth and initial conditions, such as initial income inequality, was able to explain quite well the evolution of poverty across the Brazilian States. In this section we will try to understand which economic factors affect the participation of poor people of growth, through their role in shaping these initial conditions and the change in inequality.

3.1 Differences in Elasticities across States

In order to start the investigation we firstly take advantage of the panel nature of our data to obtain growth-elasticities of poverty for each state separately, by estimating an equation that interacts income growth with the dummies for each state:

$$\Delta \ln(pov)_{it} = \alpha + \beta_i \Delta \ln(y)_{it} + \delta_t + \varepsilon_{it} \qquad (6)$$

Table 19 presents the estimates of the elasticities for the different States, on average and separately for urban and rural areas. The results show a significant variation in the poverty-growth elasticities. First of all, there is a marked difference in the elasticity across states, as column (1) demonstrates. They are higher (in absolute value) in the states of the Southeast, such as São Paulo (SP), Rio de Janeiro (RJ) and Minas Gerais (MG), all of which have elasticities that are close to 1 in absolute value. Then are the States in the South, such as Rio Grande do Sul (RS), Parana (PR) and Santa Catarina (SC), followed by those in the Centre-West, like Mato Grosso do Sul (MS), Mato Grosso (MT) and Goias (GO). The smallest elasticities are to be found in the states of the northeast region (the nine States in the bottom of the table), in the range of 0.6. We examine the reasons behind the differences in elasticities in detail below.

Columns (2) and (3) show the differences in elasticities across urban and rural areas. It is interesting to note that, with the exceptions of São Paulo (SP), Rio de Janeiro (RJ), and Espirito Santo (ES), all other States have elasticities that are higher in urban as compared to rural areas. The differences are higher in the States of the Centre-West and the Northeast, where urban elasticities can be about 4 times higher than the rural ones.

But there are also differences in the elasticities over time. Figures 35 and 36 take another look at the relationship between income and poverty growth across the States of Brazil, splitting the sample in two different periods, 1981-1993 and 1993-2001. The first was a very volatile period with inflation growing and many reforms taking place. The second was a much more stable period, after the “Real” economic plan took place in 1994. A comparison of the two figures shows there seems to be less state-level variation in the growth-poverty relationship in the first period than in the second, as one can see from the dispersion around the line of best fit. In the second period, States with the same rate of growth in income, such as Santa Catarina (SC) and Pernambuco (PE), had very different rates of poverty reduction, 55% and 20%, respectively.

Figure 37 compares the poverty-growth elasticity in the first (1981-1993) and in the second period (1993-2001). The 45o line in the figure shows that there was a rise in the absolute value of the elasticities in most states in the second period. The only exceptions are the states of Maranhão (MA), Ceara (CE), Alagoas (AL) and Rio Grande do Norte (RN) where the elasticity declined. Therefore, it seems that, in spite of the greater variation in the elasticities among states, the second period saw a rise in their value over time, making growth more pro-poor.

3.2 The Determinants of the Growth-Elasticity of Poverty

3.2.1. **Initial Income**

Figure 38 relates the growth-elasticity of poverty with the initial level of income across the different states, as in Bourguignon (2002). It is clear that there is a positive relationship between initial income and the elasticity. Piauí, for example, had the lowest income in 1981 and the one of the lowest values of the elasticity, with the opposite happening in São Paulo (SP), for example.

But is this relationship causal, or is initial income correlated with other factors that are also related to the poverty-growth elasticity? In order to examine this issue, we subject the relationship to a more stringent test, that is, we relate the change in the initial value of income (1981-1993) to the change in the growth-elasticity of poverty between the 1981-1993 and the 1993-2001periods. The reasoning for this procedure is that if initial conditions are important determinants of future pro-poor growth, then changes in initial conditions should change the poverty-growth elasticity in the subsequent period. It is as if we were taking first-difference in panel data to eliminate the fixed effects. If the slope of the regression line is approximately the same in the "changes" as in the "static" case, then evidence is produced that the relationship is causal.

Figure 39 shows that that there is no clear relationship between change in income between 1981-1993 and the change in the growth-elasticity of poverty. For example, the elasticity in the State of Piauí (PI), which had the highest growth in the first period, remained roughly constant in the second period. Rio de Janeiro (RJ), on the contrary, was the state with the biggest change in elasticity, despite having had the lowest growth rate in the first period. It seems therefore that in the case of states of Brazil changes in income did not directly lead to changes in the value of the elasticity, at least unconditionally.

3.2.2. **Initial Inequality**

The distribution of Gini coefficients across States in 1981, presented in Figure 40, shows that there was a great deal of dispersion in the initial level of inequality. Moreover, the figure confirms that initial inequality is negatively correlated with the growth-elasticity of poverty, as we saw above. The most unequal States in 1981, such as Ceara (CE), Bahia (BA) and Espirito Santo (ES), were among those with the lowest subsequent (1981-2001) poverty-growth elasticities, while in states like São Paulo (SP) and Santa Catarina (SC) the opposite happens.

But did changes in inequality between 1981-1993 caused changes in the growth-elasticity between 1993-2001? Figure 41 shows that this was indeed the case. It seems clear that the states with the biggest rise in inequality in the initial period (mainly those in the Northeast region) also saw a decline in the absolute value of the poverty-growth elasticity, as compared to other States. As a comparison, in States where inequality remained stable in the first period, such as Rio de Janeiro (RJ), Santa Catarina (SC) and Goias (GO), growth became more pro-poor. It seems therefore that in order to investigate the reasons behind the changes in pro-poor growth, one has to examine the determinants of the change in inequality across states.

3.2.3. **Human Capital**

The initial level of human capital is expected to be one of the main factors driving the differences in initial conditions across states, as it is positively related to initial income and negatively related to initial inequality (see Menezes-Filho, 2001). Figure 42 shows that this is indeed the case. States like Piaui (PI) and Maranhão (MA) had the lowest levels of schooling in 1981 and also the lowest values of the growth-elasticity of poverty. On the other extreme are states like São Paulo (SP), Rio de Janeiro (RJ) and Santa Catarina (SC), with high levels of schooling and of the elasticity.

Figure 43 in turn makes it clear that the relationship between human capital and the elasticity is robust to eliminating state fixed-effects, as changes in average years of education between 1981 and 1993 tended to provoke a rise in the absolute value of the poverty-growth elasticity. States with the lowest levels of human capital improvements like Ceará (CE) and Bahia (BA) also had the smallest change in the value of pro-poor growth.

But which is the level education that most improves pro-poor growth? Figure 43a shows that it is not education at the primary level, as there is no clear relationship between change in the share of primary education and changes in pro-poor growth. Figure 43b shows that it is not the secondary education either, as changes in the share of the heads with this level of education are negatively correlated with changes in pro-poor growth. Figures 43c and 43d, however, show that changes in the rate of enrollment in high school and college education are highly correlated with changes in the growth-elasticity of poverty. States such as Rio de Janeiro (RJ), Rio Grande do Sul (RS), Santa Catarina (SC), Paraná (PR) and Sergipe (SE) had the biggest changes in high school attainment and were among those with highest changes in the rate of pro-poor growth. One the other hand, in states like Ceara (CE) and Rio Grande do Norte (RN), the opposite happened. It seems clear therefore that investments in human capital, especially in the tertiary education, are conducive to pro-poor growth.

3.2.4. **Infra-Structure**

Figure 44 shows that the initial (1981) share of households with sewage treatment is positively correlated to subsequent poverty-growth elasticity across states, which is to be expected, since section 2 above produced evidence that infra-structure and poverty are strongly related at a point in time. This relationship is not robust to controlling for state fixed-effects, however, since, as figure 45 shows, changes in the share of households with access to a sewage system between 1981 and 1993 did not lead to a rise pro-poor growth. We experimented with other measures of infrastructure with similar results.

3.2.5. **Share of Households with Children**

Figure 46 shows that there is a strong negative correlation between the initial (1981) share of households with children and subsequent poverty-growth elasticity across states. This is to be expected since poverty is much more prevalent in these type of households, as table 6 above showed. More importantly, figure 47 shows that this relationship is robust to controlling for state fixed-effects, since states with the largest decline in the proportion of household with kids, like Espirito Santo (ES), Goias and Paraná (PR) were the ones with the highest change in the poverty-growth elasticity. This is an important result as it implies that demography plays an important role in determining pro-poor growth.

3.2.6. **Ethnicity**

We now look at the role of labor market discrimination in the relationship between growth and poverty. It is plausible to think that if some actors of the society are persistently earning less than others, they will not share the fruits of growth equally and so will remain in poverty despite high levels of growth. Figure 49 shows that States where the wage differential between whites and non-whites was initially higher, such as Bahia (BA), Rio de Janeiro (RJ) and Ceara (CE) achieved a lower level of poverty reduction for the same rate of growth. Moreover, figure 50 shows that States where this differential rose between 1981 and 1993, like Alagoas (AL), Piaui (PI), Mato Grosso (MT) and Paraiba (PB) and Rio Grande do Norte (RN), experienced a reduction in the poverty-growth elasticity in 1993-2001, as compared to 1981-2003. On the other hand, states like Rio de Janeiro (RJ), Goias (GO) and Espirito Santo (ES) experienced important change in the rate of pro-poor growth and after a substantial decline in the white/non-white wage differentials. Therefore it seems that, in the face of the inequality across ethnicities that prevails in Brazil, policies leading to more integration and less discrimination can make growth more pro-poor.

3.2.7. **Gender**

What about the role of male/female wage differentials on pro-poor growth? Figure 50 describes the relationship between the initial level of male/female wage differentials and the growth-elasticity of poverty. There seems to be a positive relationship between the two variables, but interpretation of this finding is complicated by the fact that labor force participation rose markedly over the sample period, as we saw above, which means that composition bias is certainly present here.

Figure 51 controls for state fixed-effects and the results show that a rise in differentials is associated with a reduction in the elasticity. Because of the composition problems and conflicting results in the levels and first-difference specifications however, we do not attach much weight to these results.

3.2.8. **Sector Composition**

We saw above that the manufacturing sector experienced a decline in the 1980s and 1990s, while the services and agricultural sectors grew more rapidly. Figures 52 to 57 try to relate the initial level and changes in sector composition to the level and change of poverty-growth elasticity. The results are not very clear. From the levels' perspective, it seems that a high initial share of employment in agriculture, as opposed to manufacturing and the service sectors is harmful for pro-poor growth. When we differentiate out the state fixed-effects however, states that experience a rise in agricultural employment, such as Paraiba (PB), and Piaui (PI) did not experience changes in the poverty-growth elasticity.

In same vein, a high initial share of employment in manufacturing and services seems to be positively correlated with the growth-elasticity of poverty. States where the service sector expanded the most between 1981-1993, however, such as Alagoas (AL) and Sergipe (SE), experienced a reduction in the value of the elasticity in the subsequent period. One possible explanation for these conflicting results is that eliminating the fixed effects is not enough to control for omitted factors that are driving the changes in composition, and correlated with pro-poor growth. The availability of exogenous instruments would be necessary to identify the effects in this case.

In terms of urbanity, the same pattern occurs. Figure 58 shows a strong positive correlation between the initial share of the population living in urban areas and subsequent pro-poor growth. Figure 59, however, shows that there is no clear relationship between changes in the urban population between 1981-1993 and change in the value of the growth-elasticity of poverty.

3.2.9. **Unemployment and Formality**

Interestingly enough, Figure 60 shows that a high initial unemployment rate improves the prospects of pro-poor growth. One possible explanation is that the potential for poverty alleviation is higher if initial unemployment is high. Figure 61, however, shows that the states in which unemployment rose by more between 1981 and 1993, such as Rio Grande do Sul (RS), Alagoas (AL) and Espirito Santo (ES), experienced changes in the growth-elasticity of poverty in different directions, so that there no straightforward conclusion could be reached with respect to this relationship.

In terms of formality, Figure 62 shows that a high initial share of employment in the formal sector, as in the states of the south and south-east, is good for growth, but figure 63 shows that the states in which formality rose, such as Ceará (CE) and Piauí (PI), experienced declines in the growth-elasticity of poverty, so that the results are again unclear.

3.3 Regression Analysis – Pro-Poor Growth

We now further examine the role of initial conditions in pro-poor growth. But we do that using regressions techniques in order to grasp the role of each group of variables conditionally on the effects of the other groups. The specification we use (inspired by Ravallion and Datt, 2002) interacts the change in mean income growth with the lagged levels of the regressors (initial conditions) in poverty change equations and includes state fixed effects:

$$\Delta \ln pob_{it} = \alpha_i + \beta \Delta \ln y_{it} + \gamma \Delta \ln y_{it} x_{it-1} + \varepsilon_{it} \qquad (7)$$

Table 23 presents the results, but before describing them we would like to point out that most of the explanatory variables are highly correlated amongst themselves, and that we have got only 95 observations (5 years and 17 states) so that the amount of true variation (signal) is small and we have to be careful before attaching too much weight to the results. The results of column (1), which includes proxies for infrastructure, show that better initial infrastructure indicators, such as share of households with sewage system and garbage collection, makes growth more pro-poor. The effect of access to water is statistically insignificant. These variables are clearly related to the initial level of income in each state, so that their effect is as expected.

Column (2) includes variables measuring the share of people living in urban areas and the share of employment in manufacturing and services, as compared to agriculture. The results indicate that growth in states that are initially more urban tend to be more pro-poor, and that conditional on this effect, high shares of employment in manufacturing and services make growth less pro-poor. As the correlation between share in services and in urban areas is 0.9, the effects of these two variables tend to compensate each other.

Column (3) includes the demographic variables, share of households with children and with older people. The coefficient on the share of kids is statistically insignificant, while the one on the share of older people is negative and marginally significant at 10%. In column (4) we include the labor market variables, the share of people in the formal sector, the unemployment rate and the share inactive. All of them attract coefficients that are insignificant at usual statistical levels, but one must remember that we may be asking too much of the data (see above).

Column (5) completes the specification by including the education variables, that is, the share with primary (ed1), secondary (ed2) and college (ed3) education, with the omitted variable being the share with high school education. All three variables attract negative coefficients, and are jointly significant at 10%, meaning once again the investments in human capital are very important to make growth more pro-poor. The omitted variable is the share of people with high school and it makes growth less pro-poor because it increases inequality in the short run (see Menezes-Filho, 2001).

The results of this section indicate that high initial levels of human capital, a low share of household with children, good initial infra-structure, a high share of people living in urban areas and low levels of wage differentials between white/non-white and male/female are factors that tend to be conducive to pro-poor growth.

3.4 Trade-Offs Between Growth and Pro-poor Growth

In this sub-section we investigate, in the light of the previous sections, whether there are any trade-offs between growth and the poverty impacts of growth, that is, whether in order to improve pro-poor growth, society may have to admit a lower level of overall growth. We start with an investigation of the determinants of state-level income growth in Brazil for a comparison with the determinants of poverty reduction examined above:

$$\Delta \ln y_{it} = \alpha + \beta \Delta x_{it} + \varepsilon_{it} \qquad (8)$$

Column (1) looks at the impact of the Gini coefficient and finds that a rise in inequality is positively associated with growth. This is line with the study of Forbes (2001), which finds the same relationship in a panel of countries. It is important to point out that reverse causality is a possibility at this stage, since we saw that growth in Brazil is associated with more inequality. Column (2) then includes demographic and human capital indicators and finds that the education indicators are positively and statistically significantly associated with growth. Column (3) finds, perhaps surprisingly, that changes in infrastructure indicators are not positively correlated with income growth, once one controls for the other possible determinants. Column (4) indicates that growth is positively associated with a reduction in unemployment and inactivity, while the results of column (5) suggest that sector of activity and formality are not significantly related to growth.

In column (6) we estimate a GMM (generalized method of moments) regression, to control for the possible endogeneity of the explanatory variables in the growth regression, including the lagged dependent variable. The results indicate firstly that there is some persistence in growth, as the lagged dependent variable is positive and statistically significant, even in long-differences. The Gini coefficient also attracts a positive coefficient, significant at 10%, meaning the inequality may be good for growth in Brazil. The coefficients on the human capital variables are actually higher when we control for endogeneity, while none of the infrastructure variables appear significantly. Finally the labor market variables confirm that changes in unemployment and inactivity are negatively related to growth.

5- Recommendations for Policy Making

Given the results of all our statistical and econometric exercises, the policy recommendations for pro-poor growth are pretty straightforward. Firstly, it is clear that the growth-elasticity of poverty is positively related to the initial level of income. This means that states that are initially poorer will have to grow more in order to achieve the same rate of poverty reduction. This in turn means that if all states grow at basically the same rate, regional poverty differences till rise.

In terms of inequality, it is clear that the growth-elasticity of poverty is negatively related to initial inequality and that changes in inequality further raise poverty incidence. Therefore, in order to make growth more pro-poor, both statically and dynamically, it is important that growth is achieved with a decline in income inequality.

The factors that are conducive to pro-poor growth are those that improve the level of income and decrease income inequality. Investment in human capital is the most important of these factors, as it tends to reduce poverty in the short-run and decrease inequality in the long run. Investments in infrastructure also seem important for pro-poor growth, although the strength of their effects vary according to the methodology used. It seems clear that demography is also important, so that policies that improve access to information about contraceptive methods might improve the benefits of growth.

In terms of sector composition and the share of the population living in rural areas, the results are mixed. It seems that a higher share of people living in urban areas tend to increase the growth-elasticity of poverty, but expansions of the employment share in manufacturing and especially the services sector did not lead to more pro-poor growth. In terms of labor market variables, a high initial level of unemployment makes it easier for growth to benefit the poor, but obviously we would not recommend that policy makers should aim at rising unemployment, since its direct effects on poverty are obviously negative. On the other hand, a high initial proportion of people employed in the formal sector tend to make growth more pro-poor.

In sum, we think the most important findings of our analysis are firstly the empirical confirmation of the relationship between the growth-elasticity of poverty and the initial levels of income and inequality, described in Bourguignon (2002), and secondly the role of human capital variables in making growth more pro-poor.

6- References:

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Figure 1- Per capta Gdp and Inequality in the early 1990s

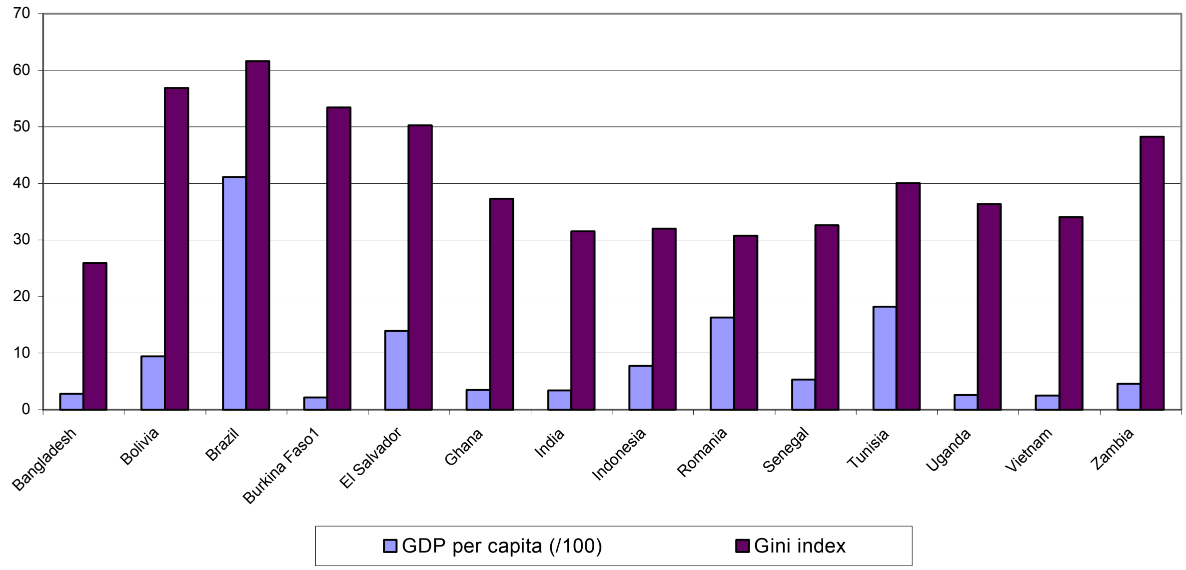


Figure 2 - Evolution of Per Capita GDP in Brazil

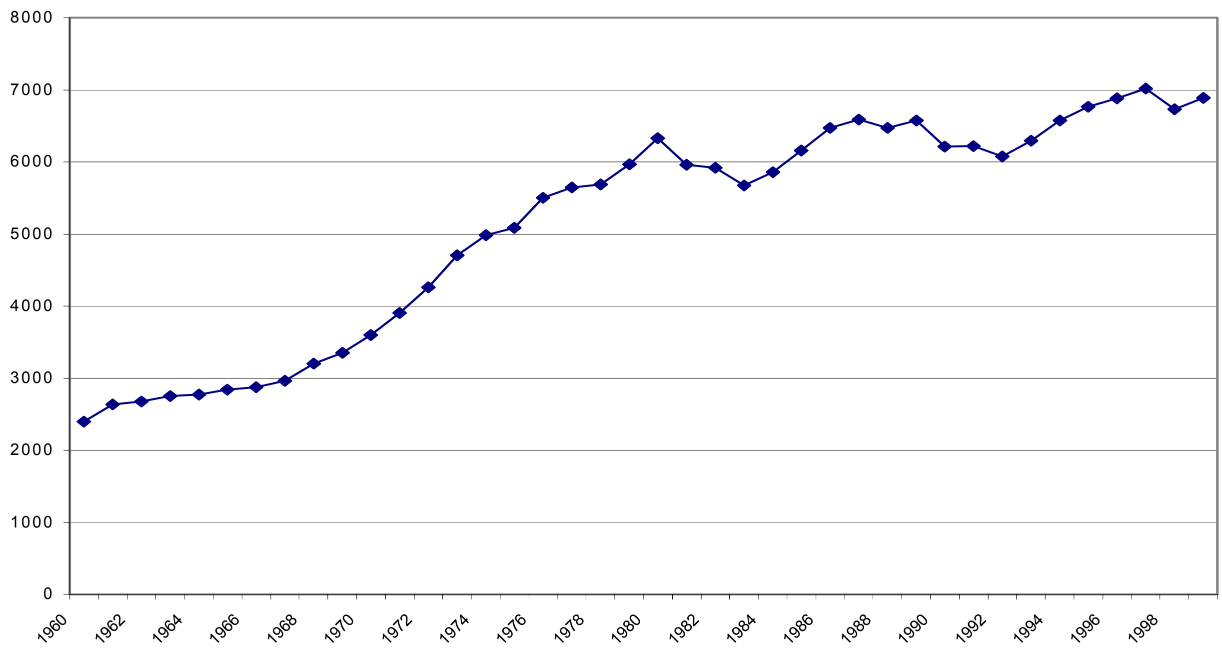


Figure 3- Standard deviation of annual GDP growth - 1990 - 2000

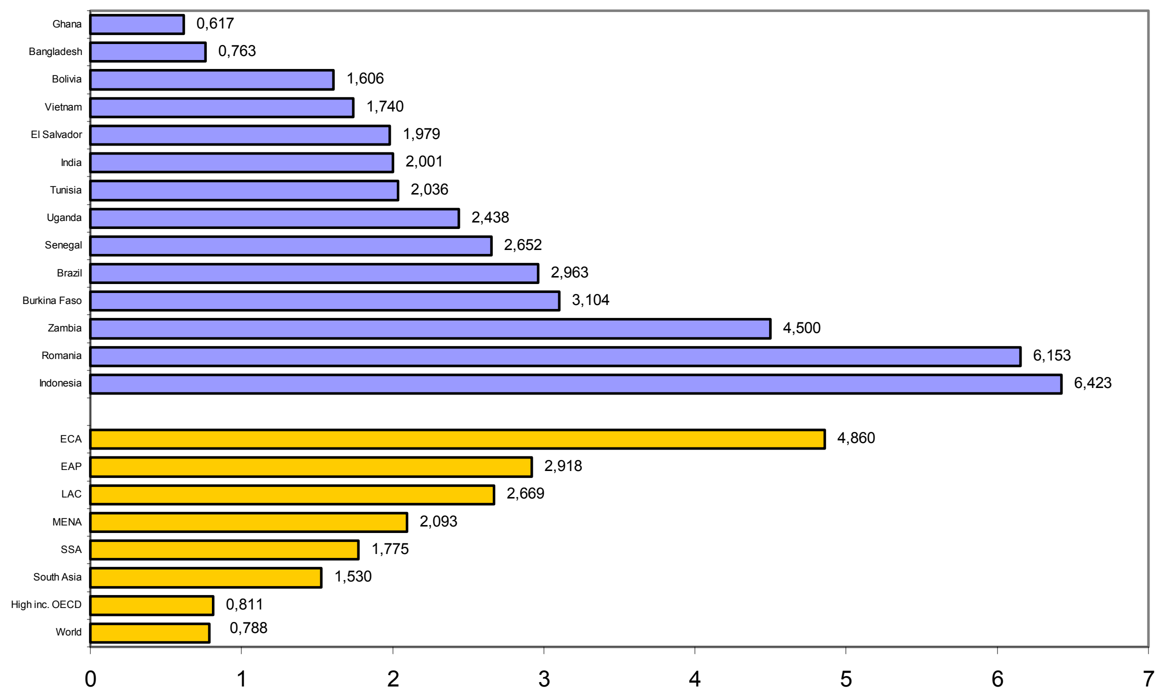
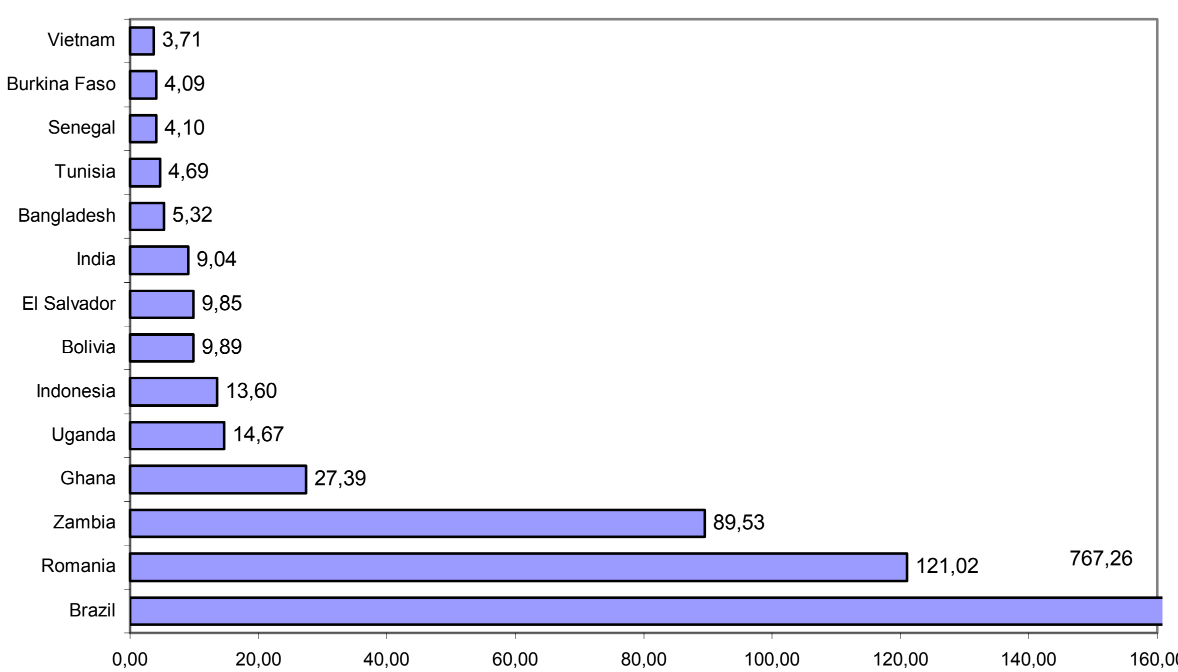


