Poverty, inequality and macroeconomic instability*

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RESUMO

Nas últimas duas décadas o Brasil experimentou uma performance macroeconômica muito aquém da registrada para o período imediatamente anterior. A inflação alcançou níveis sem precedentes e o crescimento econômico desacelerou consideravelmente. Neste artigo usamos séries de tempo mensais para estimar a relação entre a performance macroeconômica e os níveis de pobreza e desigualdade no Brasil. As estimativas usando tanto dados agregados como um *pooling* de séries regionais revelam que a inflação parece estar pouco relacionada com pobreza e desigualdade. No entanto, quando se leva em consideração que a variação na taxa mensal de inflação foi bastante alta, mostra-se que as variações correspondentes nos níveis de pobreza e desigualdade são significativas. Com relação ao desemprego, as estimativas indicam uma tênue relação desta variável com pobreza e desigualdade. Finalmente, quando consideramos a possibilidade destas relações estimadas variarem ao longo do período analisado, foi identificado uma mudança nas estimativas relacionadas ao período mais recente (pós-Real). De fato, a relação entre desemprego e pobreza ou desigualdade se torna bem mais tênue no final do período, o que parece consistente com a queda da pobreza observada a partir de 1995 quando o desemprego assume uma trajetória ascendente. Também há evidências de que a relação entre inflação e pobreza ou desigualdade é mais fraca nos períodos de aceleração inflacionária.

Palavras-chave: distribuição de renda, inflação, ciclo econômico.

ABSTRACT

Over the past seventeen years the Brazilian macroeconomic performance has been considerably weaker than in previous decades. Inflation reached unprecedented levels and economic growth declined considerably. In this study we use monthly time series to access the relation between this weak and unstable macroeconomic performance on poverty and inequality. The estimates using aggregated and pooling time series reveal that inflation seems to have little association with inequality and particularly with poverty. However, since the variation in the monthly inflation rate over the past seventeen years has been very substantial, the associated variation of poverty became quite significant. As far as the impact of unemployment is concerned, the estimates indicate relatively weak relation between this variable and poverty or inequality. Finally, time-varying regressions indicate that the major results of this study, although applicable to most of the period analyzed, may not necessarily reflect the current situation. In fact, the time-varying estimates reveal a sharp recent decline in the association between unemployment and poverty or inequality, consistent with the drop in poverty and inequality in 1995, despite a considerably increase in the unemployment rate. There is also evidence that the relation between inflation and poverty or inequality declines as inflation accelerates.

Key words: income distribution, inflation, economic cycle.

JEL classification: I30, D60.

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1 Introduction

The level of poverty and inequality is mainly determined by the distribution of household characteristics, the distribution of assets among households and the prices of these assets. These are often referred to as the structural determinants of poverty and inequality. However, the macroeconomic environment and, in particular, the rates of economic growth and inflation also have considerable influence on the level of poverty and inequality.

In fact, most literature on the determinants of poverty and inequality has focused attention on the structural determinants. Considerably less attention has been given to the connection between macroeconomic fluctuations and the level of poverty and inequality. Even in this case, attention has been concentrated on the impact of growth on poverty (Datt and Ravallion, 1995) and inequality. (Kuznets, 1955) Indeed, almost no attention has been given at all to the impact of other dimensions of the macroeconomic environment, such as the inflation rate.

Perhaps the lack of attention given to the estimated macroeconomic effects on poverty and inequality could, at least partially, be justified by the presumption that these effects are weak in relation to the impact of structural factors. However, there is also an alternative simpler explanation based on the availability of information.

Three factors, however, led the Brazilian experience over the past fifteen years to be particularly suitable for an empirical analysis of the relationship between income distribution and macroeconomic performance. First, the availability of temporally comparable monthly employment surveys and household surveys covering the entire period ensure that the time series on poverty and inequality over this period are available.

Second in the 1980s and 1990s the Brazilian macroeconomic performance was considerably weaker than in previous decades.[1] There was an overall perception that this poor macroeconomic performance had a great impact on poverty and inequality.[2]

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1 At least two leading indicators clearly demonstrate this deterioration in the macroeconomic environment. On one hand, the average growth rate of GDP dropped from an impressive average of 8% per year in the 1970s to an average of 3% per year in the 1980s and 1990s (see IPEA 2000). On the other hand, inflation, which was already increasing over the previous decades, particularly in the mid-1960s and late 1970s, became a chronic problem over the past fifteen years. In fact, the Brazilian annual inflation rate rose from around 10% in the late 1940s to the absurd level of 2,500% in the early 1990s (see IPEA 2000).

2 That was pointed as one of the major motivation for an intense goverment intervention, such as the sequence of stabilization plans that we experienced, at this time.

Finally, growth, inflation and unemployment varied considerably over the period. All such wide variations are very important for identifying the effects of macroeconomic variables on poverty and inequality and for getting precise estimates of these effects.

The objective of this study is to explore this empirical possibility to investigate the relationship between poverty and inequality, on one hand, and inflation and unemployment (as a proxy for economic growth), on the other. Moreover we will try to identify temporal variations of these relations, distinguishing mainly periods pre and post Real Plan.