Figure 4- Average inflation consumer prices (annual %) 1990-2000



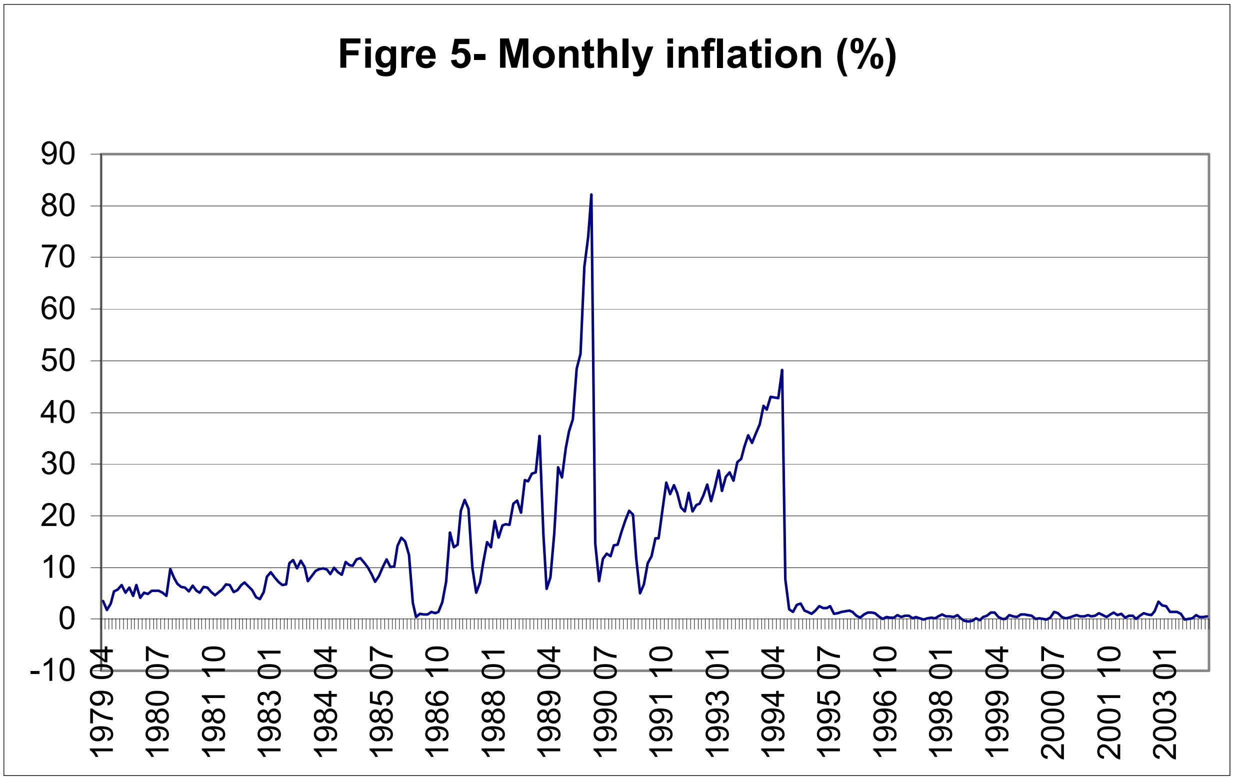

Figre 5- Monthly inflation (%)
90
80
70
60
50
40
30
20
10
0
-10
1979 04
1980 07
1981 10
1983 01
1984 04
1985 07
1986 10
1988 01
1989 04
1990 07
1991 10
1993 01
1994 04
1995 07
1996 10
1998 01
1999 04
2000 07
2001 10
2003 01

Figure 6a- Change in share of agriculture as % of GDP 1990-1999

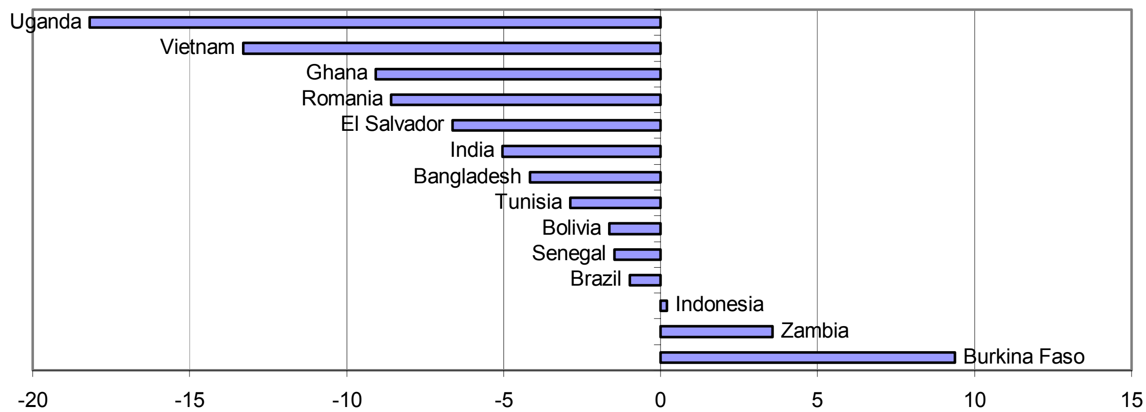


Figure 6b - Change in share of industry as % of GDP 1990-1999

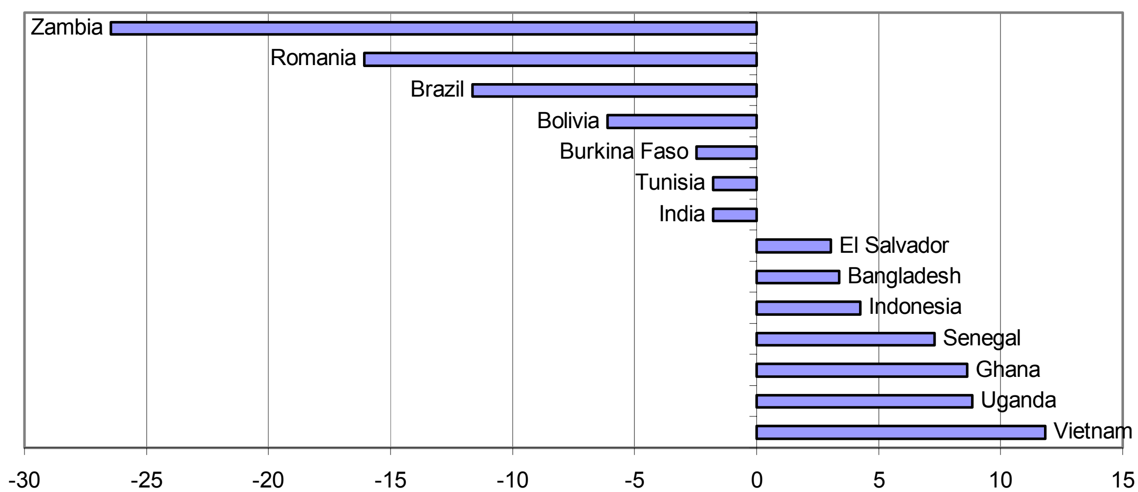
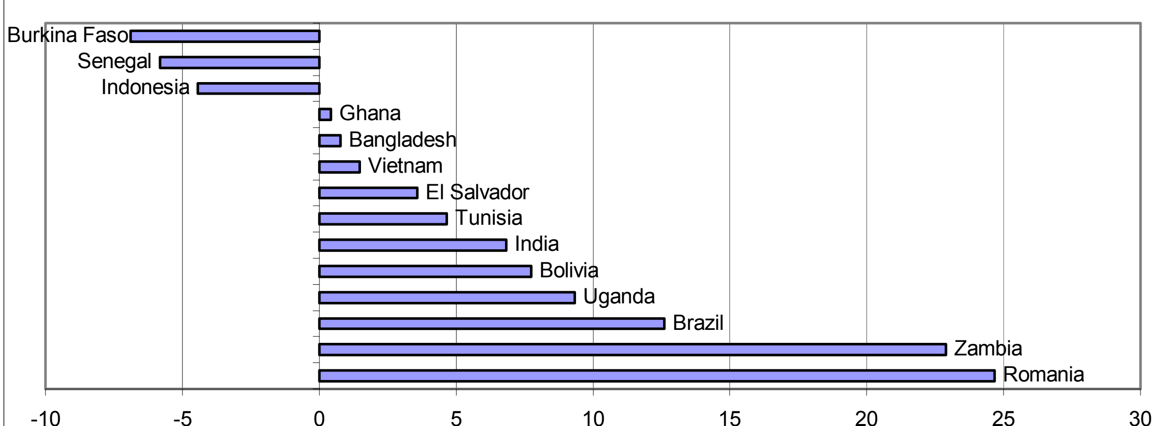


Figure 6c- Change in share of services as % of GDP 1990-1999



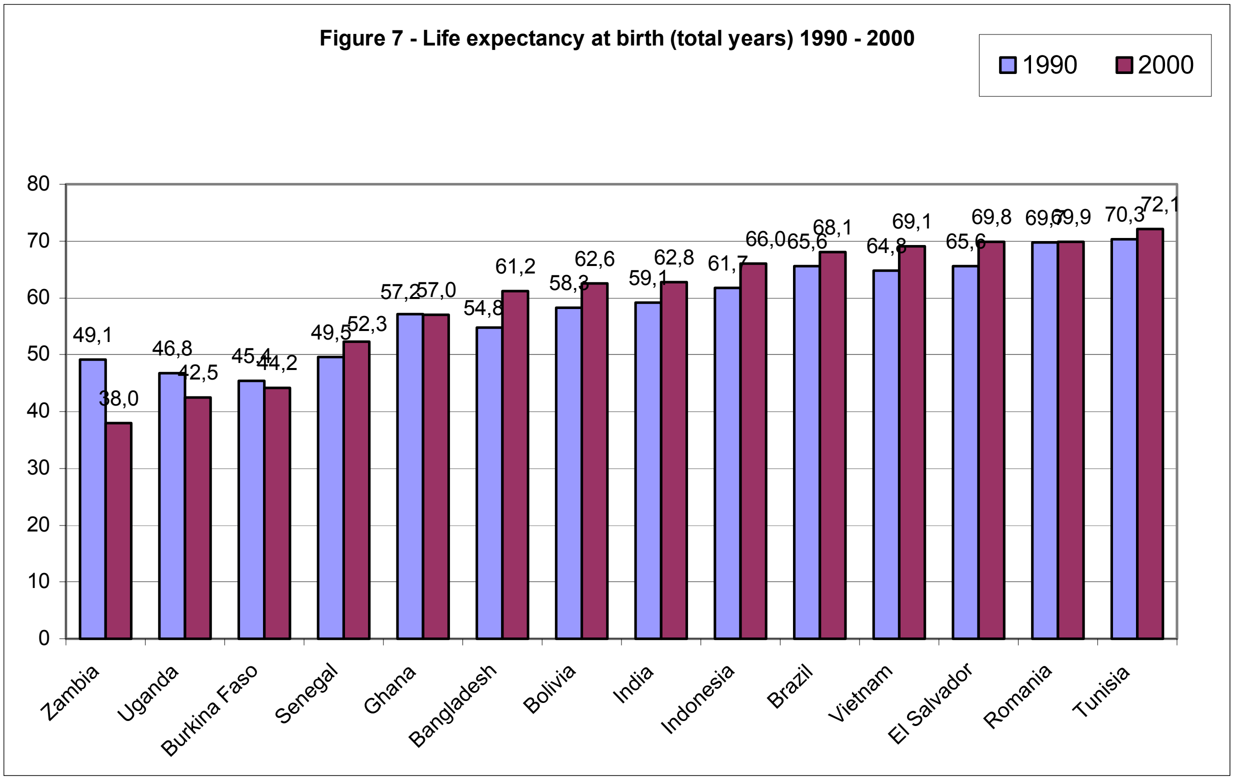


Figure 7 - Life expectancy at birth (total years) 1990 - 2000
1990
2000
0
10
20
30
40
50
60
70
80
49,1
38,0
46,8
42,5
45,4
44,2
49,5
52,3
57,2
57,0
54,8
61,2
58,3
62,6
59,1
62,8
61,7
66,0
65,6
68,1
64,8
69,1
65,6
69,8
69,7
69,9
70,3
72,1
Zambia
Uganda
Burkina Faso
Senegal
Ghana
Bangladesh
Bolivia
India
Indonesia
Brazil
Vietnam
El Salvador
Romania
Tunisia

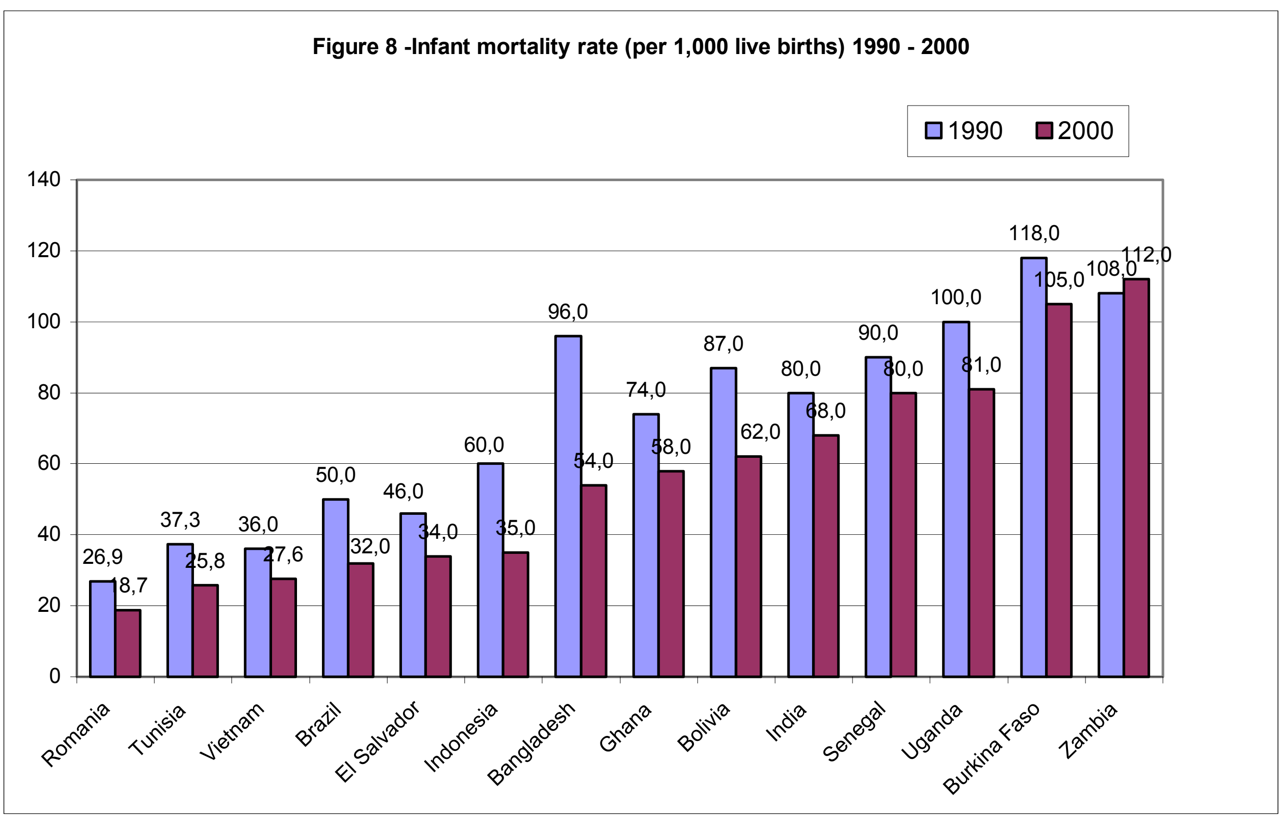


Figure 8 -Infant mortality rate (per 1,000 live births) 1990 - 2000
1990
2000
0
20
40
60
80
100
120
140
26,9
18,7
37,3
25,8
36,0
27,6
50,0
32,0
46,0
34,0
60,0
35,0
96,0
54,0
74,0
58,0
87,0
62,0
80,0
68,0
90,0
80,0
100,0
81,0
118,0
105,0
108,0
112,0
Romania
Tunisia
Vietnam
Brazil
El Salvador
Indonesia
Bangladesh
Ghana
Bolivia
India
Senegal
Uganda
Burkina Faso
Zambia

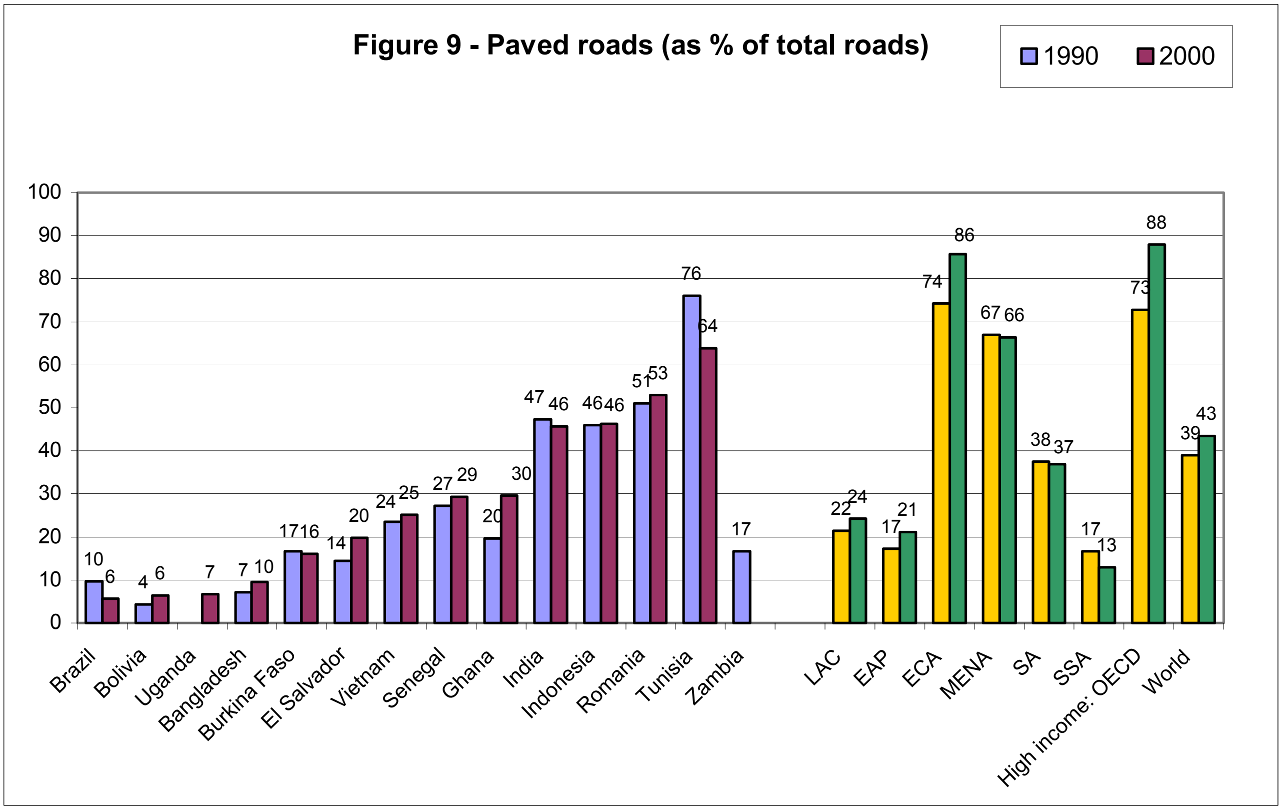


Figure 9 - Paved roads (as % of total roads)
1990
2000
Brazil
Bolivia
Uganda
Bangladesh
Burkina Faso
El Salvador
Vietnam
Senegal
Ghana
India
Indonesia
Romania
Tunisia
Zambia
LAC
EAP
ECA
MENA
SA
SSA
High income: OECD
World

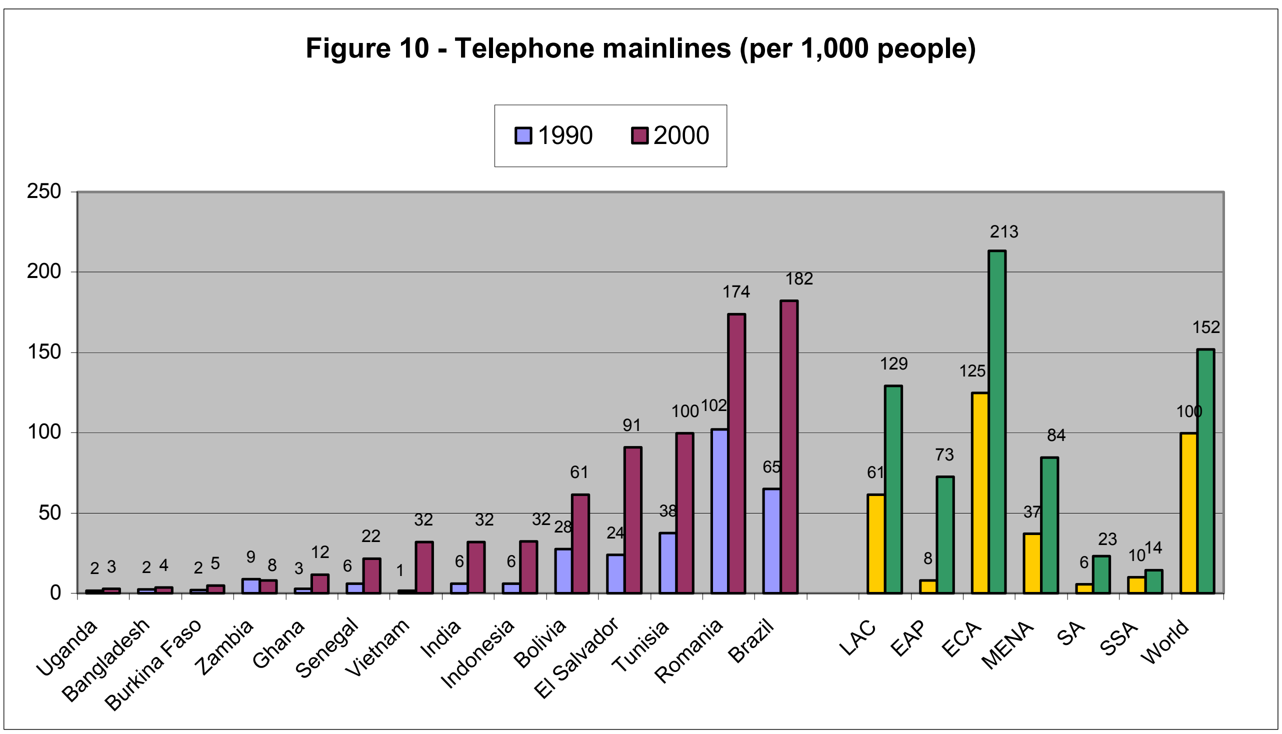


Figure 10 - Telephone mainlines (per 1,000 people)
1990
2000
Uganda
Bangladesh
Burkina Faso
Zambia
Ghana
Senegal
Vietnam
India
Indonesia
Bolivia
El Salvador
Tunisia
Romania
Brazil
LAC
EAP
ECA
MENA
SA
SSA
World

Figure 11- evolution of Per capita GDP since the 1970s

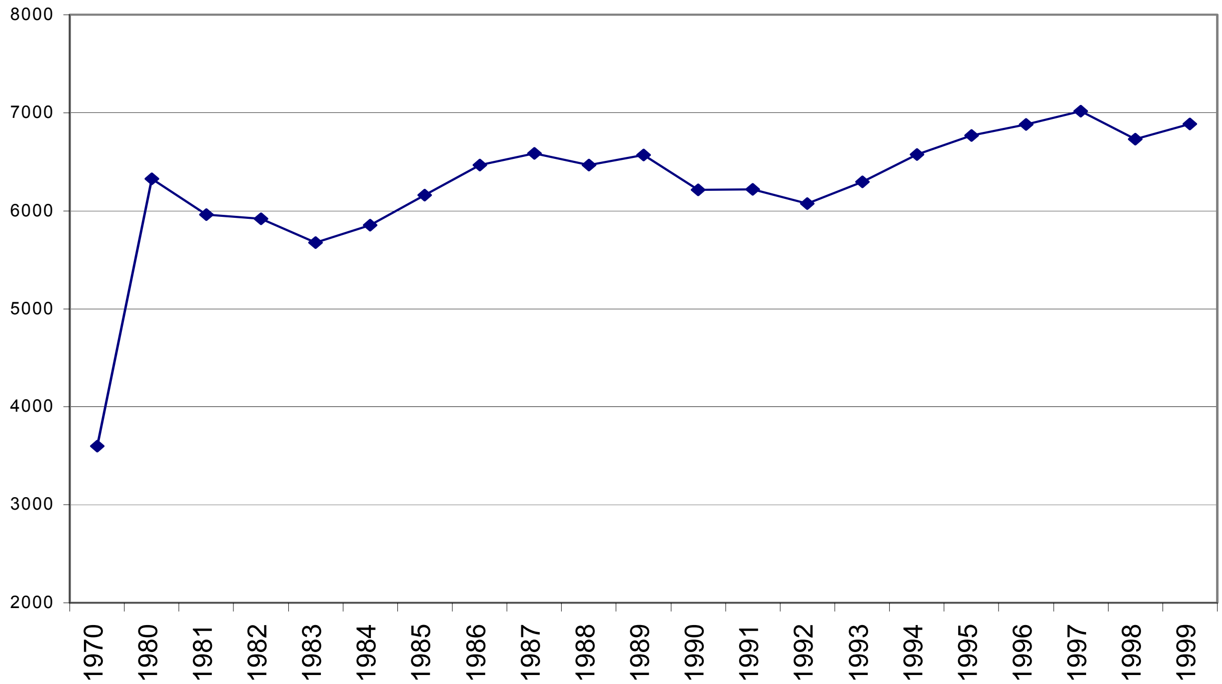
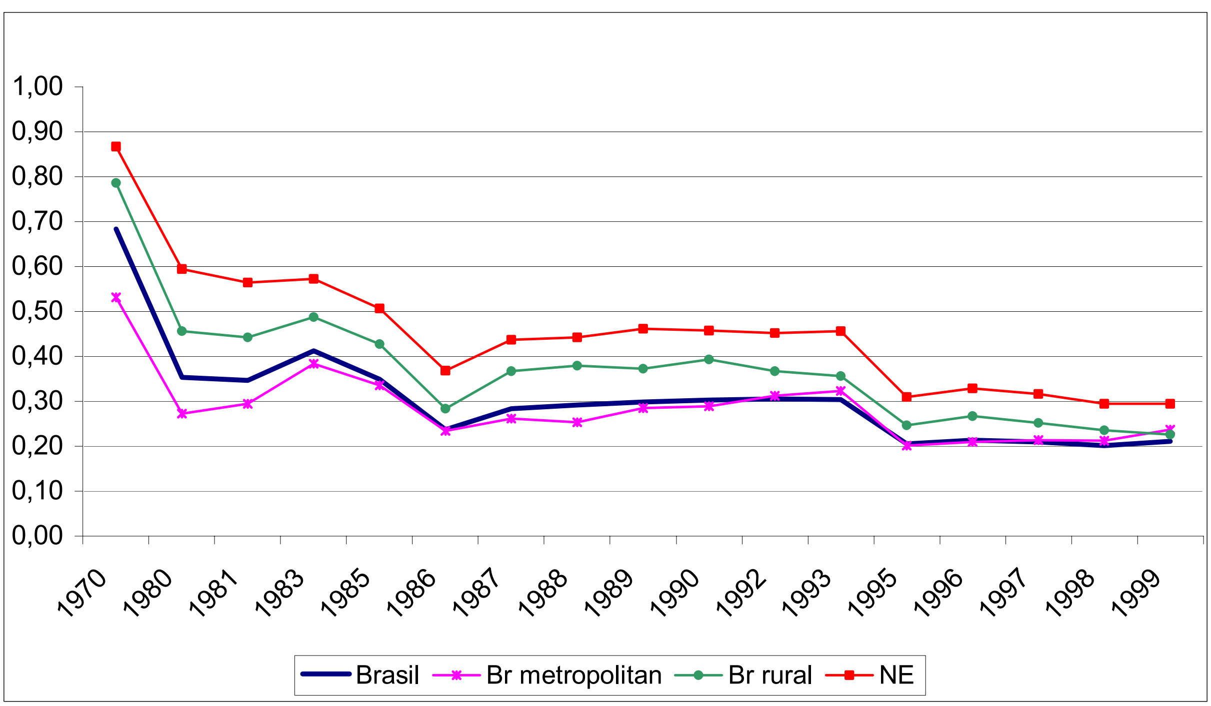


Figure 12- Evolution of Poverty rate since the 1970s - Brazil



Source: Rocha (2003)

Figure 13 – Evolution of Income Distribution in Brazil

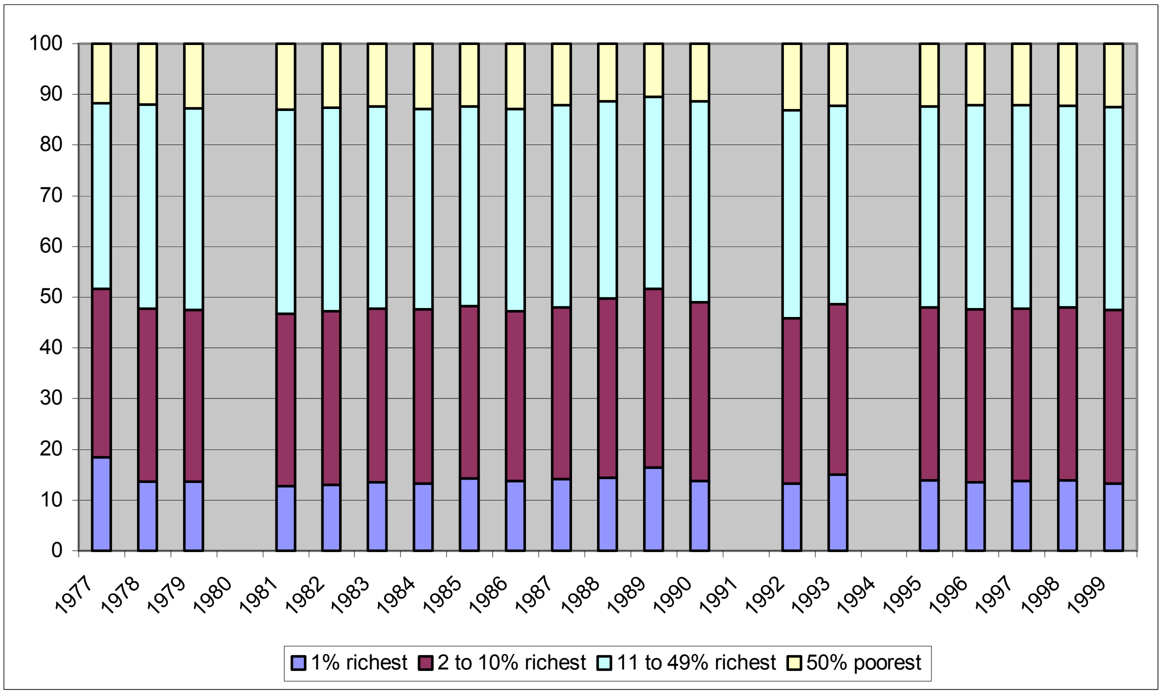


Table 1. Poverty measures, mean income and Gini index

Years	FGT(0)	FGT(1)	FGT(2)	Watts index	Income	Gini index
			Indigence line = R$65,07			
1981	32,81	13,61	7,70	20,11	193,29	0,575
1985	34,54	14,49	8,09	22,05	195,96	0,592
1989	31,81	13,84	8,08	21,45	246,15	0,630
1993	34,12	15,26	9,27	23,47	200,12	0,605
1997	25,08	10,85	6,54	14,69	262,58	0,598
2001	25,72	11,07	6,73	14,84	251,82	0,594
			Poverty line = R$ 131,97			
1981	60,89	31,32	19,95	52,74		
1985	61,90	32,56	20,95	56,13		
1989	57,14	30,17	19,65	52,60		
1993	61,62	32,62	21,45	56,57		
1997	50,33	25,13	15,98	40,24		
2001	51,38	25,55	16,25	40,64		

Notes. Poverty lines and mean income are in **1996 R$.** Gini: own calculations based on Pnads. Income is corrected for different cost of living costs across states and for ownership of dwellings.

Figure 14 - Headcount rate – poverty and indigency lines

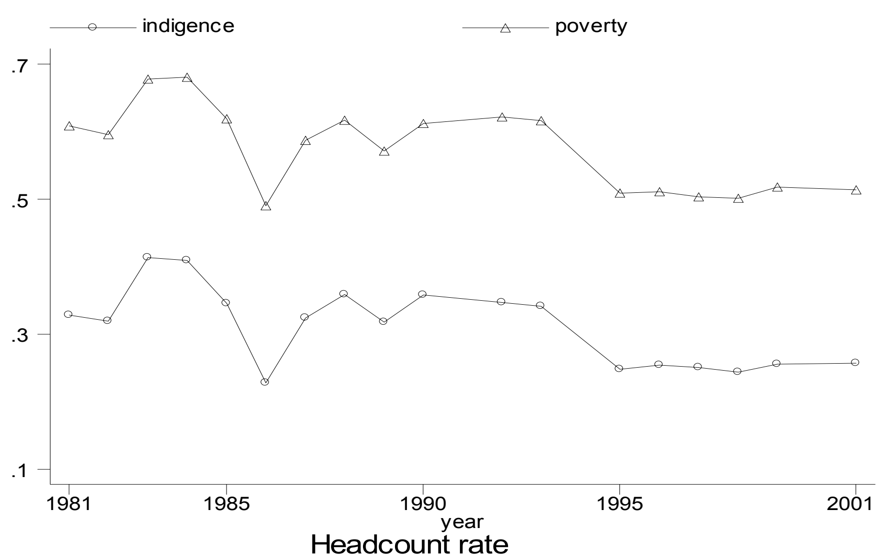


Table 2a - Living conditions among regions – 2000.

Regions	Mortality up to the age of 1	% of people in households with piped water	Municipal human development index
N	34.47	53.92	0.73
NE	47.79	59.52	0.68
SE	23.90	93.52	0.79
S	18.03	95.35	0.81
CO	24.55	86.81	0.79

Source: Human development atlas in Brazil (2000), IBGE.

Table 2b - Per capita GDP (R$ in 2000), Contribution to GDP and Gini by Region

Regions	Per capita GDP – R$ in 2000				Contribution Total GDP (%)	Gini index *
year	1985	1990	1995	2000	2000	2000
N	3,800	4,381	4,450	4,461	4.60	0.65
NE	2.678	2.761	2.658	2.681	13,09	0,67
SE	7,711	7,760	8,232	8,524	57.79	0.61
S	6,085	6,506	6,636	6,944	17.57	0.58
CO	3,964	4,538	4,263	4,402	6.95	0.63

Source: IPEADATA (2004), IPEA (Applied Research Institute);
* Human Development Atlas in Brazil (2000), IBGE.

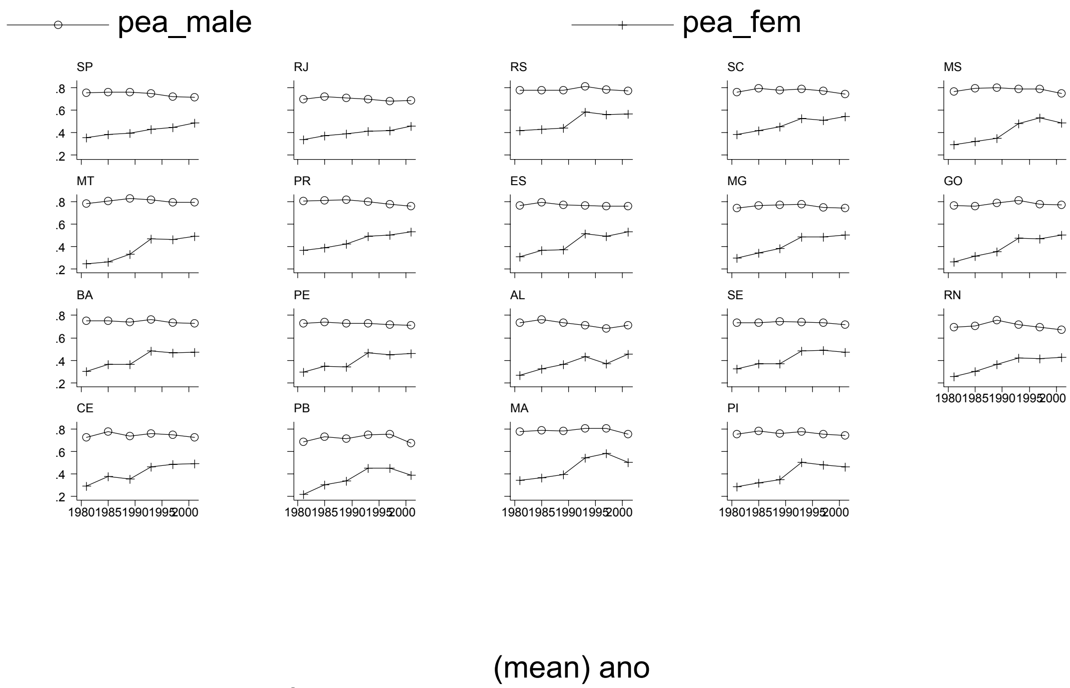


Fig 15-M/F Labor Force Participation over Time

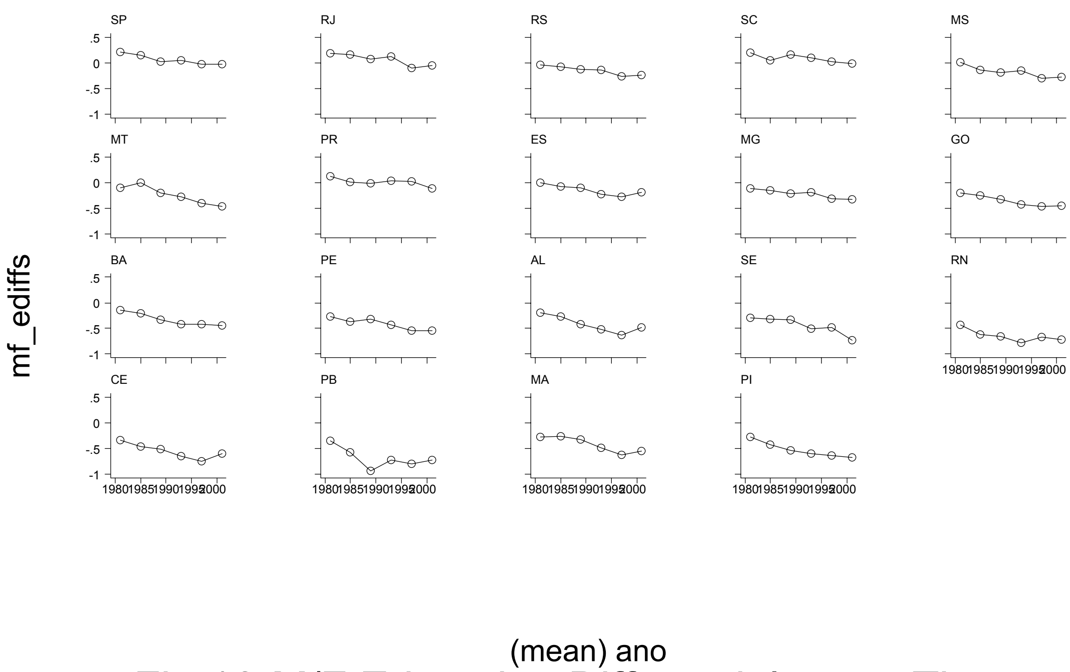


Fig 16-M/F Education Differentials over Time

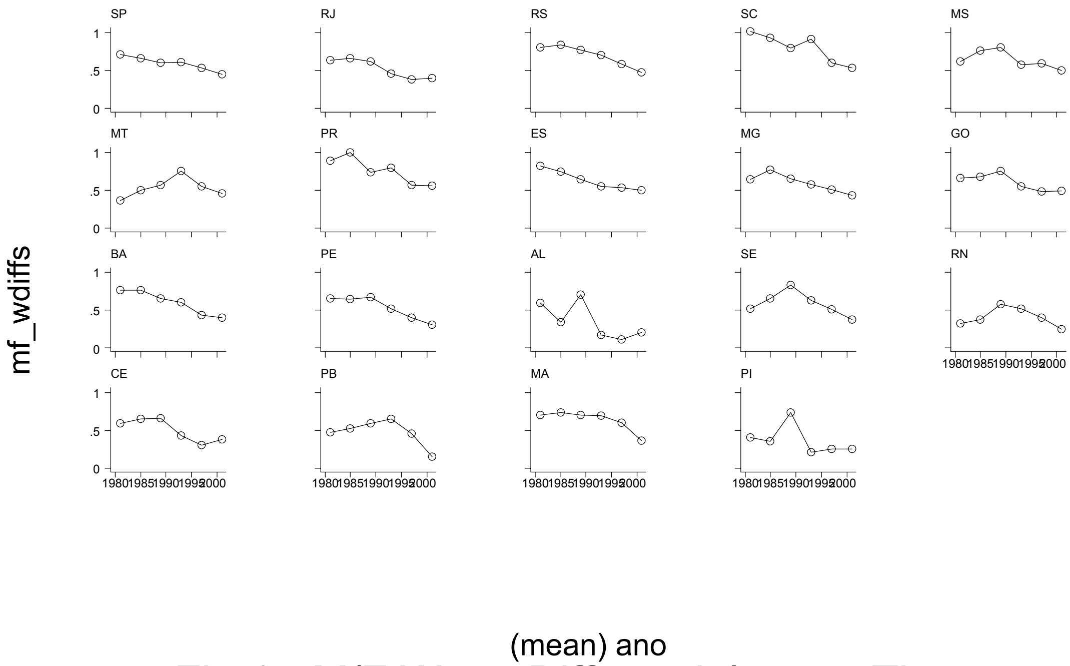


Fig 17-M/F Wage Differentials over Time

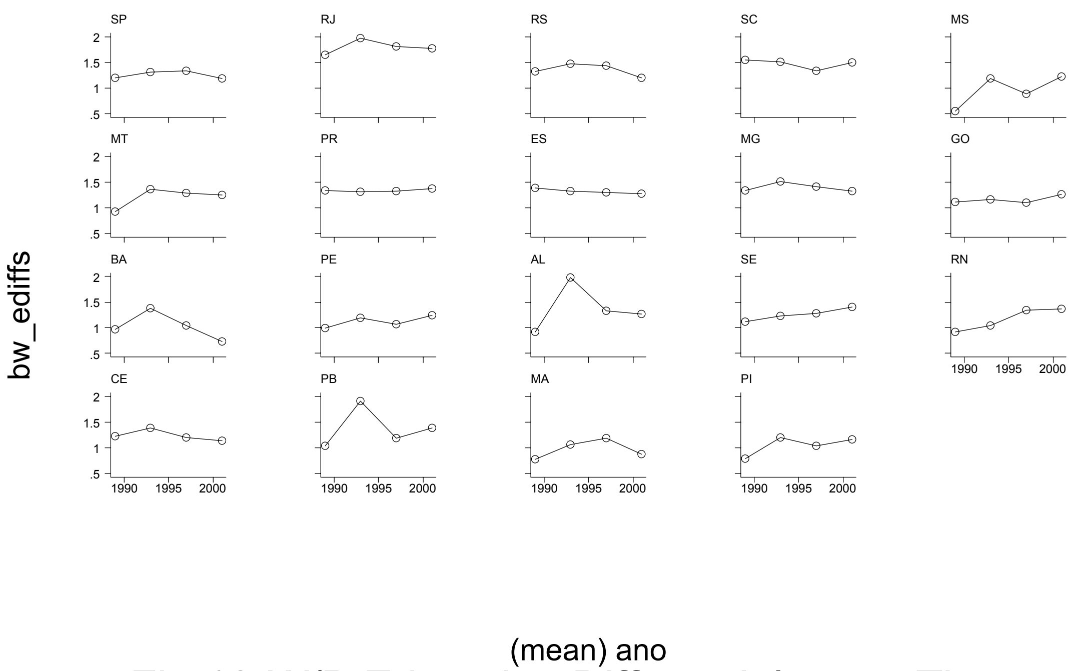


Fig 18-W/B Education Differentials over Time

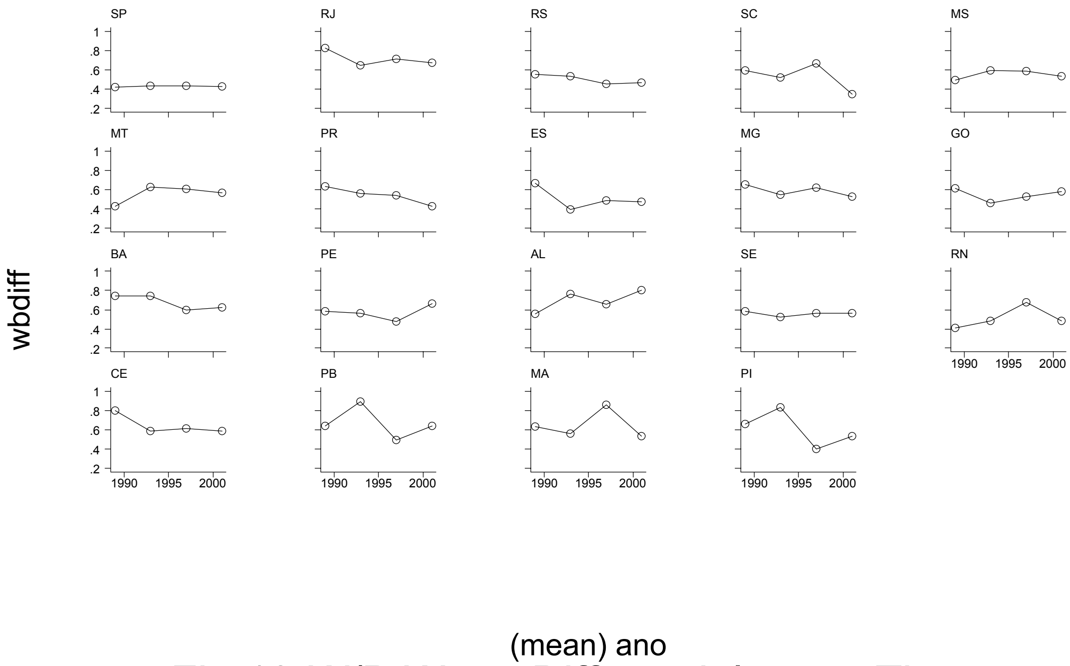


Fig 19-W/B Wage Differentials over Time

Figure 20 - The Evolution of Total Factor Productivity in Brazil

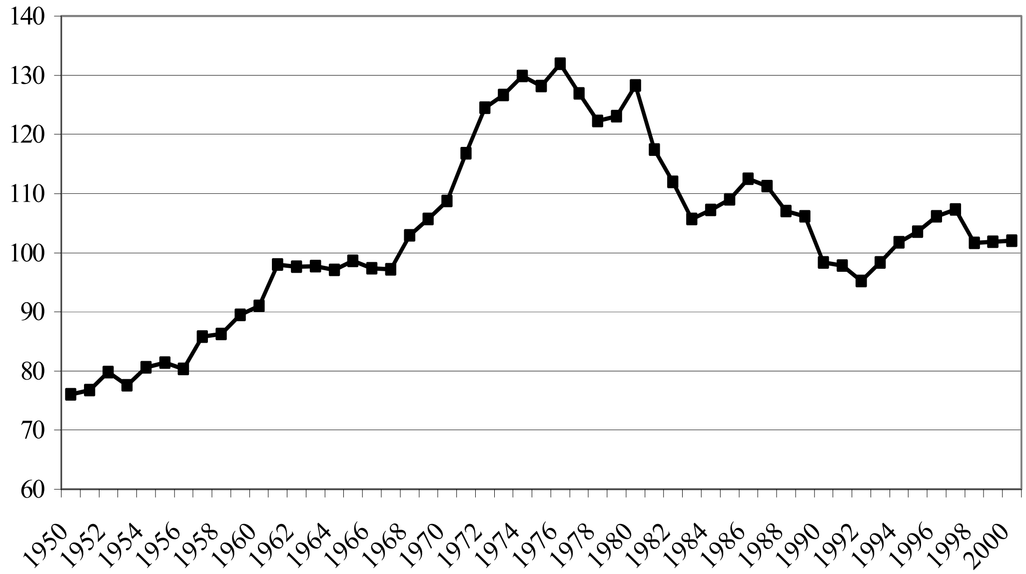
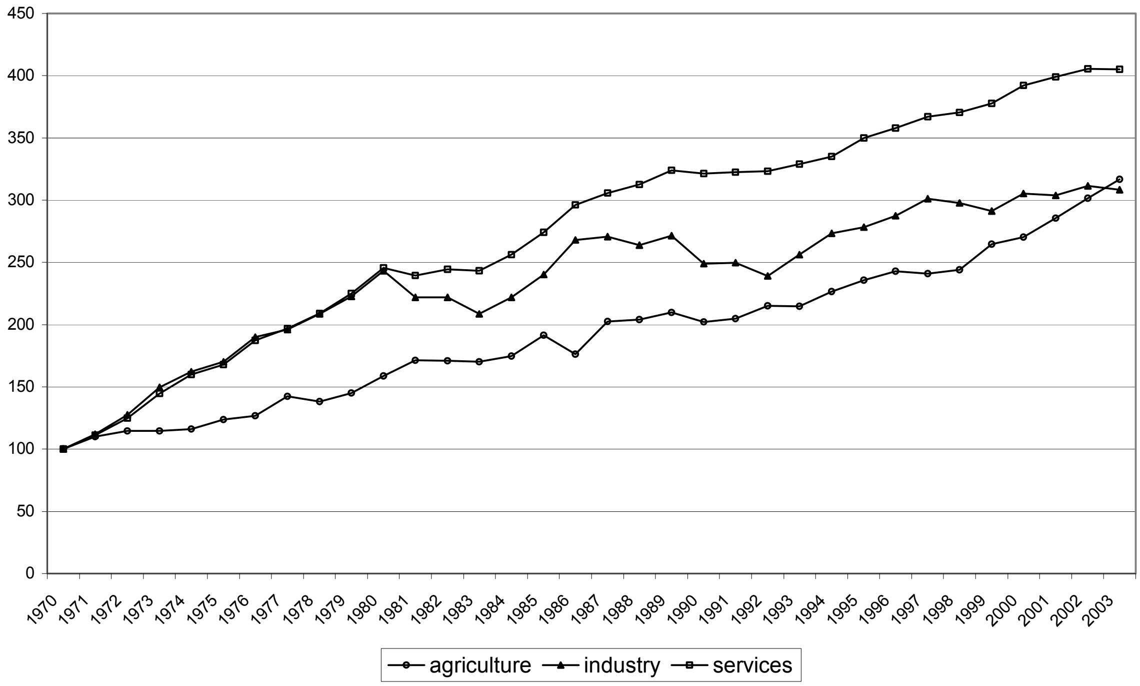


Table 3 - Logarithmic Decomposition of Overall Growth

Período	ΔY	ΔY_{anual}	N	L/N	PTF	K/L	H
1950-66	168%	0,062	0,029	0,002	0,017	0,011	0,002
			48%	**3%**	**27%**	**19%**	**4%**
1967-76	136%	0,096	0,028	0,020	0,033	0,015	-0,001
			29%	**21%**	**35%**	**16%**	**-1%**
1977-91	45%	0,026	0,020	0,011	-0,020	0,008	0,007
			76%	**41%**	**-75%**	**30%**	**27%**
1992-00	29%	0,032	0,014	0,000	0,006	0,004	0,008
			43%	**0%**	**19%**	**12%**	**25%**
1950-00	1191%	0,051	0,024	0,008	0,005	0,010	0,004
			46%	**16%**	**10%**	**19%**	**8%**

Figure 21 - GDP growth by sector of activity (index 100 in 1970)



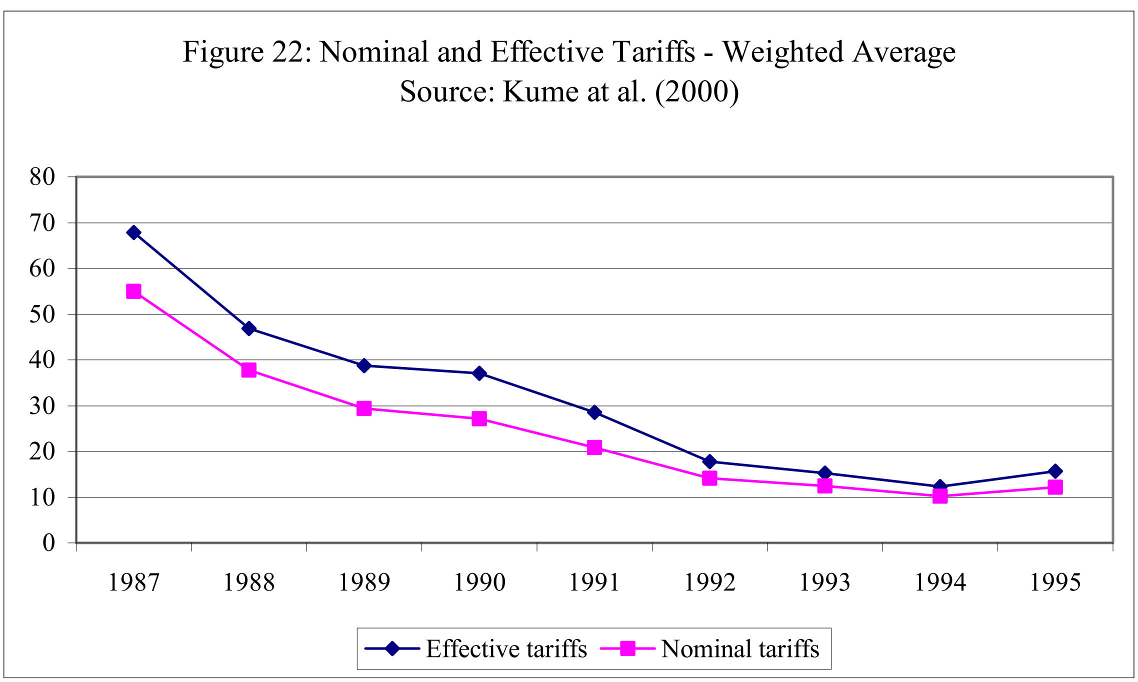


Table 4: Tariffs and Product Market Rents

Dependent Variable	**Quasi-Rents**	**Productivity**	**Profitability**
	(1)	(2)	(3)
Effective Tariffs	-0.152	-0.156	-0.194
	0.078	*0.052*	*0.073*
Time Dummies	*yes*	*yes*	*yes*
Industry Fixed Effects	*yes*	*yes*	*yes*
N	126	126	126

Notes: Source: Arbache and Menezes-Filho (2003). Standard Errors in Brackets.

Table 5 - Correlates of poverty – averages 1981

	Total sample		Rural		Urban	
	Poor	**Non-poor**	**Poor**	**Non-poor**	**Poor**	**Non-poor**
	(1)	(2)	(3)	(4)	(5)	(6)
Household structure						
Income (R$)	38,07	269,09	34,682	152,621	40,706	286,134
Urban	0,562	0,872	-	-	-	-
Children	0,95	0,782	0,946	0,762	0,954	0,785
Old	0,16	0,208	0,161	0,251	0,16	0,202
Head Man	0,879	0,874	0,937	0,922	0,833	0,867
Head White (data from 1982)	0,372	0,604	0,39	0,589	0,357	0,606
Education of the head						
Edu 1	0,789	0,407	0,896	0,703	0,707	0,363
Edu 2	0,183	0,342	0,098	0,248	0,248	0,355
Edu 3	0,021	0,096	0,004	0,025	0,034	0,106
Edu 4	0,007	0,156	0,002	0,023	0,011	0,176
Household infra-structure						
Sewage	0,135	0,539	0,018	0,112	0,226	0,602
Energy	0,507	0,889	0,154	0,434	0,783	0,956
Garbage	0,204	0,6	0,009	0,058	0,356	0,679
Water	0,336	0,731	0,028	0,104	0,577	0,823
Working status of the head						
Employed	0,811	0,829	0,907	0,897	0,736	0,819
Unemployed	0,039	0,007	0,006	0	0,064	0,008
Inactive	0,15	0,164	0,087	0,102	0,2	0,173
Sector of activity and formality of the head						
Agriculture	0,493	0,159	0,812	0,727	0,185	0,065
Industry	0,255	0,333	0,136	0,142	0,371	0,365
Services	0,251	0,508	0,052	0,131	0,444	0,57
Formal (only employees)	0,464	0,773	0,192	0,517	0,645	0,797
Position in occupation						
Employee	0,568	0,633	0,464	0,396	0,667	0,671
Self-employed	0,418	0,290	0,517	0,504	0,323	0,256
Employer	0,014	0,076	0,019	0,099	0,008	0,072
Non-remunerated	0,001	0,001	0,000	0,000	0,001	0,001

Table 6 - Poverty regressions – 1982 / 2001

	1981	2001	Urban81	Urban01	Rural01	Rural81
Urban	-0,052	0,018	-	-	-	-
	0,002	*0,002*				
Children	0,223	0,154	0,151	0,146	0,263	0,412
	0,001	*0,001*	*0,001*	*0,001*	*0,005*	*0,004*
Old	-0,054	-0,101	-0,035	-0,091	-0,233	-0,087
	0,002	*0,001*	*0,002*	*0,001*	*0,006*	*0,004*
Head is a man	-0,017	-0,01	-0,019	-0,012	0,056	0,03
	0,002	*0,002*	*0,002*	*0,002*	*0,01*	*0,007*
White	-0,073	-0,064	-0,053	-0,062	-0,071	-0,095
	0,001	*0,001*	*0,001*	*0,001*	*0,006*	*0,003*
Edu 2	-0,118	-0,054	-0,084	-0,051	-0,093	-0,187
	0,001	*0,001*	*0,001*	*0,001*	*0,006*	*0,005*
Edu 3	-0,183	-0,088	-0,127	-0,084	-0,141	-0,308
	0,002	*0,001*	*0,001*	*0,001*	*0,008*	*0,017*
Edu 4	-0,25	-0,156	-0,177	-0,15	-0,215	-0,411
	0,001	*0,001*	*0,001*	*0,001*	*0,006*	*0,02*
Sewage	-0,133	-0,049	-0,107	-0,047	-0,081	-0,122
	0,002	*0,001*	*0,001*	*0,002*	*0,007*	*0,008*
Energy	-0,182	-0,117	-0,122	-0,143	-0,16	-0,253
	0,002	*0,011*	*0,003*	*0,018*	*0,018*	*0,004*
Garbage	-0,07	-0,054	-0,056	-0,056	-0,042	-0,112
	0,002	*0,002*	*0,001*	*0,002*	*0,009*	*0,013*
Water	-0,024	0,028	-0,024	0,019	0,095	0,012
	0,002	*0,002*	*0,002*	*0,002*	*0,008*	*0,008*
Unemployed	0,454	0,128	0,425	0,127	0,103	0,334
	0,007	*0,004*	*0,008*	*0,004*	*0,017*	*0,007*
Inactive	-0,03	-0,032	-0,018	-0,033	-0,027	-0,018
	0,003	*0,002*	*0,003*	*0,002*	*0,013*	*0,007*
Industry	-0,076	-0,078	-0,049	-0,075	-0,147	-0,114
	0,002	*0,002*	*0,002*	*0,002*	*0,007*	*0,006*
Services	-0,066	-0,093	-0,04	-0,092	-0,111	-0,132
	0,002	*0,002*	*0,002*	*0,002*	*0,008*	*0,006*
Formal	-0,066	-0,061	-0,044	-0,056	-0,121	-0,133
	0,002	*0,001*	*0,002*	*0,001*	*0,007*	*0,006*
Self-employed	-0,065	-0,029	-0,046	-0,025	-0,072	-0,088
	0,002	*0,002*	*0,002*	*0,002*	*0,007*	*0,004*
Employer	-0,203	-0,112	-0,133	-0,105	-0,218	-0,41
	0,002	*0,001*	*0,001*	*0,001*	*0,006*	*0,007*

* Probit on the individual data (standard errors in italic). Marginal Effects

Table 7. Region of Residence

	Poverty within		Population share		Change in poverty (%)
	1981	2001	1981	2001	
North	22,9	24,7	7,56	9,56	-1,97
Northeast	52,4	42,0	29,79	32,23	44,37
Southeast	23,7	17,1	33,87	30,39	31,70
South	21,1	13,3	15,8	15,55	17,03
Centre-west	31,7	20,9	12,94	12,27	19,19
Total intra-sectoral effect					110,32
Population-shift effect					-8,87
Interaction effect					0,001

Table 8. Urban / rural areas

	Poverty within		Population share		Change in poverty (%)
	1981	2001	1981	2001	
Urban	23,9	21,5	77,31	85,55	25,66
Rural	62,6	50,3	22,69	14,45	42,06
Total intra-sectoral effect					67,72
Population-shift effect					44,82
Interaction effect					-12,54

Table 9. Education of Head – Urban SE

	Poverty within		Population share		Change in poverty (%)
	1981	2001	1981	2001	
Edu=1	28,9	25,8	40,35	25,08	45,61
Edu=2	14,3	17,3	36,09	33,66	-35,08
Edu=3	6,4	10,8	8,98	15,43	-13,47
Edu=4	1,3	3,4	14,58	25,83	-9,86
Total intra-sectoral effect					-12,79
Population-shift effect					144,99
Interaction effect					-32,20

Table 10. Education of Head – Rural NE					
	Poverty within		Population share		Change in poverty (%)
	1981	2001	1981	2001	
Edu=1	76,8	66,8	90,50	82,54	96,10
Edu=2	56,1	59,9	7,61	13,97	-1,74
Edu=3	29,5	48,3	0,90	1,97	-1,54
Edu=4	13,8	15,3	0,99	1,52	-0,13
Total intra-sectoral effect					92,68
Population-shift effect					19,13
Interaction effect					-11,81

Table 11. Labor Market Status of Head – Urban SE					
	Poverty within		Population share		Change in poverty (%)
	1981	2001	1981	2001	
Employed	15,7	12,4	78,22	71,46	85,98
Unemployed	70,0	43,2	2,46	6,66	21,80
Inactive	19,9	14,4	19,33	21,88	36,12
Total intra-sectoral effect					143,90
Population-shift effect					-78,54
Interaction effect					34,64

Table 12. Labor Market Status of Head – Rural NE					
	Poverty within		Population share		Change in poverty (%)
	1981	2001	1981	2001	
Employed	74,7	67,8	89,28	84,88	71,04
Unemployed	95,9	62,4	0,47	4,18	1,46
Inactive	70,5	43,3	10,25	10,94	24,61
Total intra-sectoral effect					97,10
Population-shift effect					-6,85
Interaction effect					9,75

Table 13. Growth-elasticity of poverty – Brazil - no controls

	FGT(0)	FGT(1)	FGT(2)	Watts index
Indigence line = R$65,07				
	-0,890	-1,023	-1,164	-1,146
	(0,104)	(0,125)	(0,159)	(0,173)
Poverty line = R$ 131,97				
	-0,521	-0,706	-0,844	-0,829
	(0,071)	(0,084)	(0,097)	(0,106)
N	95 (17 states x 5 years)			

Note: Time dummies included in all regressions

Table 14. Explaining the Growth-elasticity of poverty

	OLS	OLS	OLS	OLS	FE
	(1)	(2)	(3)	(4)	(5)
Change in Income	-0,890 (0,120)	-1,029 (0,114)	-1,821 (0,676)	1,198 (0,842)	1,264 (1,074)
Change in Gini	-	2,324 (0,354)	2,634 (0,308)	-9,883 (2,644)	-10,432 (3,980)
Change in Income * Initial Income	-	-	-0,361 (0,086)	-0,731 (0,095)	-0,735 (0,109)
Change in Income * Initial Gini	-	-	4,779 (0,792)	2,414 (0,759)	2,317 (1,091)
Change in Gini * Initial Income	-	-	-	2,946 (0,321)	3,014 (0,440)
Change in Income * Initial Gini	-	-	-	-3,366 (3,682)	-2,956 (5,095)
R2	0,722	0,808	0,896	0,940	0,940
N	95	95	95	95	95
Time Dummies	yes	yes	yes	yes	yes

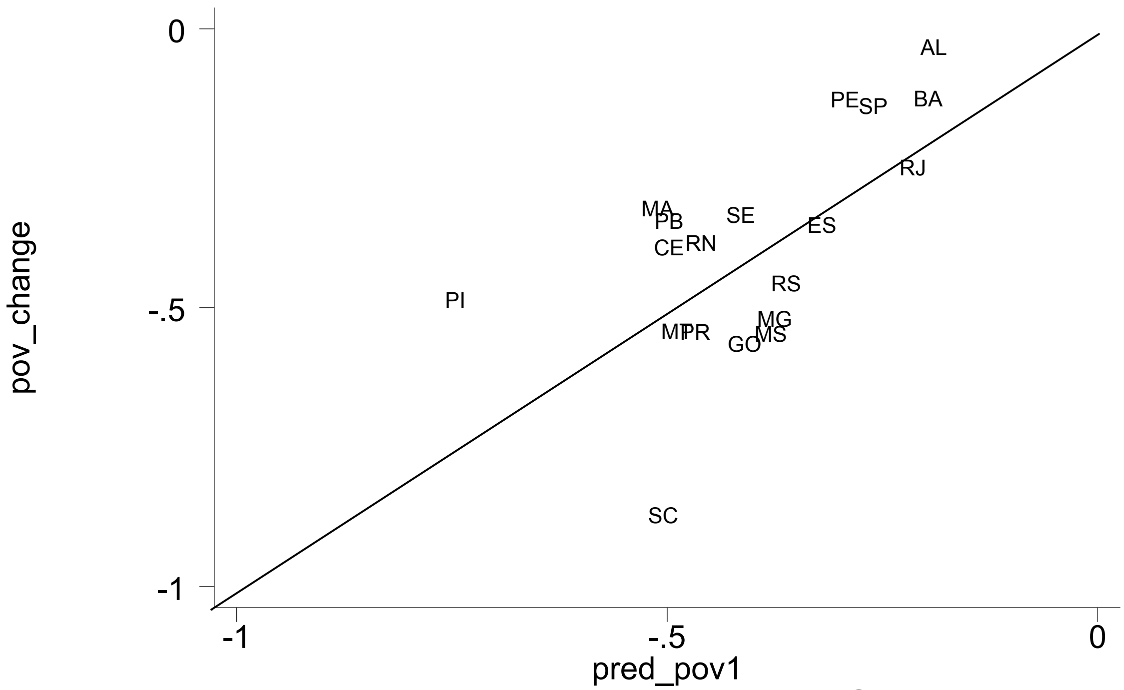


Fig 23-Predicted and Actual Poverty Change-1

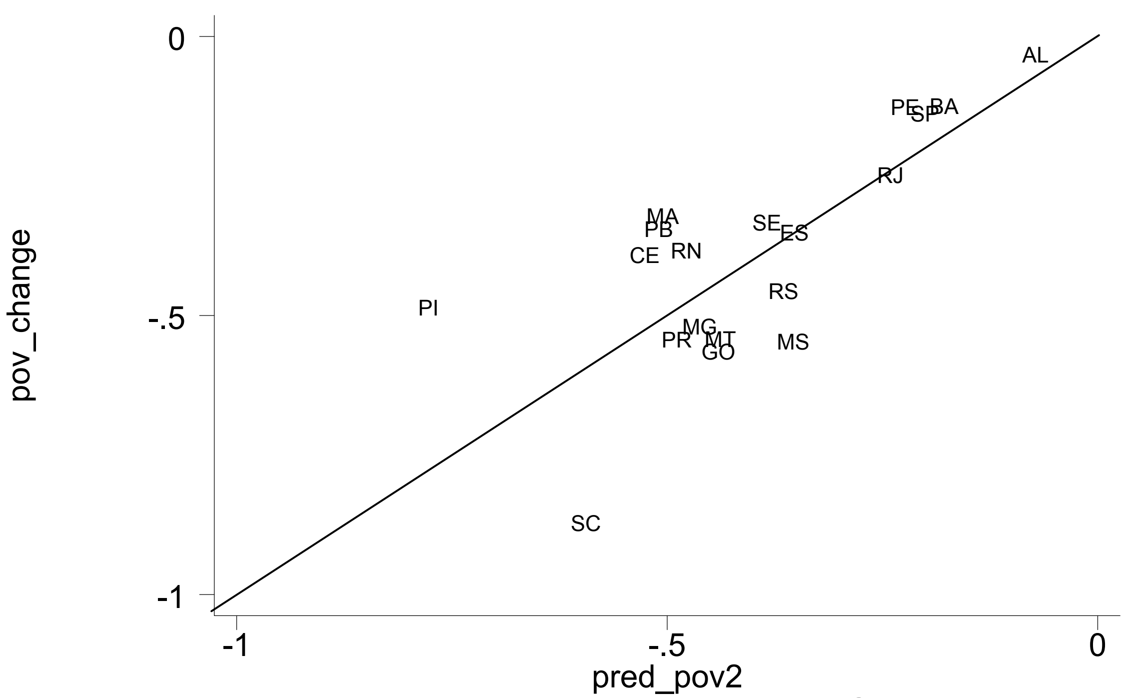


Fig 24-Predicted and Actual Poverty Change-2

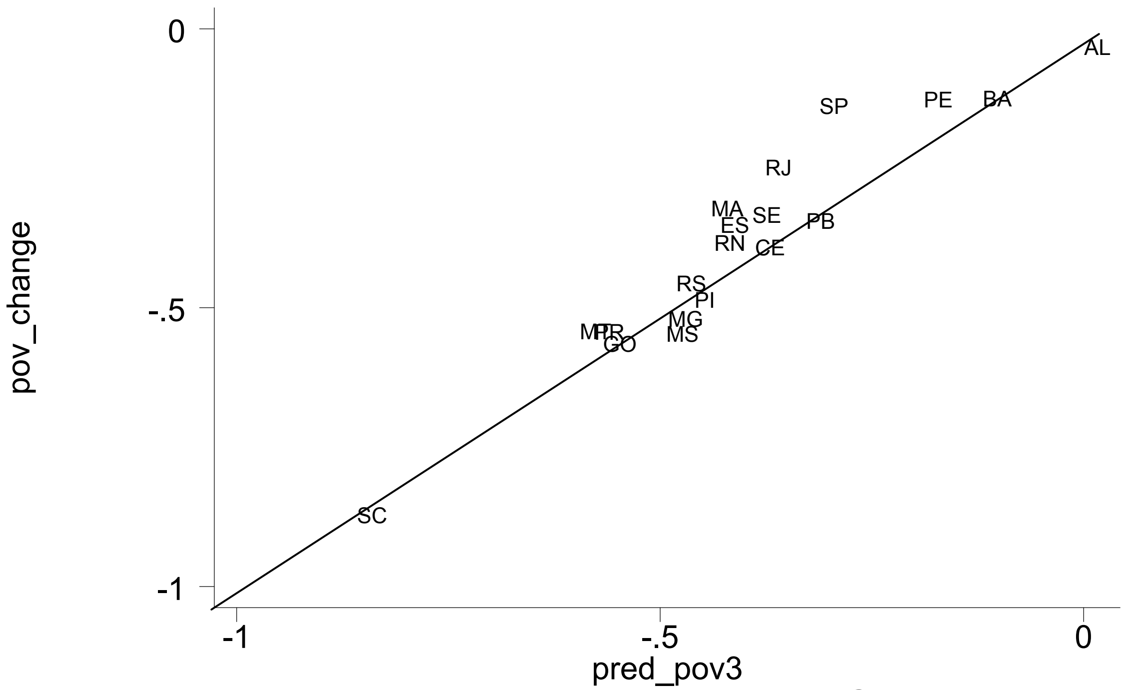


Fig 25-Predicted and Actual Poverty Change-3

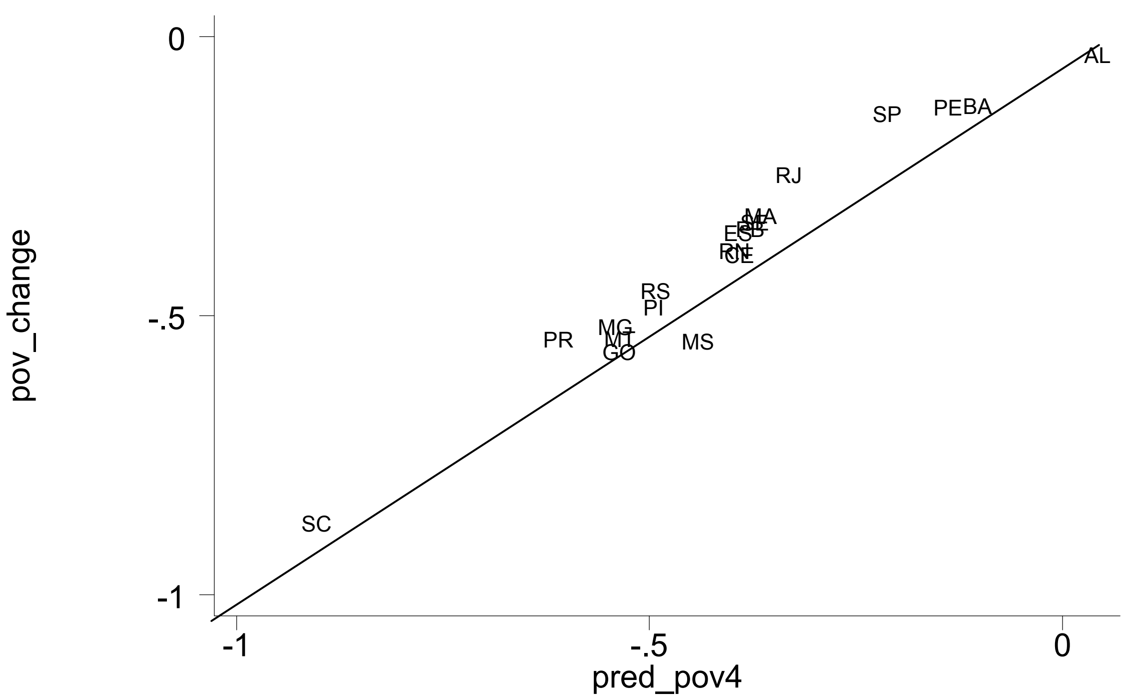


Fig 26-Predicted and Actual Poverty Change-4

Figure 27 – GIC curve, total income distribution

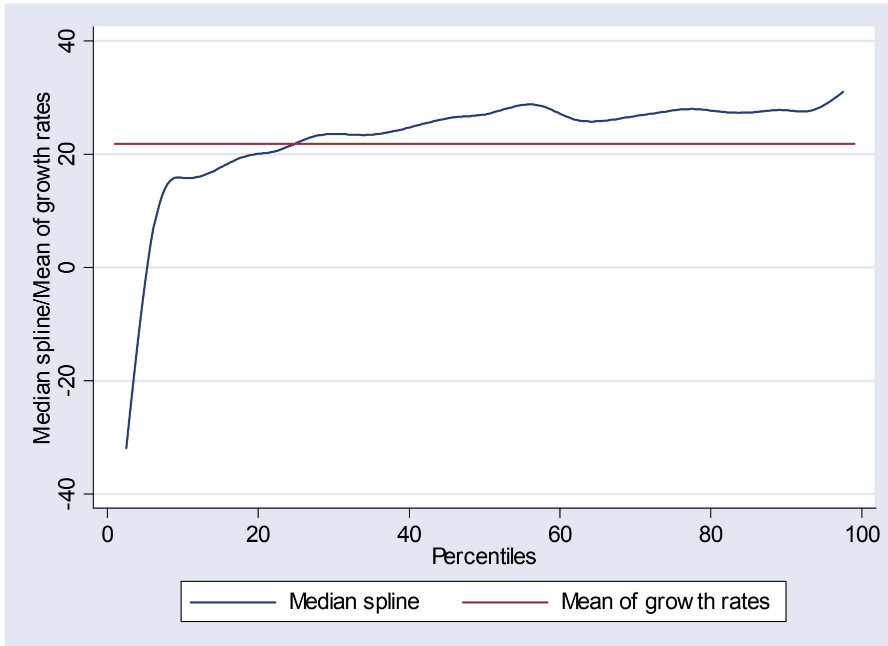


Figure 28 – GIC curve – Urban Areas

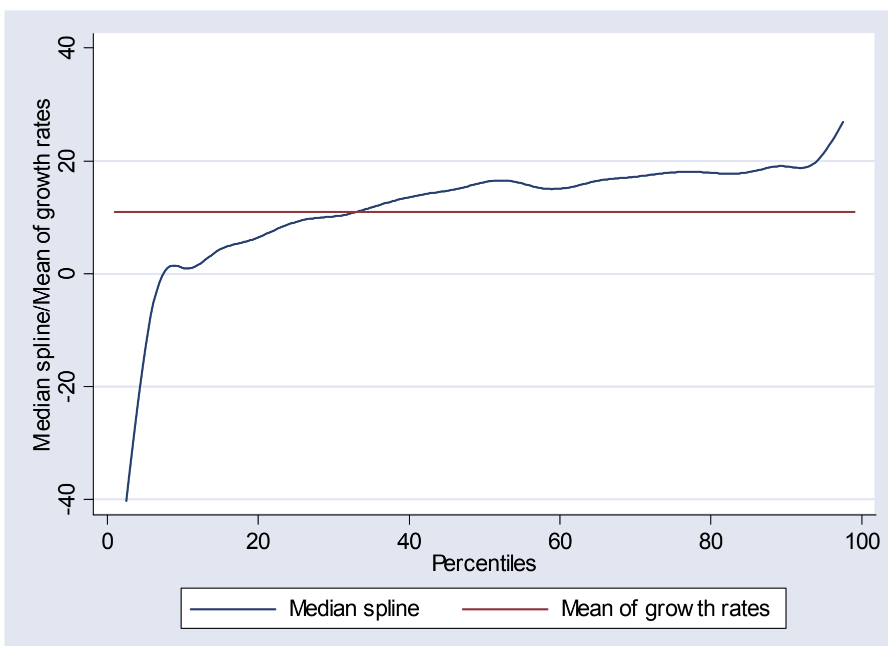


Figure 29 – GIC curve – Rural Areas

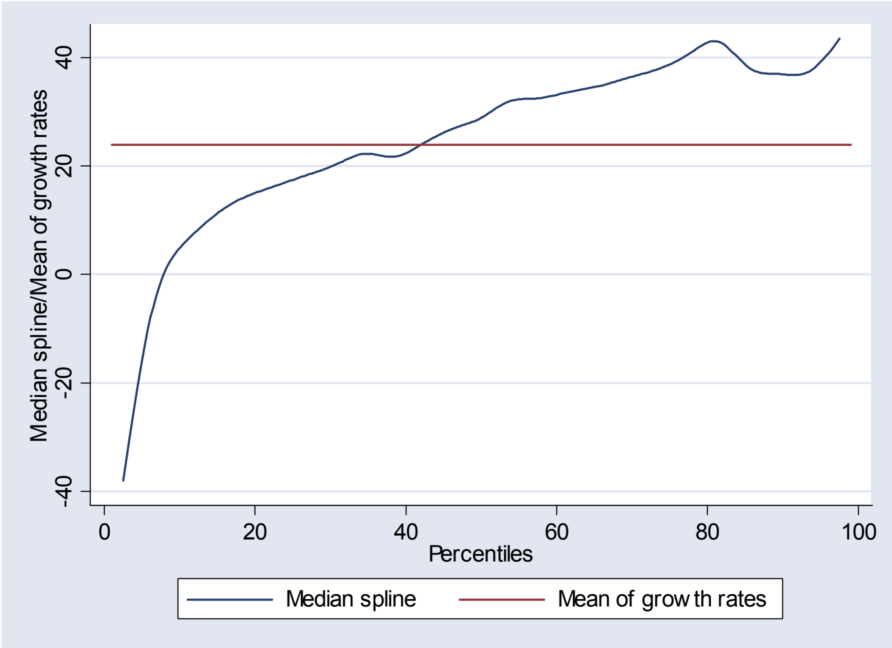


Figure 30 - GIC by Sub-Periods: 1981 – 1986:

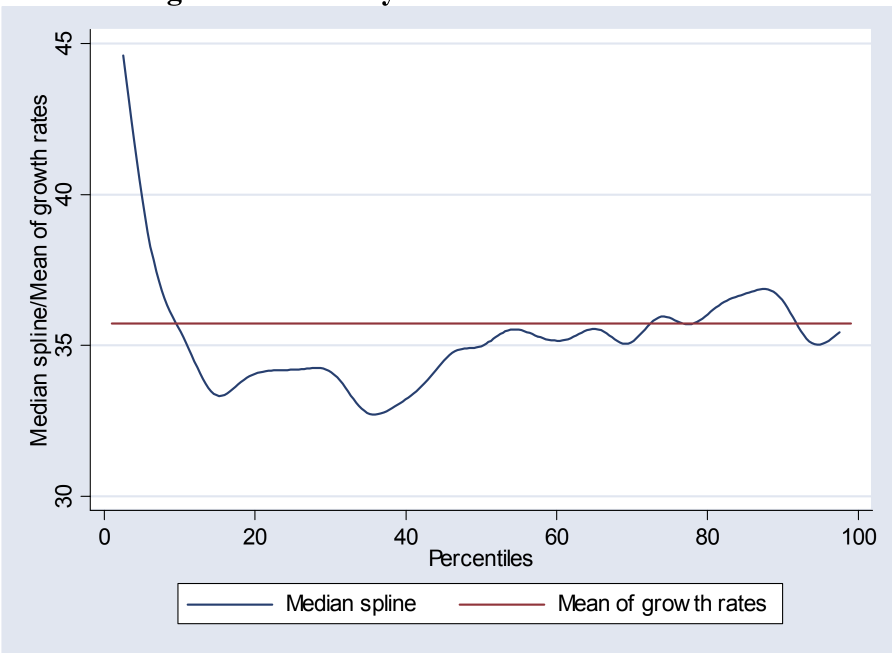


Figure 31 - GIC by Sub-Periods: 1986 – 1989

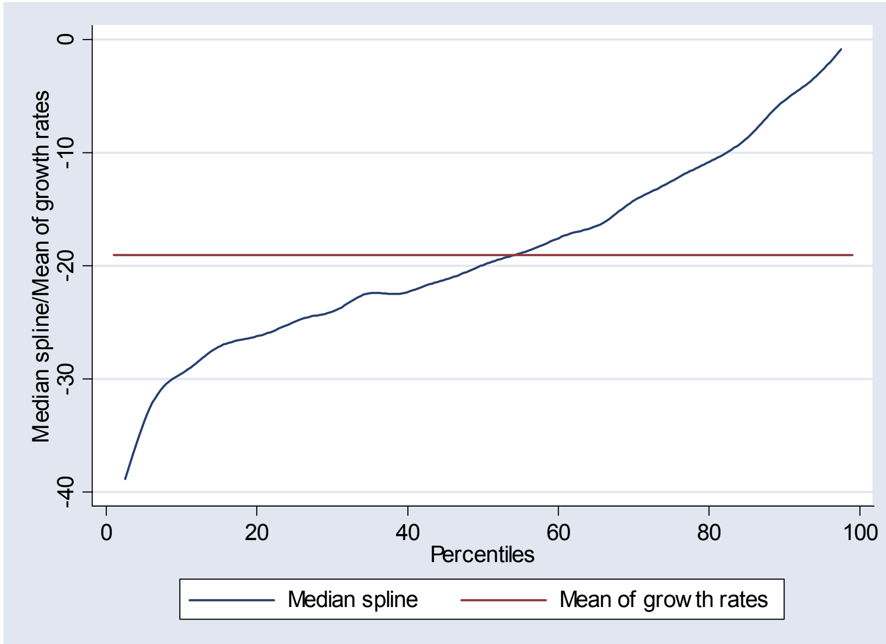


Figure 32 - GIC by Sub-Periods: 1989 – 1993

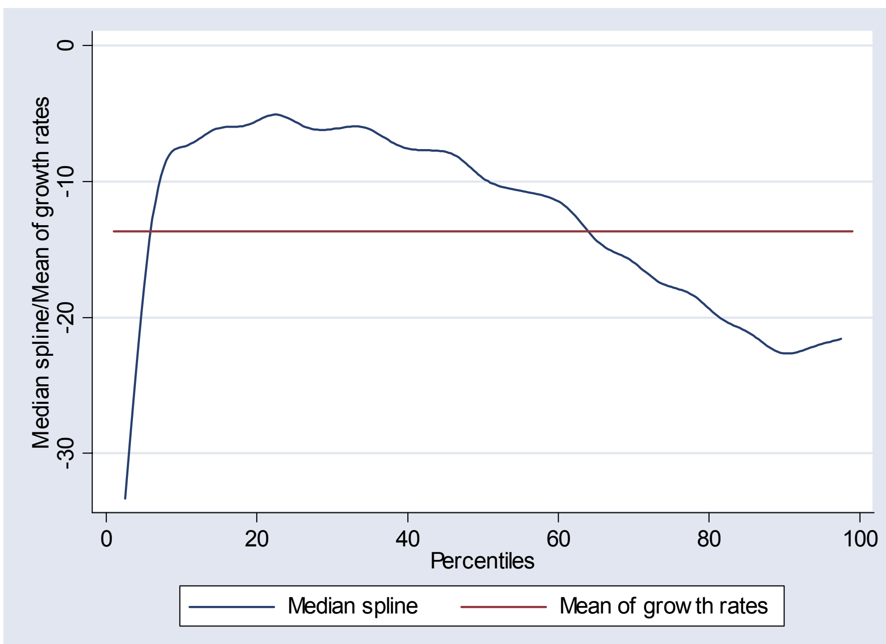


Figure 33 - GIC by Sub-Periods: 1993 – 2001

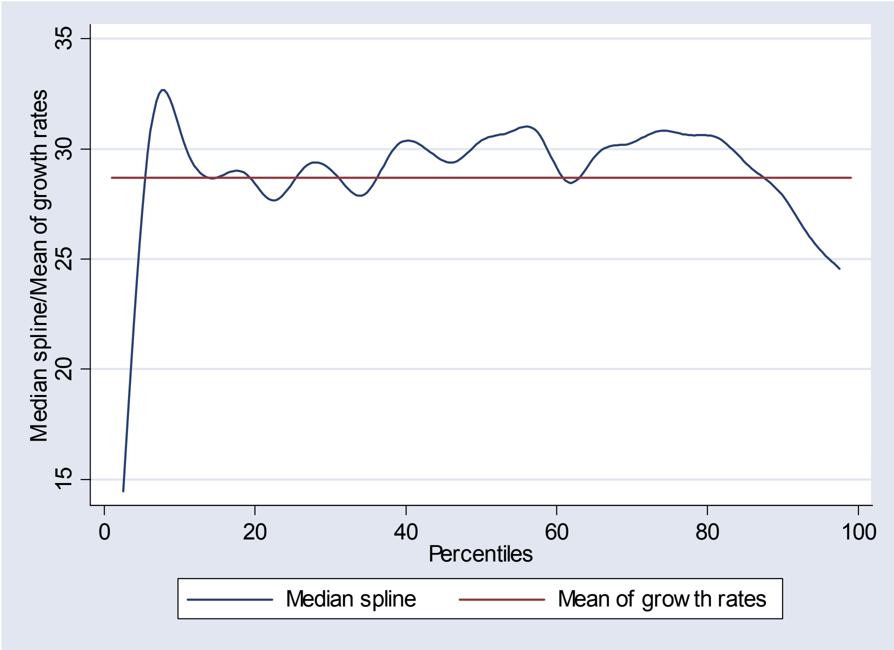


Table 15. Growth rates for the period 1981 to 2001

Growth rates at (%):	1981-2001	81-86	86-89	89-93	93-01
Mean	30,26	37,86	-7,61	-18,70	25,79
Median	27,04	34,84	-19,93	-9,74	30,38
Mean percentile	21,87	35,73	-19,05	-13,67	28,69

Headcount index	**Rate of pro-poor growth (%):**				
	1981-2001	***81-86***	***86-89***	***89-93***	***93-01***
10	-10,45	42,67	-34,84	-25,12	24,75
15	-1,19	39,89	-32,55	-18,89	26,35
20	3,85	38,37	-31,08	-15,64	27,00
25	7,26	37,52	-29,99	-13,56	27,18
30	9.90	36,98	-29,06	-12,32	27,50
Indigence headcount	**32**	**32**	**22**	**31**	**34**
ppg indigence	10,78	36,78	-30,62	-12,12	27,60

Note: 0,71% of observations (with income information) reported zero income in 1981 and 1,60% in 2001. They were given an arbitrary low income for the GIC calculation.

Table 16. Growth and Inequality Poverty Decomposition – 1981 to 2001

Average effect	Change in poverty	Growth component	Redistribution component	Residual
Headcount ratio – indigence line	-0,071	-0,089	0,018	0
Headcount ratio – poverty line	-0,096	-0,104	0,007	0
Watts index – indigence line	-0,015	-0,015	0	0
Watts index – poverty line	-0,114	-0,07	-0,045	0

Table 17 - Growth and Inequality Poverty Decomposition – Urban/Rural

Average effect	Change in poverty	Growth component	Redistribution component	Residual
Headcount ratio – indigence line				
- total	-0,071	-0,089	0,018	0
- urban	-0,024	-0,058	0,034	0
- rural	-0,132	-0,134	0,002	0

Table 18 - Growth and Inequality Poverty Decomposition – Sub-periods

Headcount ratio – indigence line (average effect)	Change in poverty	Growth component	Redistribution component	Residual
1981-1986	-0,098	-0,109	0,011	0,0
1986-1989	0,087	0,024	0,063	0,0
1989-1993	0,017	0,071	-0,053	0,0
1993-2001	-0,077	-0,075	-0,003	0,0

Table 19
Growth-Elasticity of Poverty By State and Area

	Overall	Rural	Urban
	(1)	(2)	(3)
SP	-1,594	-1,588	-1,589
	0,147	*0,298*	*0,158*
RJ	-0,904	-0,818	-0,803
	0,145	*0,205*	*0,157*
RS	-0,642	-1,157	-0,680
	0,325	*0,378*	*0,326*
SC	-0,962	-0,943	-1,124
	0,188	*0,245*	*0,174*
MS	-1,091	-0,229	-1,003
	0,229	*0,275*	*0,251*
MT	-0,571	-0,055	-0,896
	0,191	*0,152*	*0,188*
PR	-1,071	-0,151	-1,286
	0,227	*0,247*	*0,208*
ES	-0,449	-0,417	-0,363
	0,202	*0,167*	*0,192*
MG	-1,087	-0,735	-1,205
	0,176	*0,244*	*0,189*
GO	-0,799	-0,498	-0,854
	0,145	*0,167*	*0,162*
BA	-0,826	-0,562	-0,557
	0,228	*0,188*	*0,275*
PE	-0,715	-0,515	-0,622
	0,204	*0,203*	*0,216*
AL	-0,647	-0,337	-0,673
	0,169	*0,123*	*0,200*
SE	-0,565	-0,252	-0,662
	0,235	*0,191*	*0,199*
RN	-0,708	-0,457	-0,870
	0,173	*0,235*	*0,172*
CE	-0,530	-0,259	-0,574
	0,267	*0,266*	*0,316*
PB	-0,642	-0,231	-0,979
	0,190	*0,274*	*0,201*
MA	-0,545	-0,249	-0,511
	0,208	*0,234*	*0,200*
PI	-0,508	-0,166	-0,537
	0,209	*0,172*	*0,275*

Time-dummies included; standard-errors in italics;
Headcount Index, Indigence Line

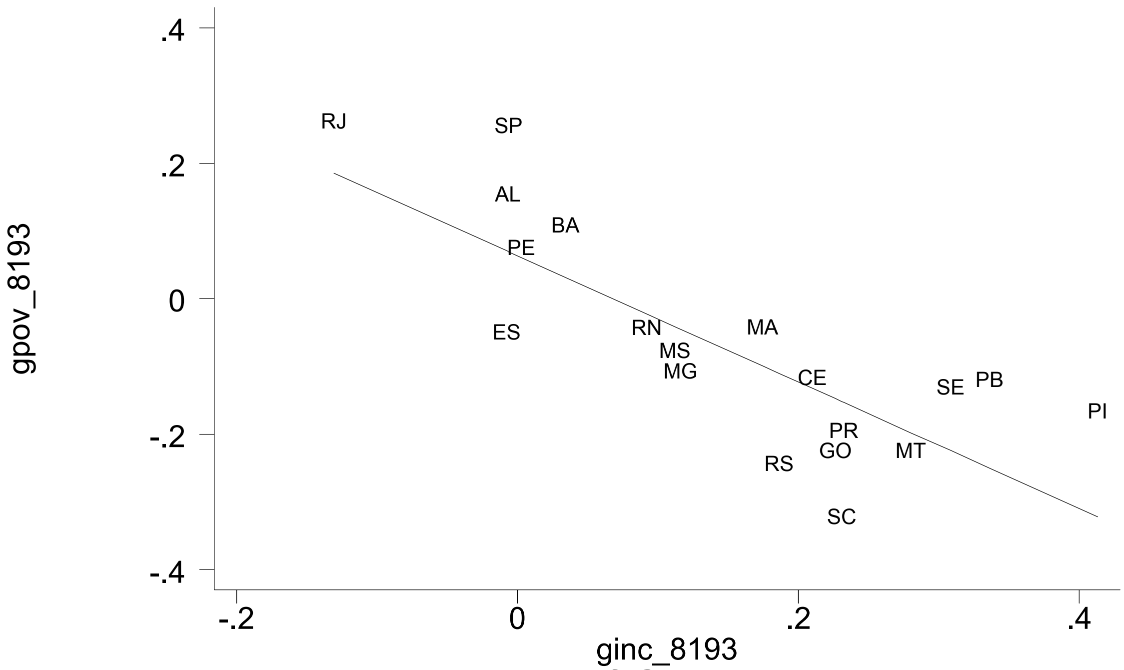


Fig 35-Poverty Impact of Growth: 1981-1993

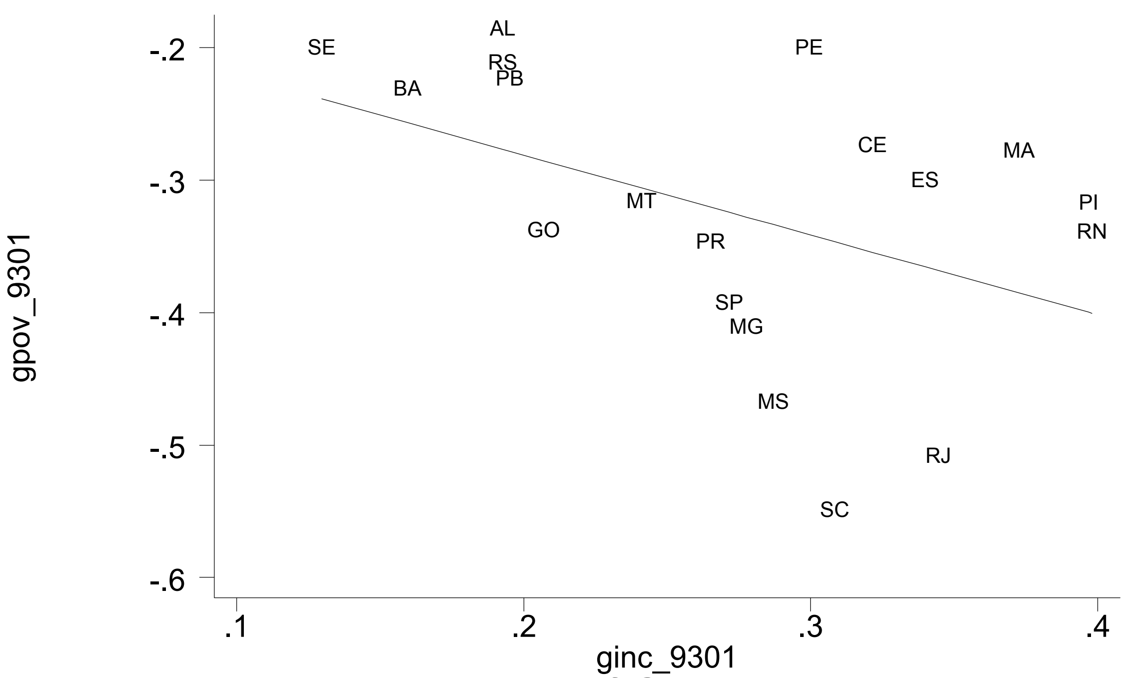


Fig 36-Poverty Impact of Growth: 1993-2001

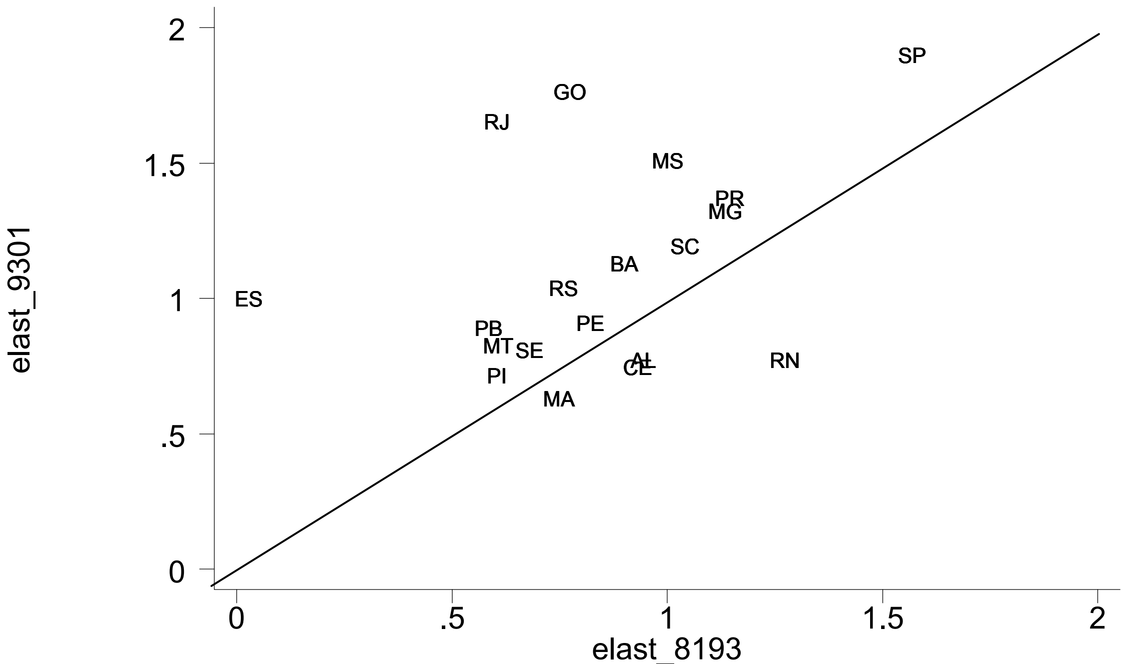


Fig 37 -Change in Poverty Growth Elasticities

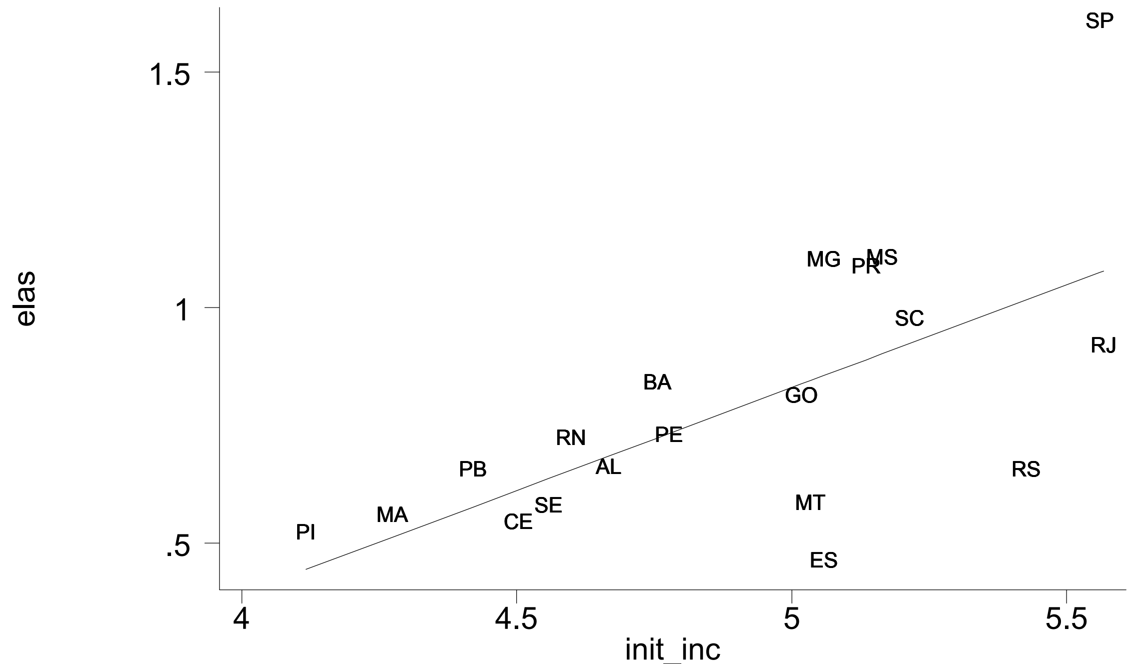


Fig 38 -Initial Income and Poverty-Growth Elasticity

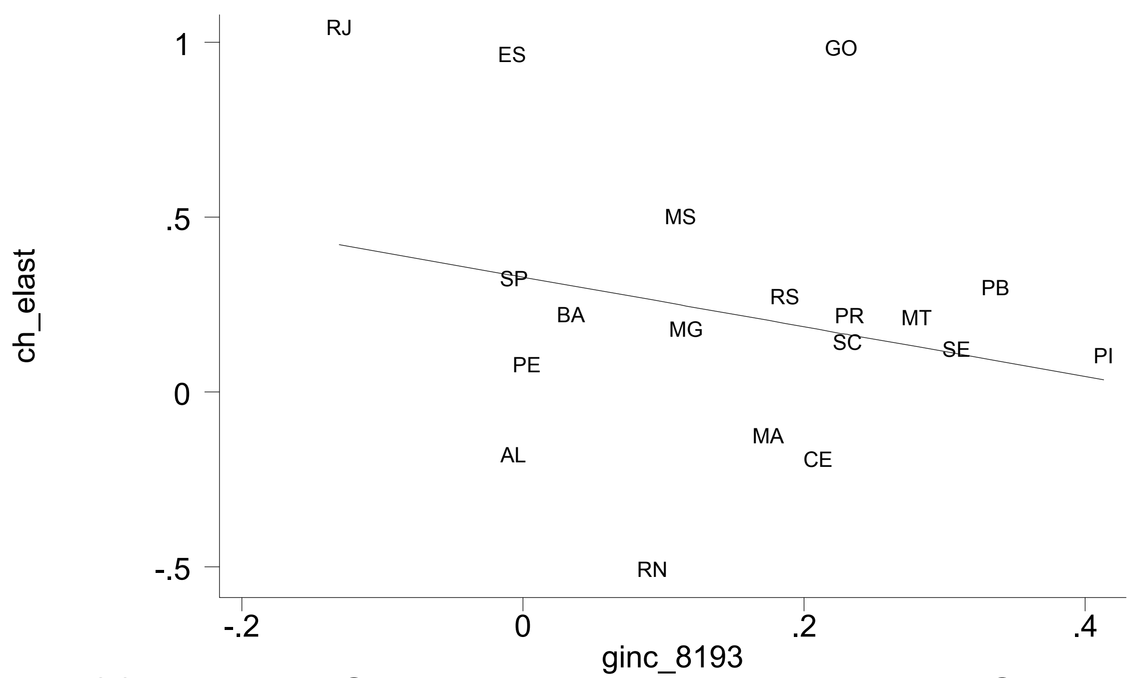


Fig 39-Previous Change in Poverty and Elasticity Change

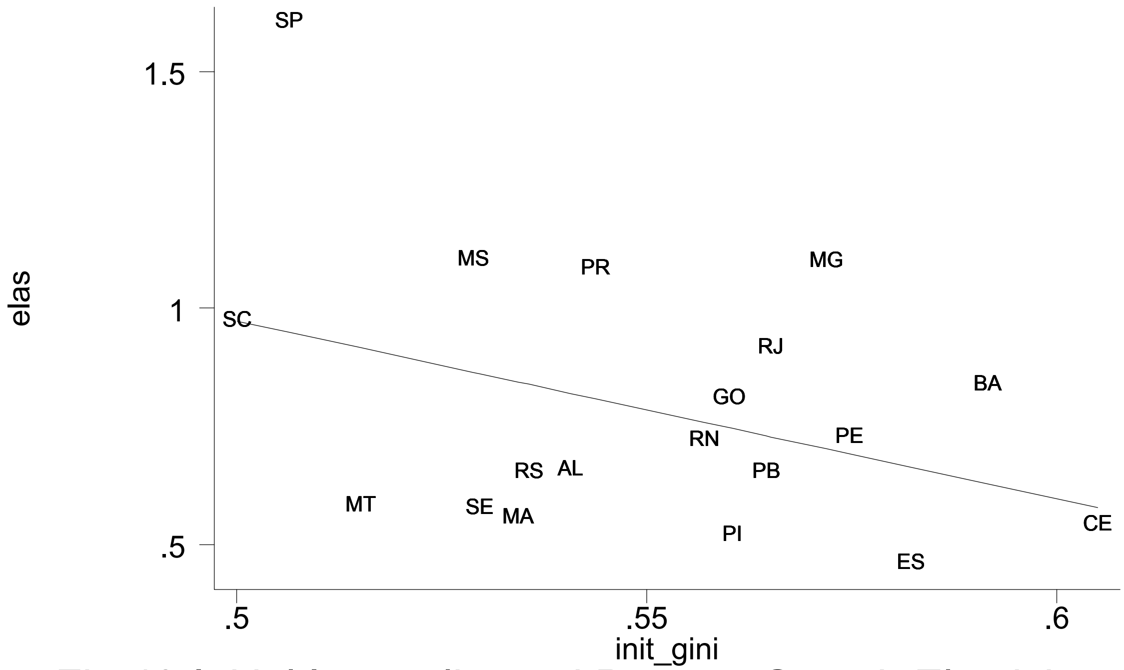


Fig 40-Initial Inequality and Poverty-Growth Elasticity

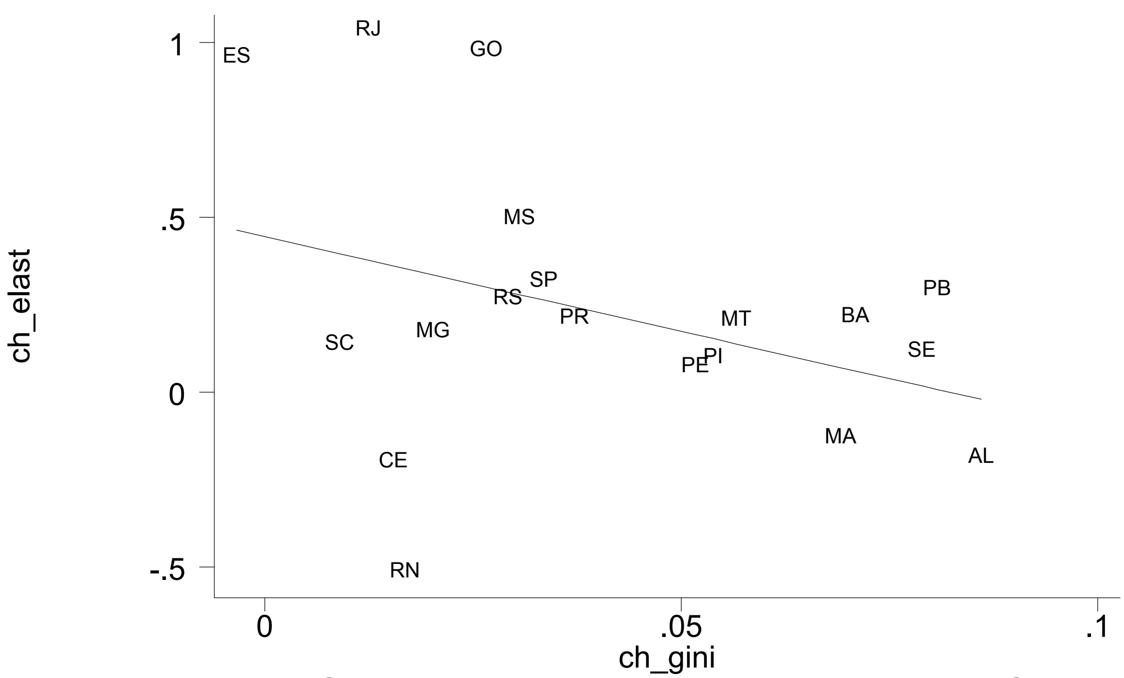


Fig 41-Previous Change in Inequality and Elasticity Change

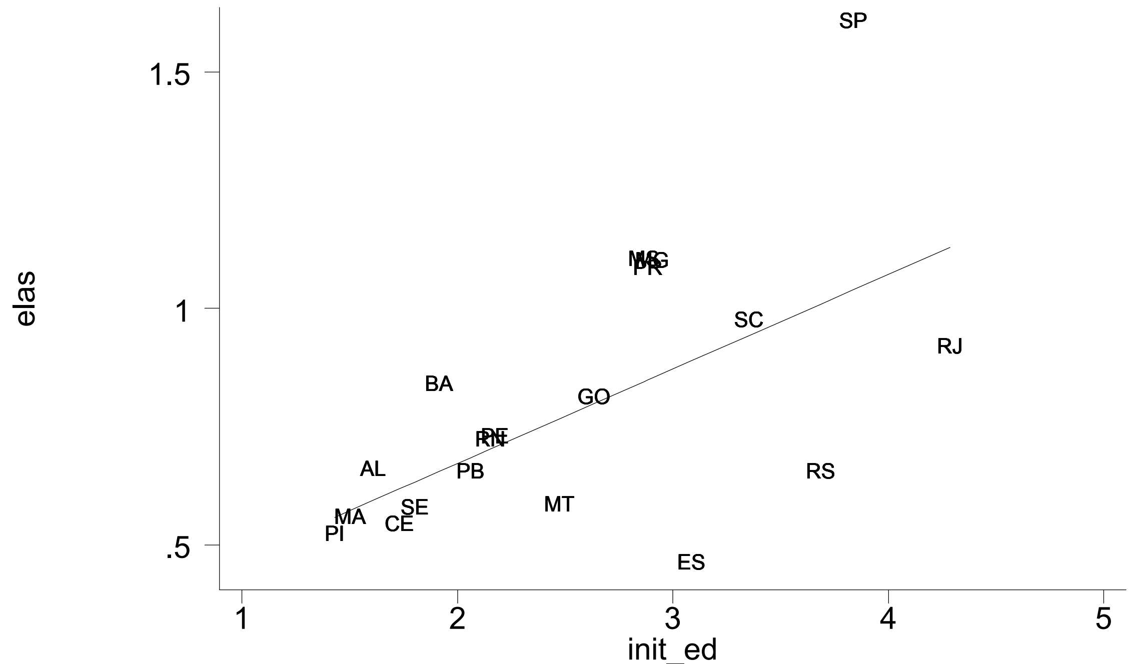


Fig 42-Human Capital and Poverty-Growth Elasticity

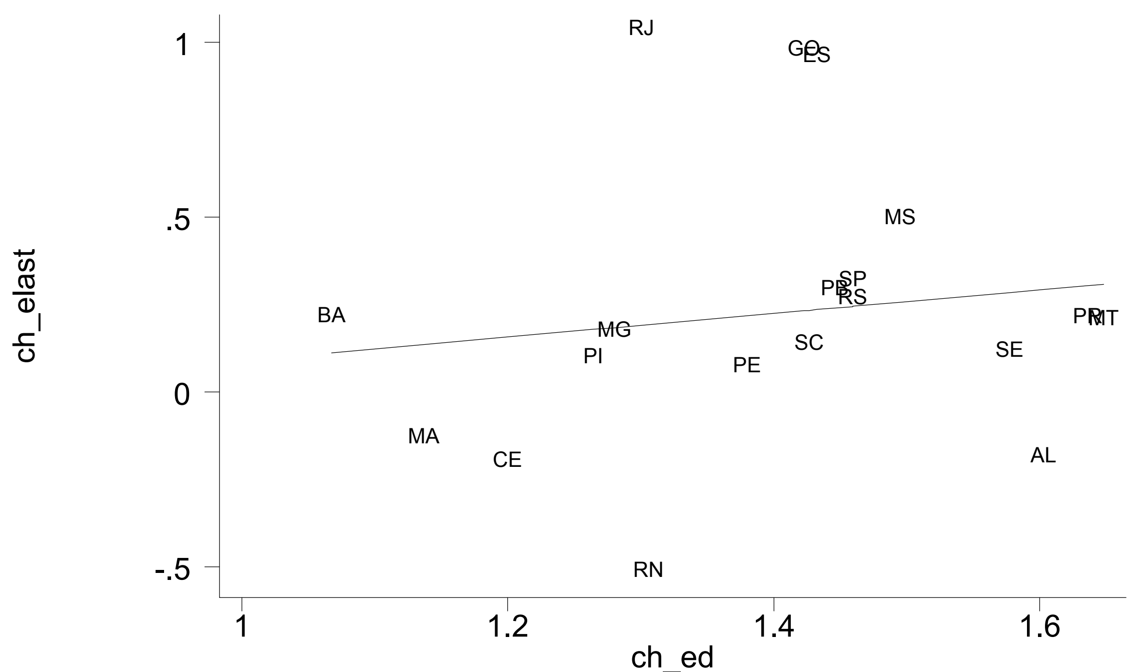


Fig 43-Previous Change in HC and Elasticity Change

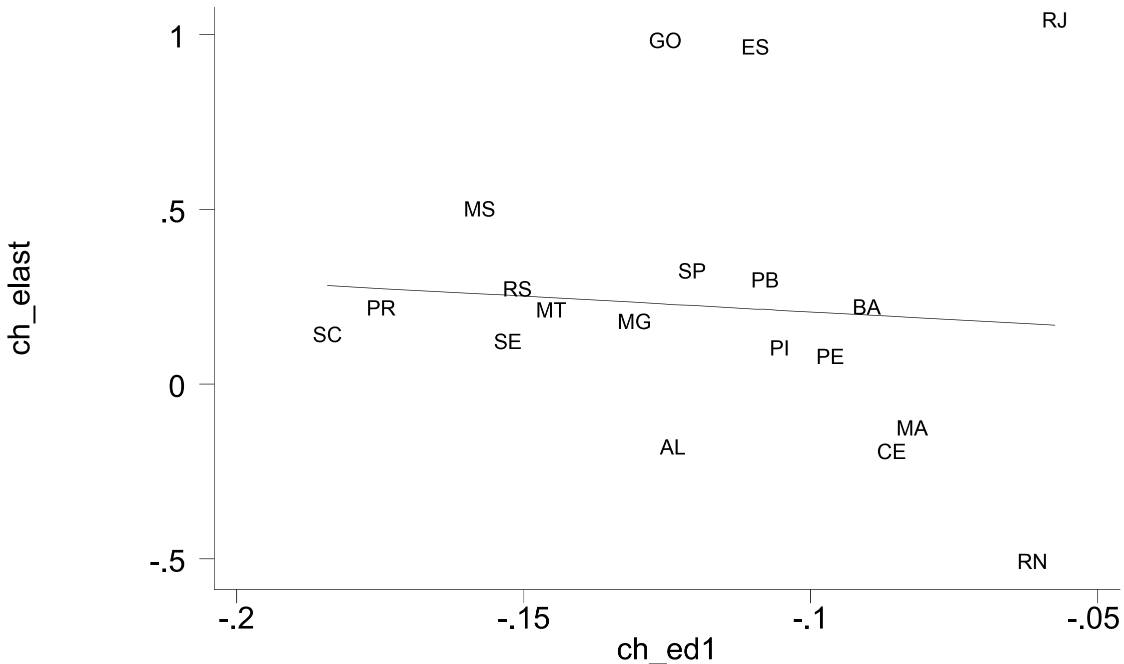


Fig 43a-Change in Prim. Educ and Elasticity Change

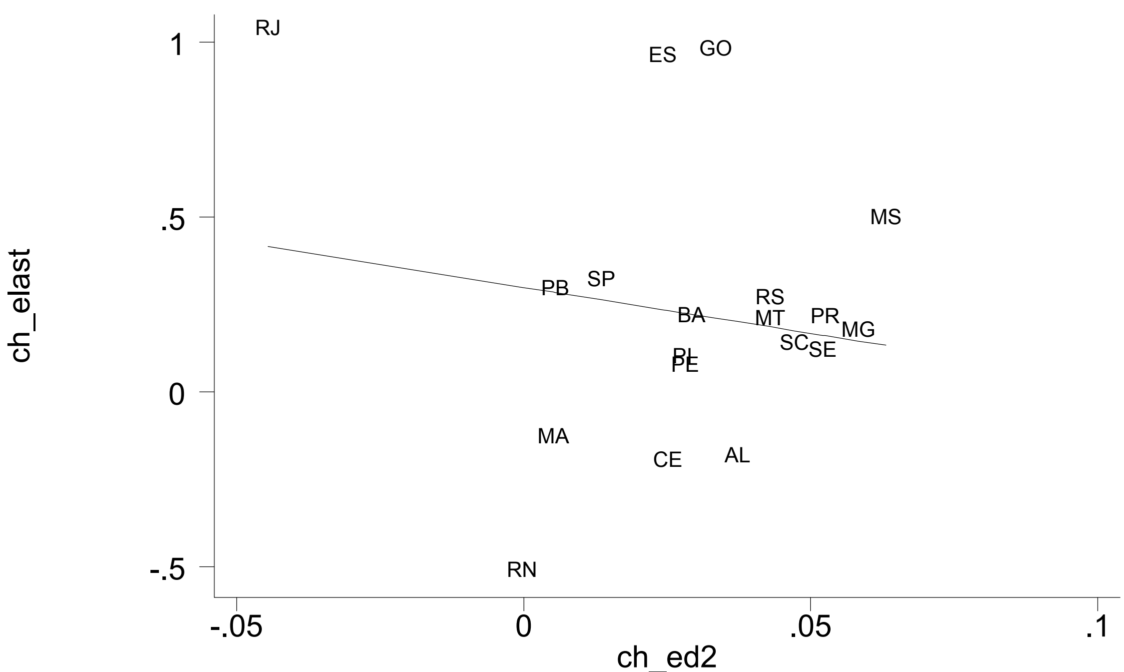


Fig 43b-Change in Sec. Educ and Elasticity Change

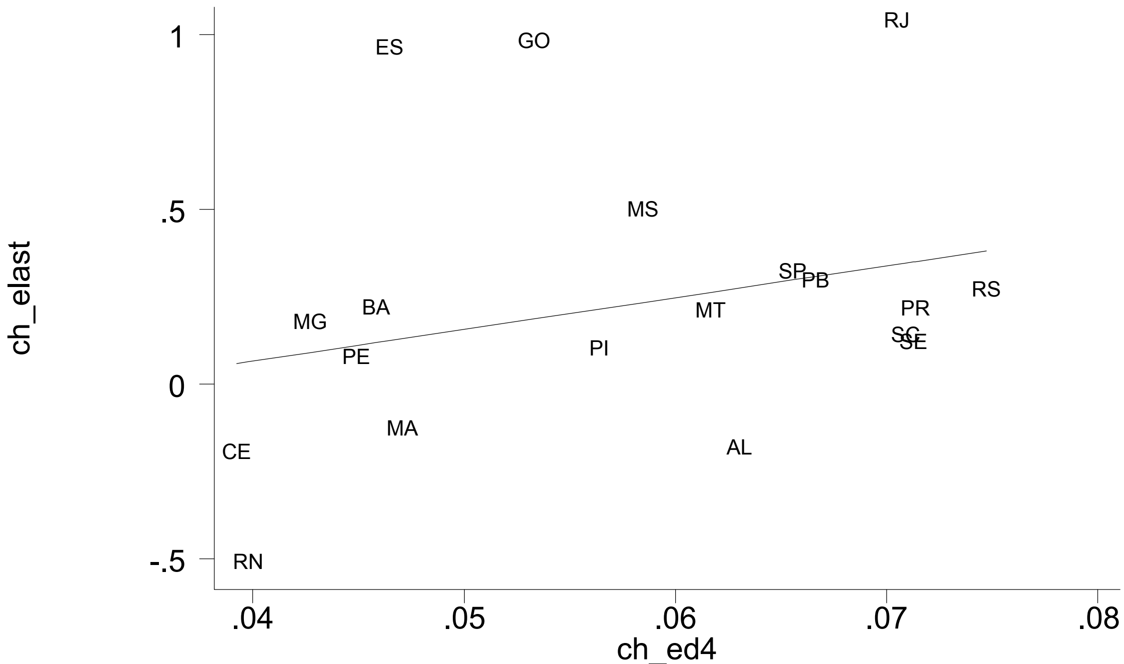


Fig 43c-Change in HS Educ and Elasticity Change

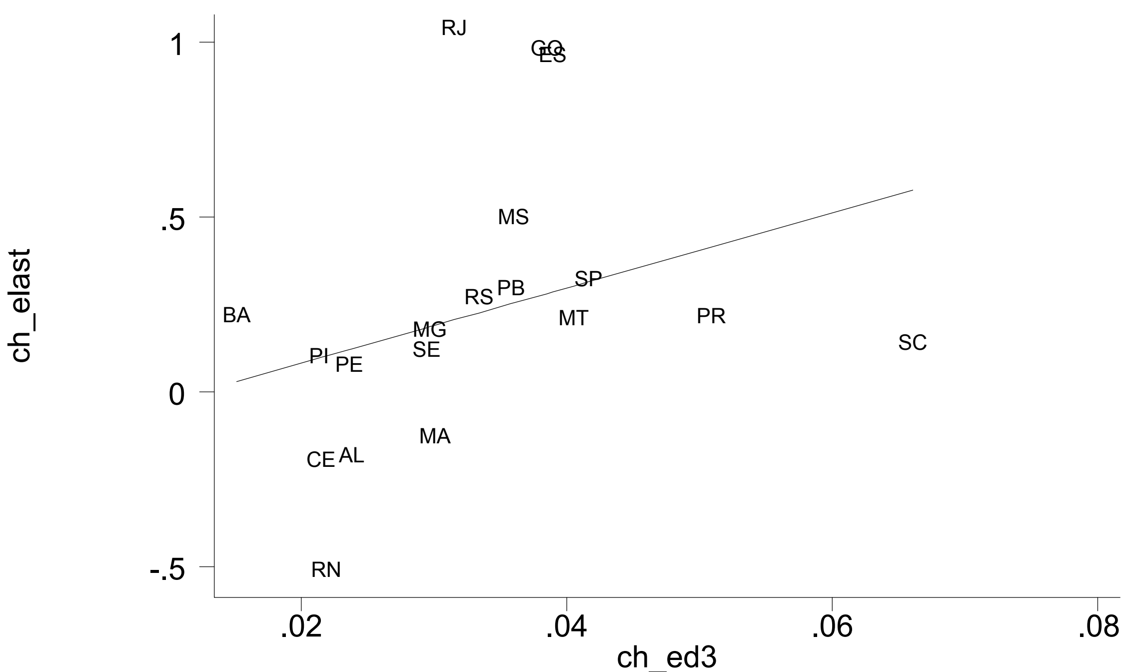


Fig 43d-Change in College Educ and Elasticity Change

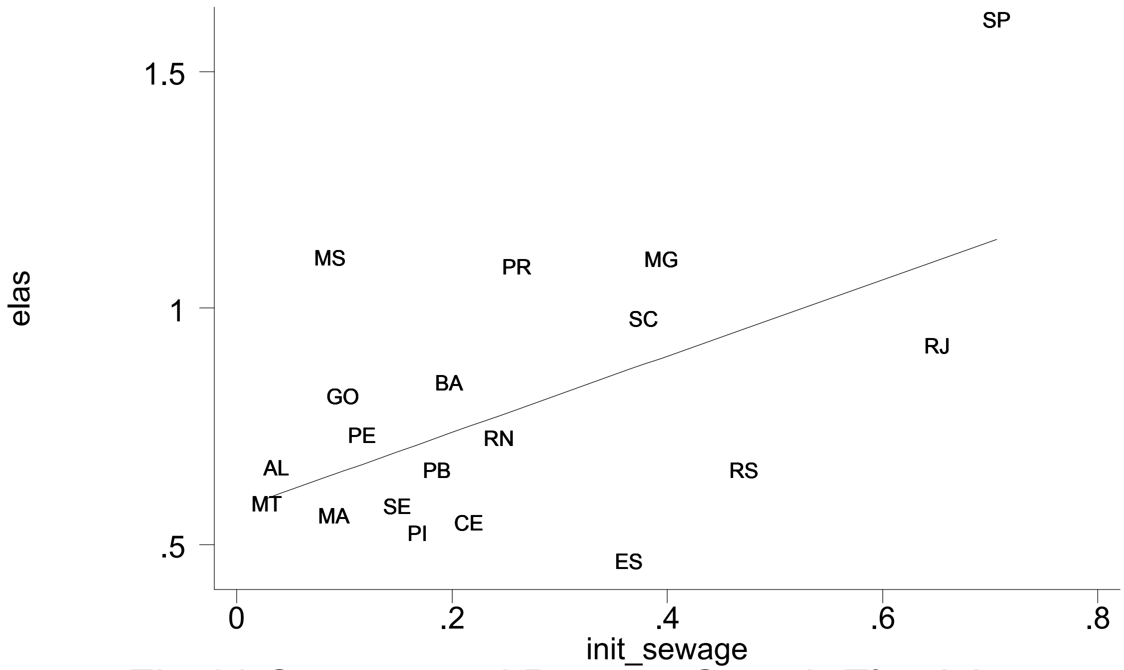


Fig 44-Sewage and Poverty-Growth Elasticity

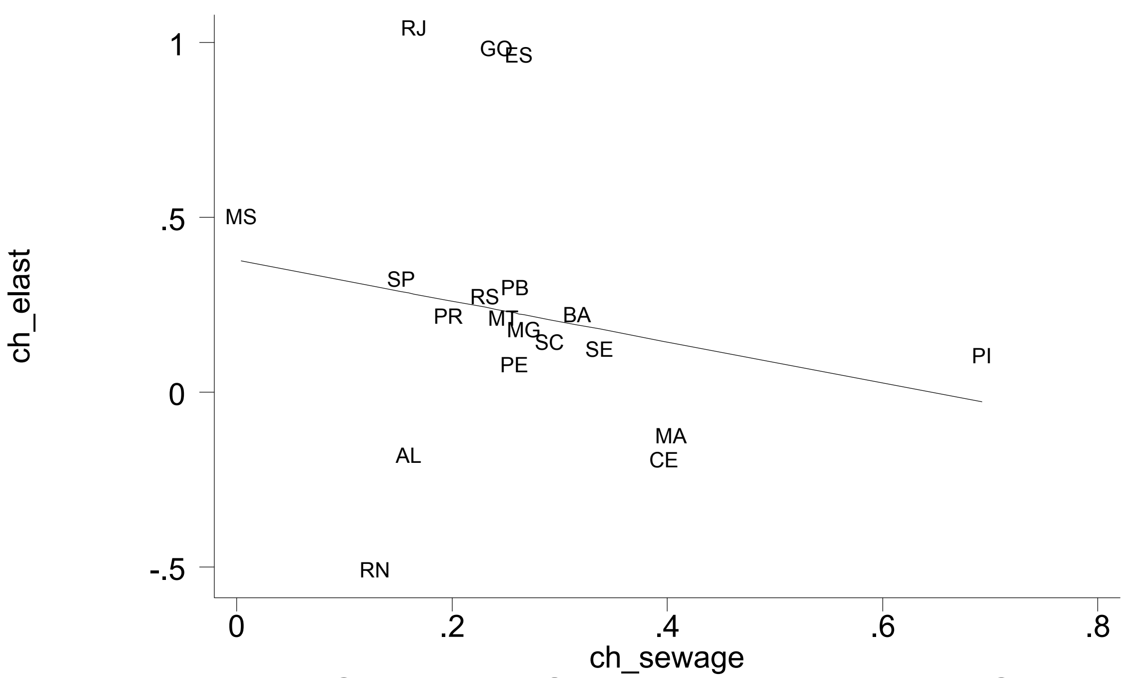


Fig 45-Previous Change in Sewage and Elasticity Change

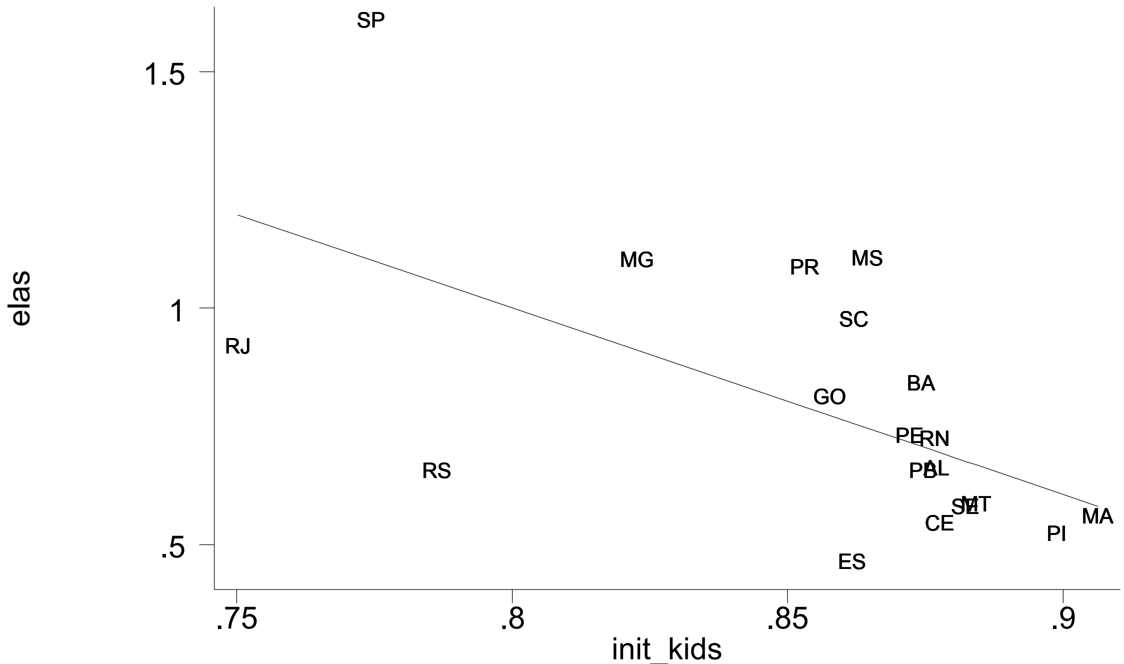


Fig 46- Share of HH with Kids and Poverty-Growth Elasticity

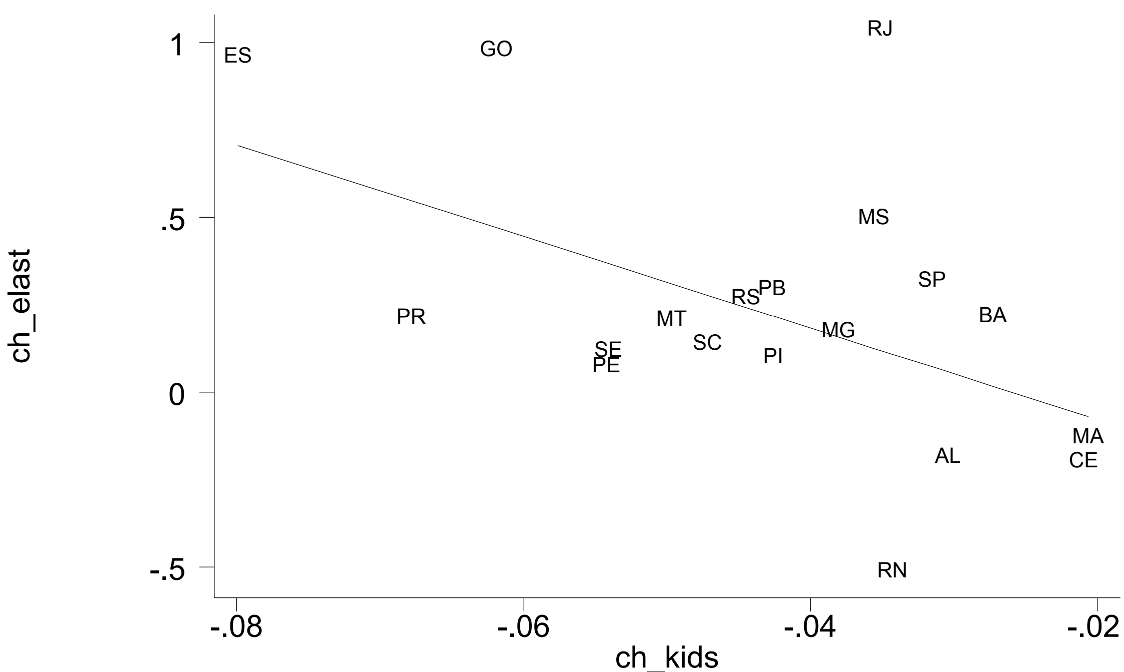
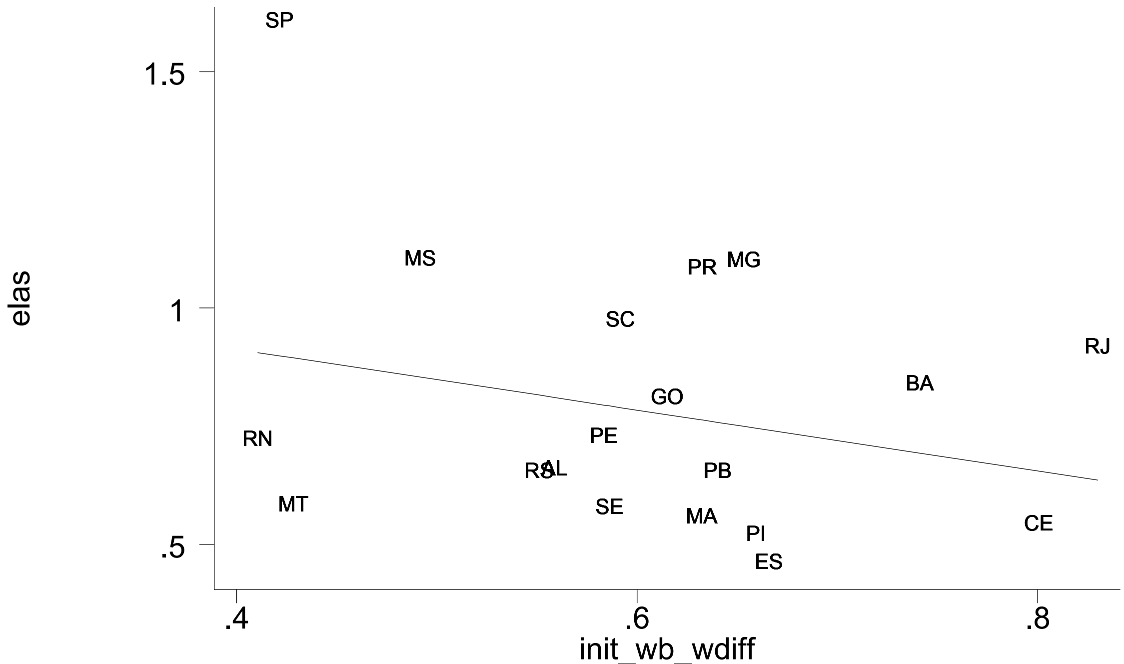


Fig 47-Previous Change in HH with Kids and Elasticity



48-White/Non-White Wage Diffs and Poverty-Growth Elasti

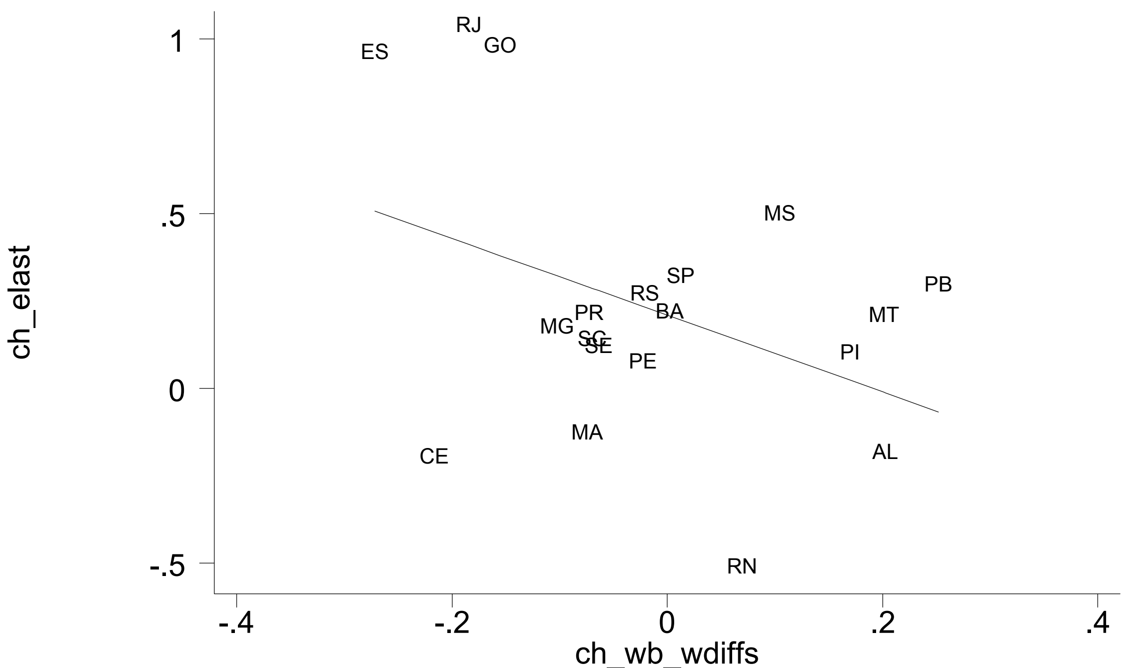
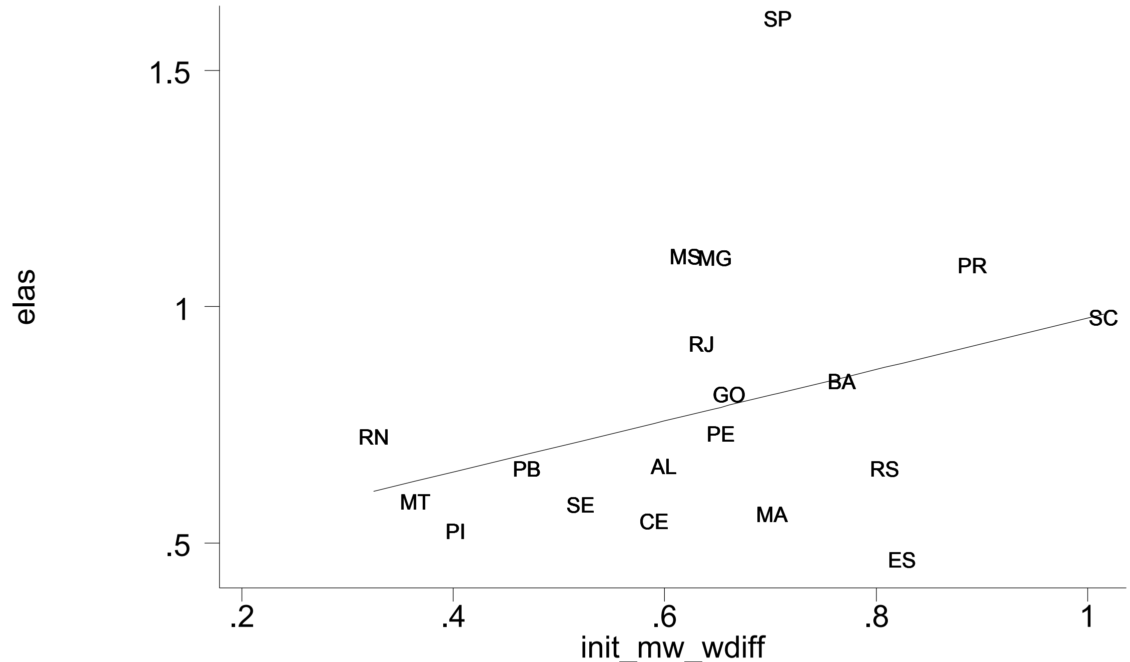


Fig 49-Previous Change in W/B Wage Diff and Elasticity



ig 50-Male/Female Wage Diffs and Poverty-Growth Elastici

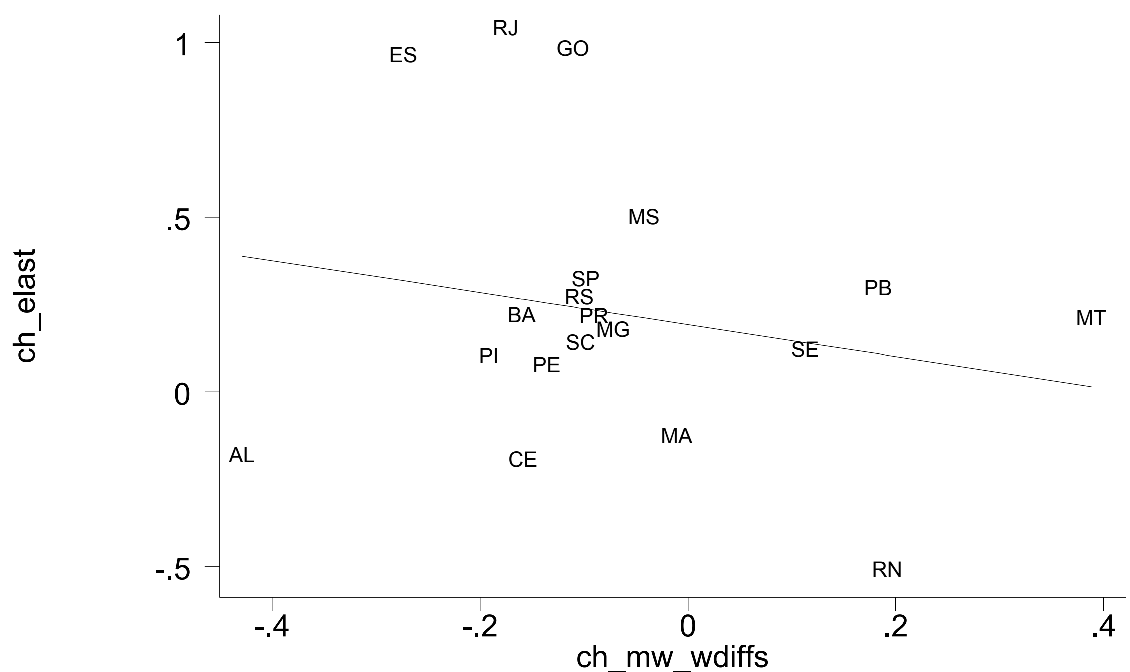


Fig 51-Previous Change in M/F Wage Diff. and Elasticity

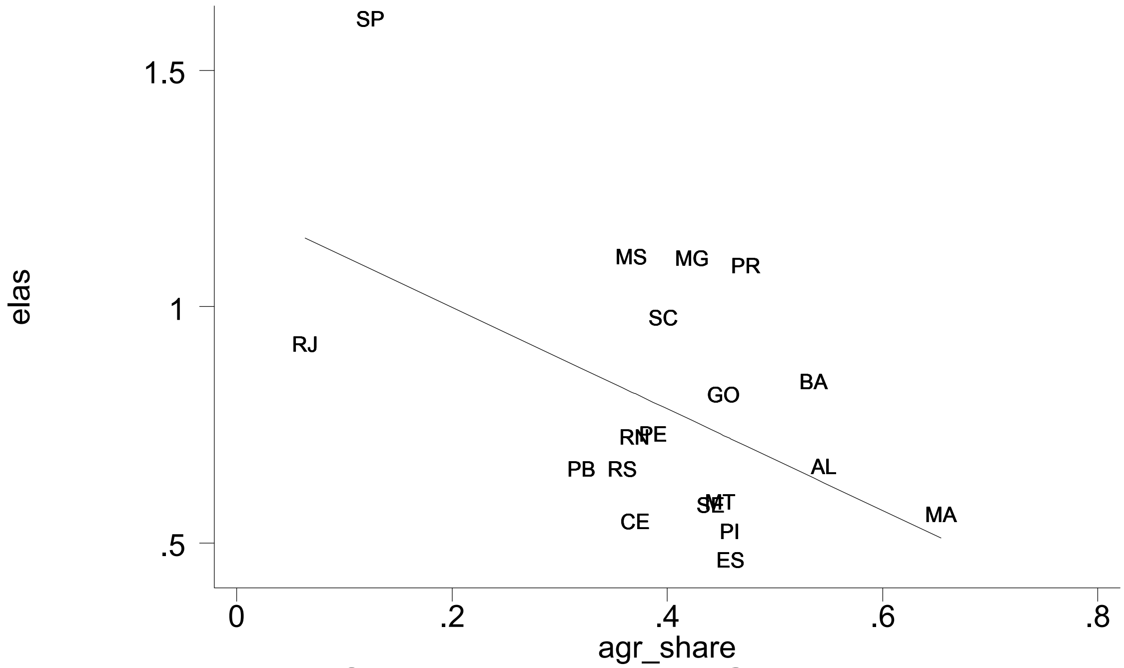


Fig 52-Agri. Share and Poverty-Growth Elasticity

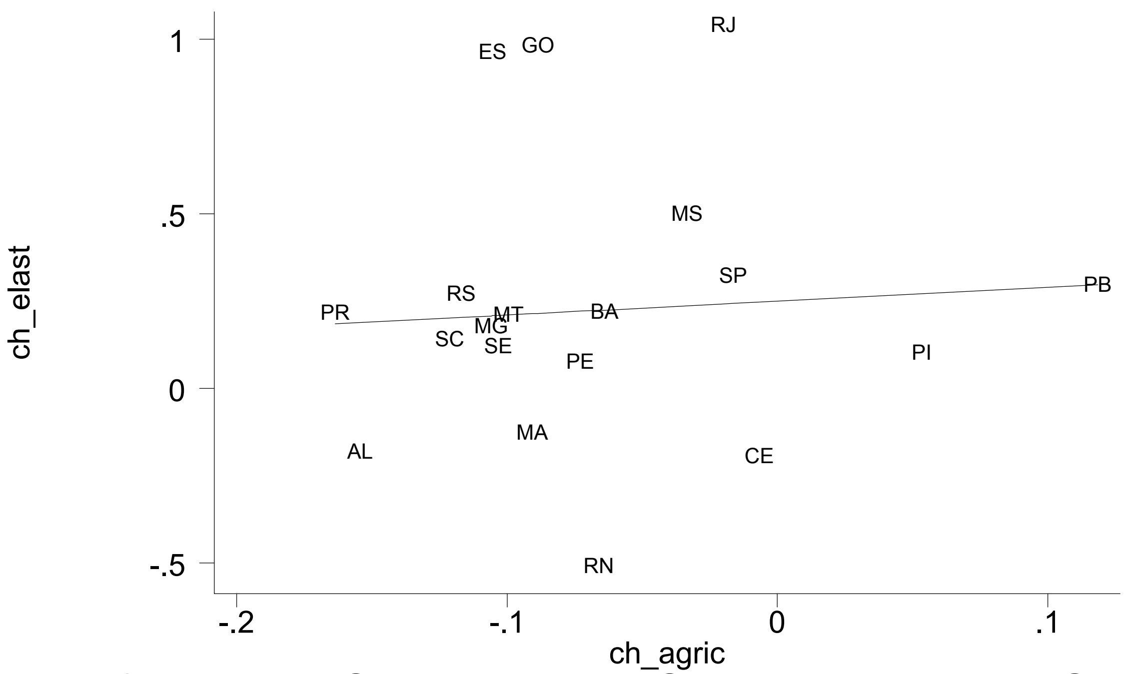


Fig 53-Previous Change in Agri. Share and Elasticity Ch.

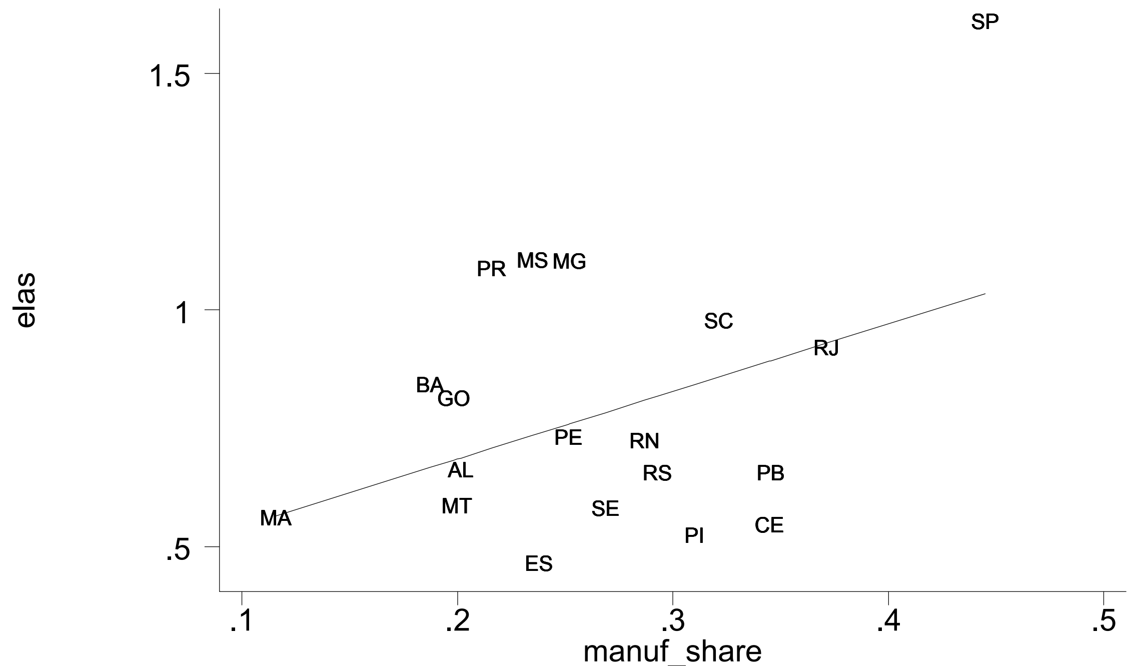


Fig 54-Manuf. Share and Poverty-Growth Elasticity

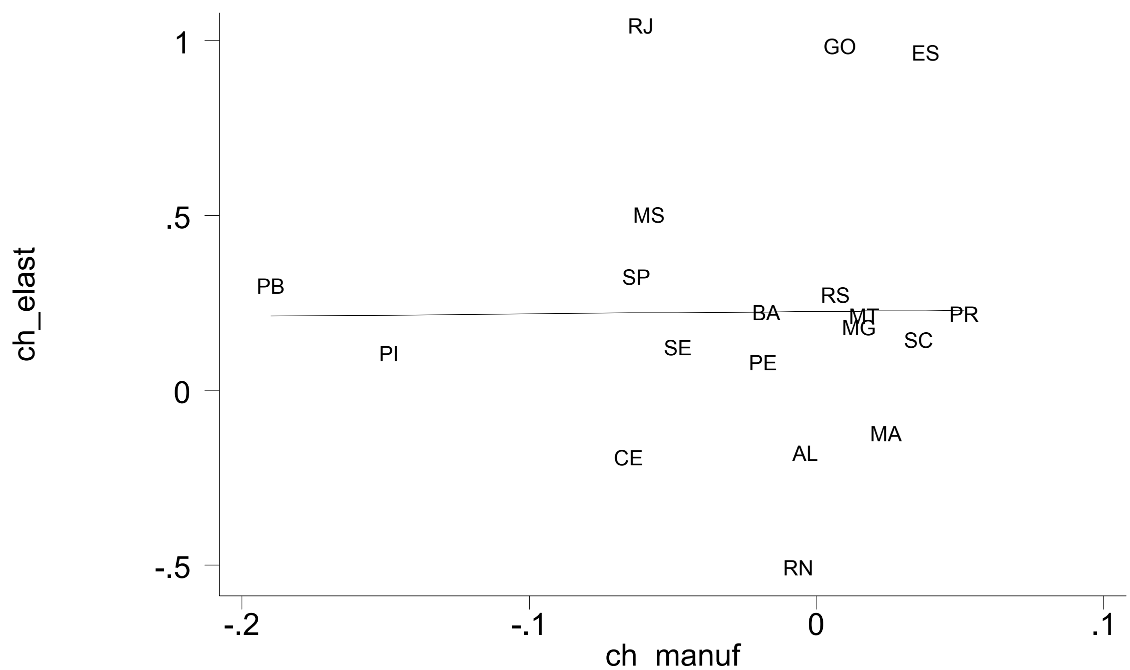


Fig 55-Previous Change in Manuf. Share and Elasticity Ch.

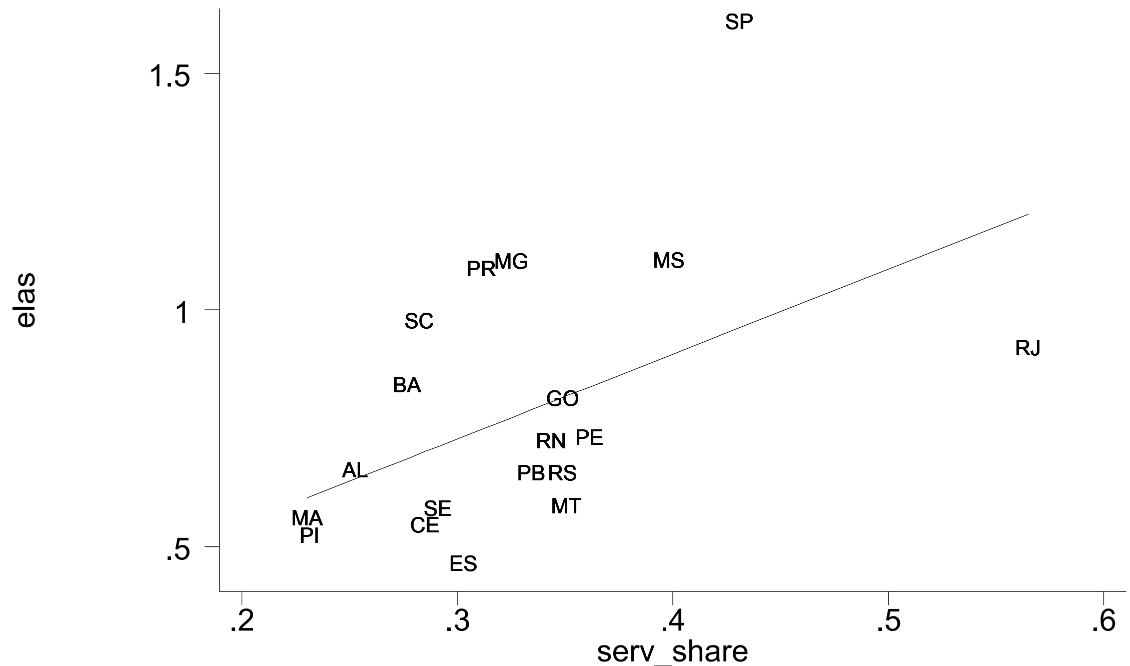


Fig 56-Serv. Share and Poverty-Growth Elasticity

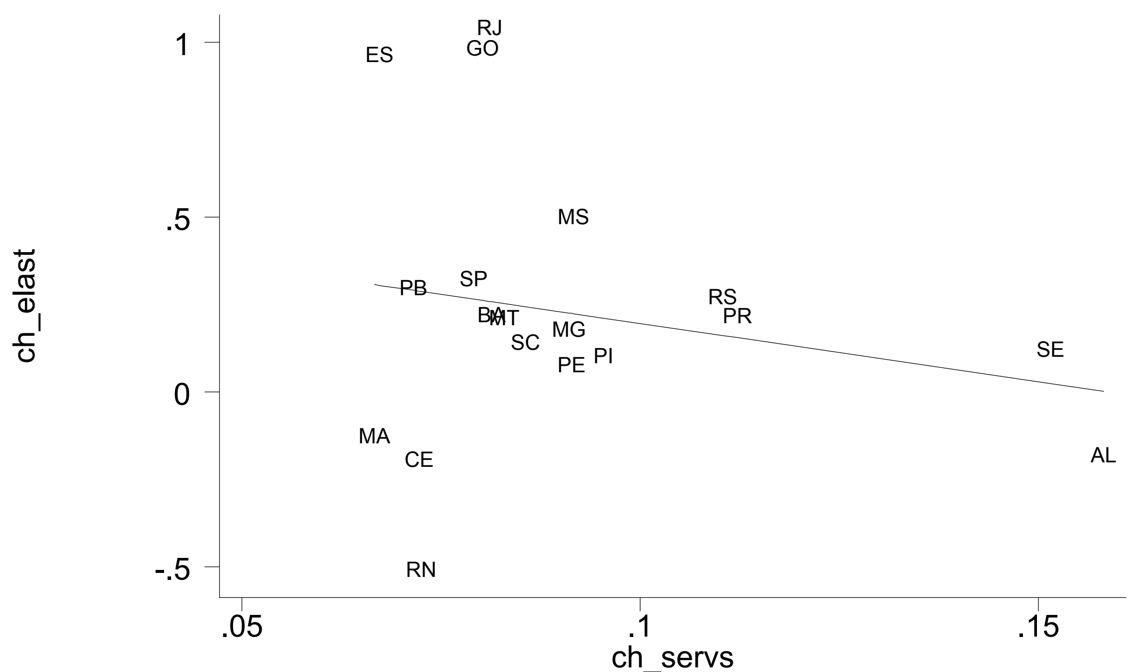


Fig 57-Previous Change in Servs Share and Elasticity Ch.

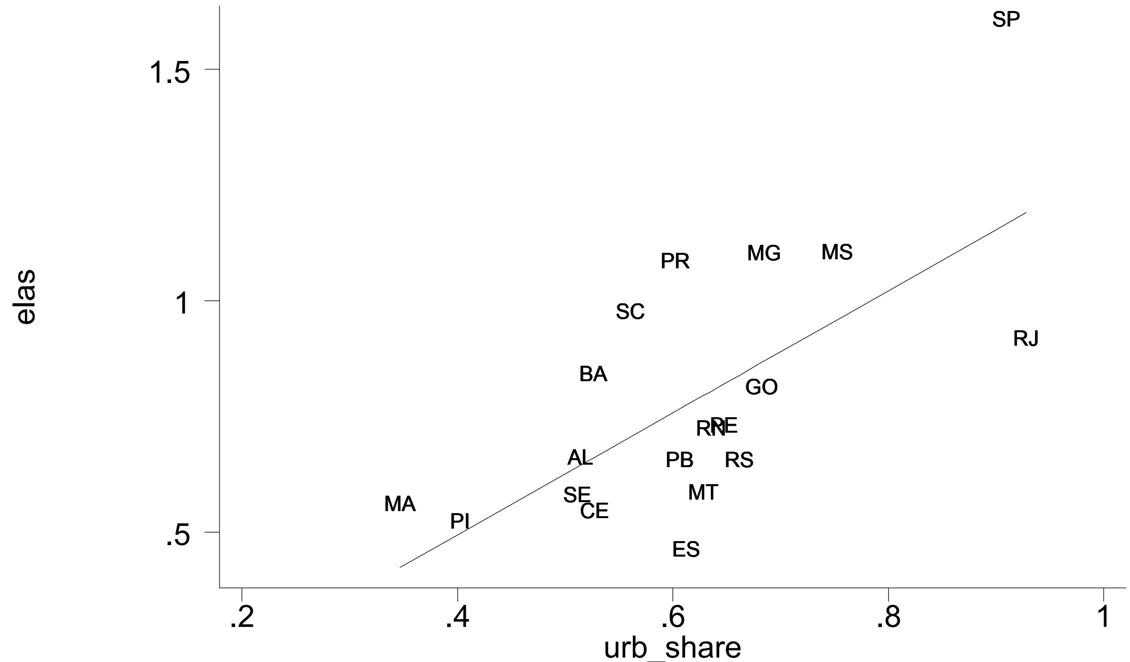


Fig 58-Urban Share and Poverty-Growth Elasticity

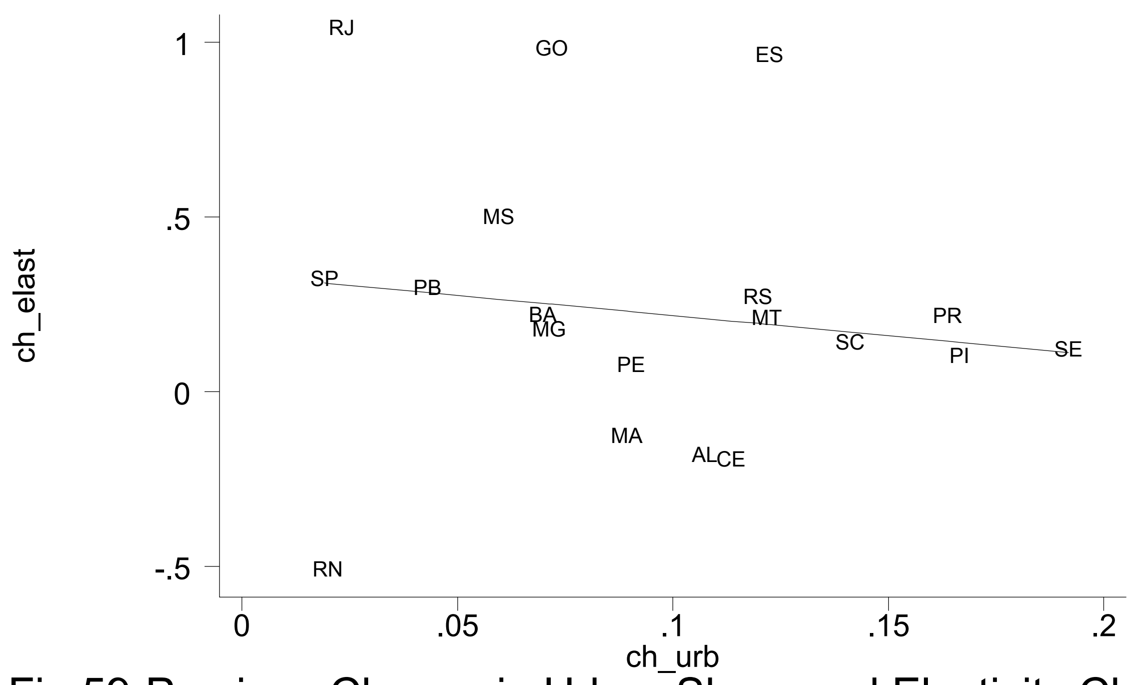


Fig 59-Previous Change in Urban Share and Elasticity Ch.

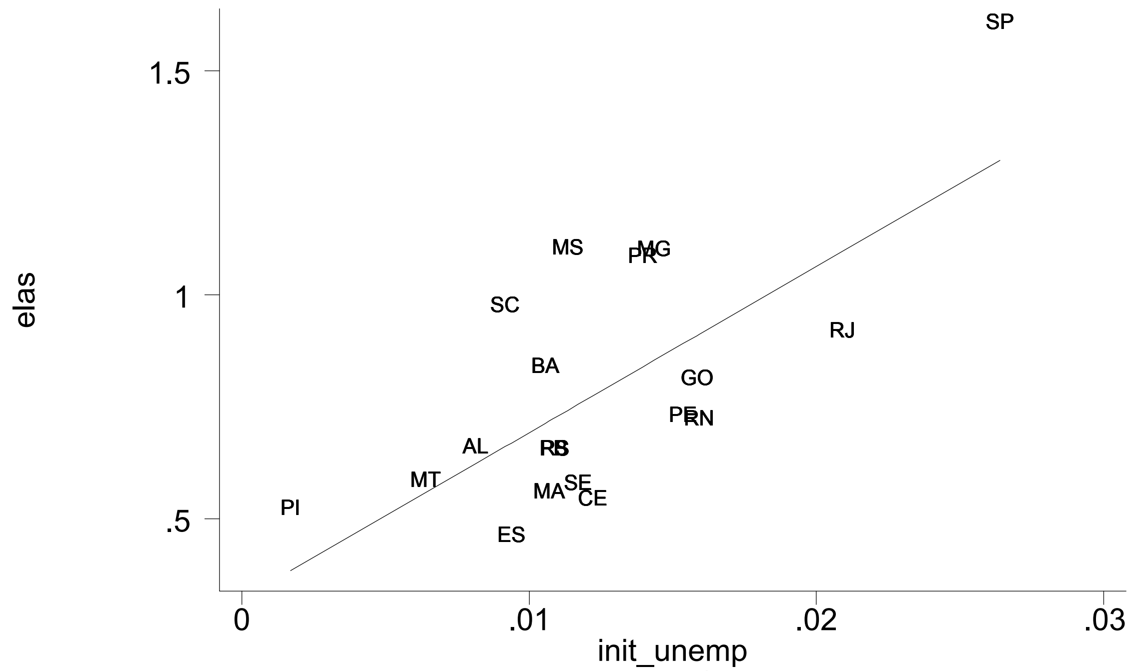


Fig 60-Unempl.and Poverty-Growth Elasticity

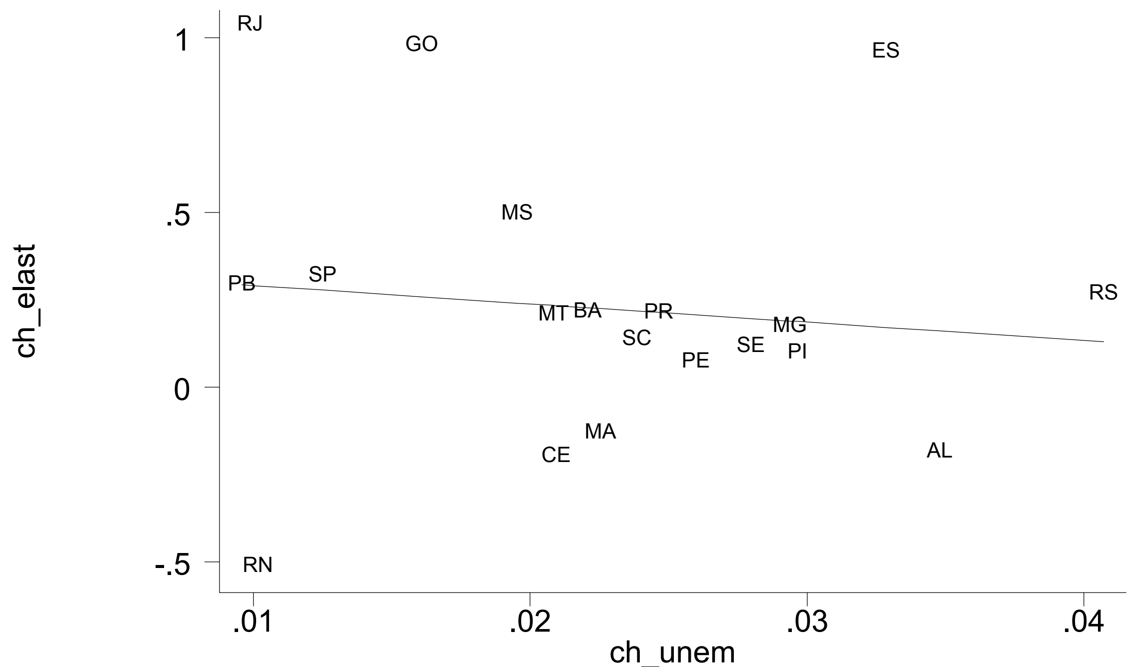


Fig 61-Previous Change in Unempl. and Elasticity Change

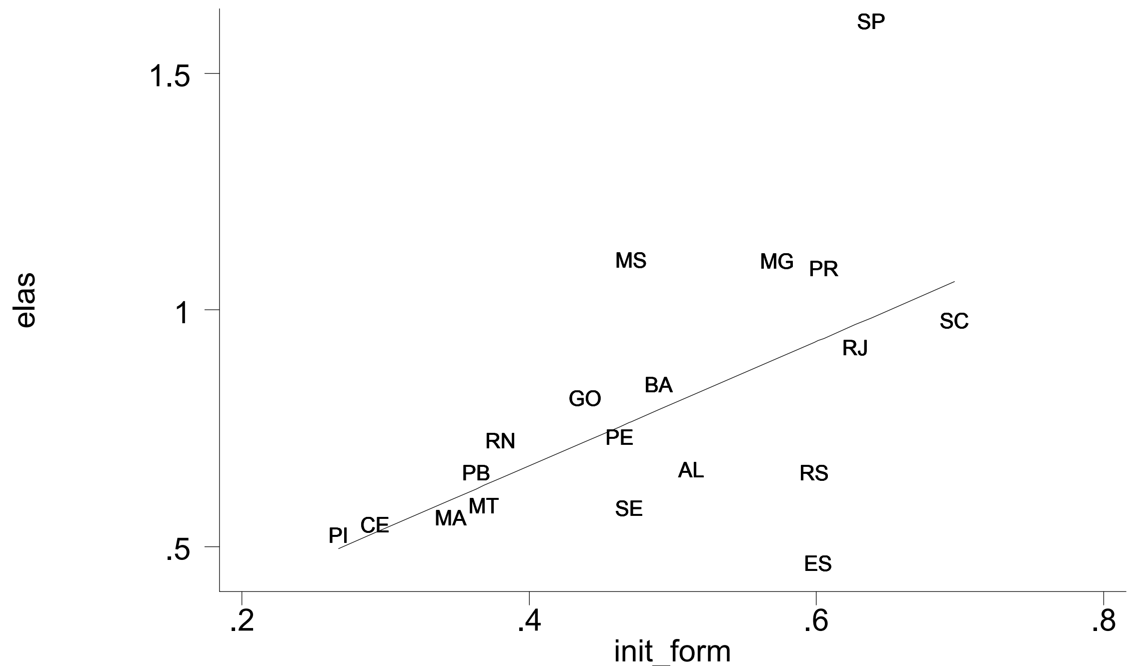


Fig 62-Formality and Poverty-Growth Elasticity

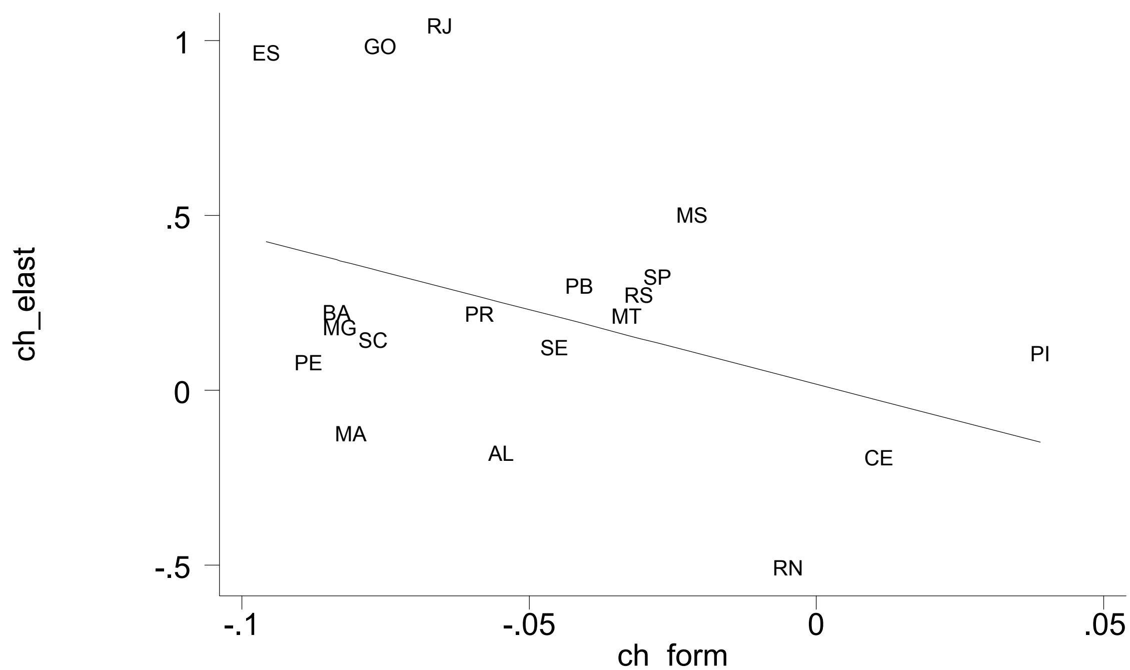


Fig 63-Previous Change in Formality and Elasticity Change

Table 20 – Determinants of Pro-Poor Growth

Change in Poverty	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Income Growth	*-0,188*	*-2,225*	*0,087*	*0,054*	*-4,625*
	0,205	*0.163*	*0,244*	*0,270*	*0,794*
Interactions with income growth:					
Water	0.692	0,627	1.001	1.382	1.384
	0,439	*0,516*	*0.634*	*0.781*	*0.767*
Sewage	-0.313	-0.329	-0.153	-0.361	-0.745
	0.256	*0,380*	*0.551*	*0.702*	*0.726*
Garbage	-1.461	-1.317	-1.331	-1.468	-1.936
	0.395	*0.731*	*0.749*	*0.963*	*1.003*
Urban	-	-2.210	-3.070	-3.307	-2.460
		1.169	1.499	1.526	1.689
Industry	-	1.120	1.130	1.582	1.940
		1.447	*1,479*	*1.881*	*1.967*
Services	-	2,803	4,037	4.080	1.889
		1.319	*1,507*	*1.710*	*2.469*
Children	-	-	0.968	-0.754	4.485
			3,976	4.314	4.811
Older			-3.175	-1.728	0.506
			1.916	4.056	4.163
Formal	-	-	-	-0,809	-1,394
				1,089	*1,193*
Unemployed	-	-	-	-8,684	-10,405
				6,651	*6,644*
Inactive	-	-	-	-2,073	0,457
				4,589	*4,725*
Education 1	-	-	-	-	-10.049
					5.900
Education 2	-	-	-	-	-5.754
					5.242
Education 4	-	-	-	-	-16.967
					11.597
Time Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
State Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

All variables in lagged levels.

Table 21 – Determinants of Growth

	OLS	OLS	OLS	OLS	OLS	GMM
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(log income)$_{t-1}$						0,188
						0,089
Gini	0,894	1,698	1,691	1,676	1,594	0,775
	0,389	*0,317*	*0,377*	*0,339*	*0,346*	*0,406*
Urban		0,393	0,185	0,308	0,605	-0,134
		0,263	*0,261*	*0,276*	*0,343*	*0,388*
Man		0,967	0,574	0,138	0,151	-0,236
		0,778	*0,679*	*0,698*	*0,635*	*0,799*
Child		-0,893	-0,324	-0,984	-1,022	-1,184
		0,593	*0,647*	*0,645*	*0,603*	*0,700*
Old people		-0,152	-0,181	-0,150	-0,178	0,598
		0,505	*0,428*	*0,419*	*0,390*	*0,636*
Education 2		1,534	1,264	1,480	1,262	1,859
		0,400	*0,414*	*0,433*	*0,393*	*0,344*
Education 3		2,172	1,945	1,733	1,763	0,585
		0,692	*0,647*	*0,652*	*0,643*	*0,844*
Education 4		1,945	1,323	1,762	2,118	2,402
		0,569	*0,650*	*0,640*	*0,677*	*0,806*
Water			0,277	0,182	0,251	0,213
			0,133	*0,110*	*0,120*	*0,138*
Sewage			0,163	0,165	0,091	0,202
			0,171	*0,154*	*0,141*	*0,176*
Garbage			0,193	0,075	0,098	-0,096
			0,187	*0,183*	*0,187*	*0,131*
Unemployed				-3,755	-3,555	-2,385
				1,205	*1,279*	*0,974*
Inactive				-1,195	-1,218	-1,330
				0,537	*0,474*	*0,619*
Industry				0,225	0,159	
				0,028	*0,269*	
Services					-0,616	
					0,430	
Formal					-0,232	
					0,287	
constant	0,255	0,196	0,210		0,231	-0,017
	0,024	*0,033*	*0,031*		*0,032*	*0,027*

All variables in long-differences. Robust Standard errors in italics. Time-dummies included.

Headcount, GDP growth, income growth and Gini index

Years	Headcount index (indigence)	GDP growth (%)	GDP per capita growth (%)	Income growth (% per year)	Gini index
1990	35,81	-4,35	-5,90	-16,16	0,612
1991	-	1,03	-0,54	-5,87	-
1992	34,71	-0,54	-2,05	-5,87	0,579
1993	34,12	4,92	3,37	10,34	0,605
1994	-	5,85	4,33	13,93	-
1995	24,75	4,22	2,75	13,93	0,596
1996	25,42	2,66	1,24	0,81	0,599
1997	25,08	3,27	1,87	0,27	0,598
1998	24,40	0,13	-1,21	1,07	0,598
1999	25,53	0,79	-0,55	-5,18	0,593
2000	-	4,36	2,99	0,04	-
2001	25,72	1,31	-0,01	0,04	0,594

Notes. **Indigence line = R$65,07** in **1996 R$.** Gini: own calculations based on Pnads.