The relation between economic growth and inflation, in one hand, and inequality in Brazil were estimated by Cardoso (1993); Barros, Cardoso and Urani (1995); Ferreira and Litchfield (1996); and Hoffmann (1995, 1998). The analogous estimation considering poverty instead of inequality are much less explored. (Barros, Mendonça and Neri, 1995) The most recent papers (Hoffmann and Ferreira & Litchfield) use annual information which limit their sample to less than 20 observations. The others use information prior to the real plan and the recent climbing of unemployment rates. It worths mentioning that only Barros, Mendonça and Neri (1995) tries to identify temporal variations on the relations estimated.

This paper is organized as follows: in the following section we present a basic description of the monthly evolution of poverty, inequality, inflation and unemployment in Brazil over the past seventeen years. In section 3 we describe the methodology used to obtain quantitative estimates of the impact of inflation and unemployment on poverty and inequality. In this section, we also provide some alternative regression models estimated by us using monthly aggregated time series and by pooling regional specific time series. In section 4 we submit our estimates of the impact of unemployment and inflation on poverty and inequality, comparing when it is possible to those reported on the papers mentioned above. Finally, in section 5 we present a summary of the main findings of this paper.

2 Basic description

In this section we investigate the overall trends in some macroeconomic variables, namely inflation and unemployment, and the degree of poverty and inequality. For most of this analysis we use aggregated monthly time series covering metropolitan Brazil during the period from 1982 to 1998.[3]

3 Metropolitan Brazil consists of the regions of the following capital cities: Porto Alegre, Rio de Janeiro, Belo Horizonte, São Paulo, Recife and Salvador.

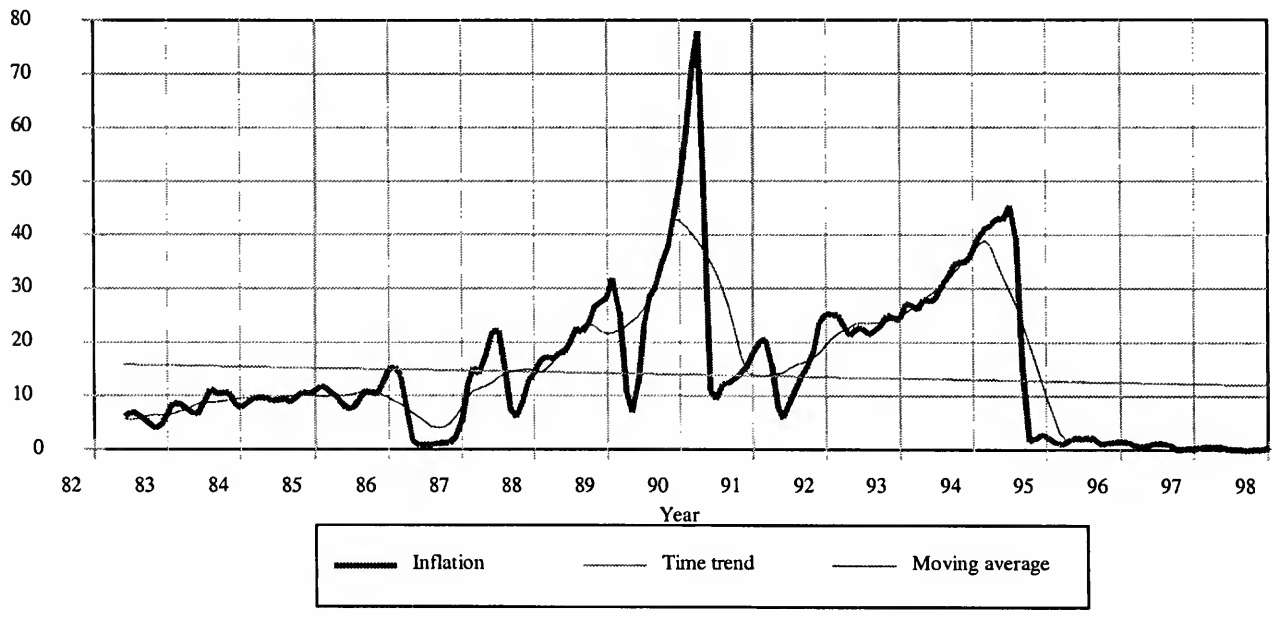
Inflation is measured by monthly variations in the INPC-R (Índice Nacional de Preços ao Consumidor, Restrito). The unemployment rate follows the standard definition considering anyone who did not have a job in the reference week but did look for a job during that week. Poverty is measured by the average income gap using a monthly poverty line of R$ 50 per person in terms of 1995 Reais.[4] Inequality is measured using the Theil-T Index. Both measures use the distribution of persons according to the per capita family income.

Inflation

During this period, inflation underwent sharp fluctuations, mainly between 1986 and 1992, caused by a sequence of five unsuccessful stabilization plans. Despite these fluctuations, the rate of inflation displayed a sharp upward trend at least until the Real Plan in mid-1994 (see Figure 1). In fact, the monthly inflation rate went from 5% per month in the beginning of the 1980s to 40% per month by mid-1994. With the Real Plan, inflation declined and continued extremely low during the past five years.

Figure 1

Evolution of Montly Inflation (%)



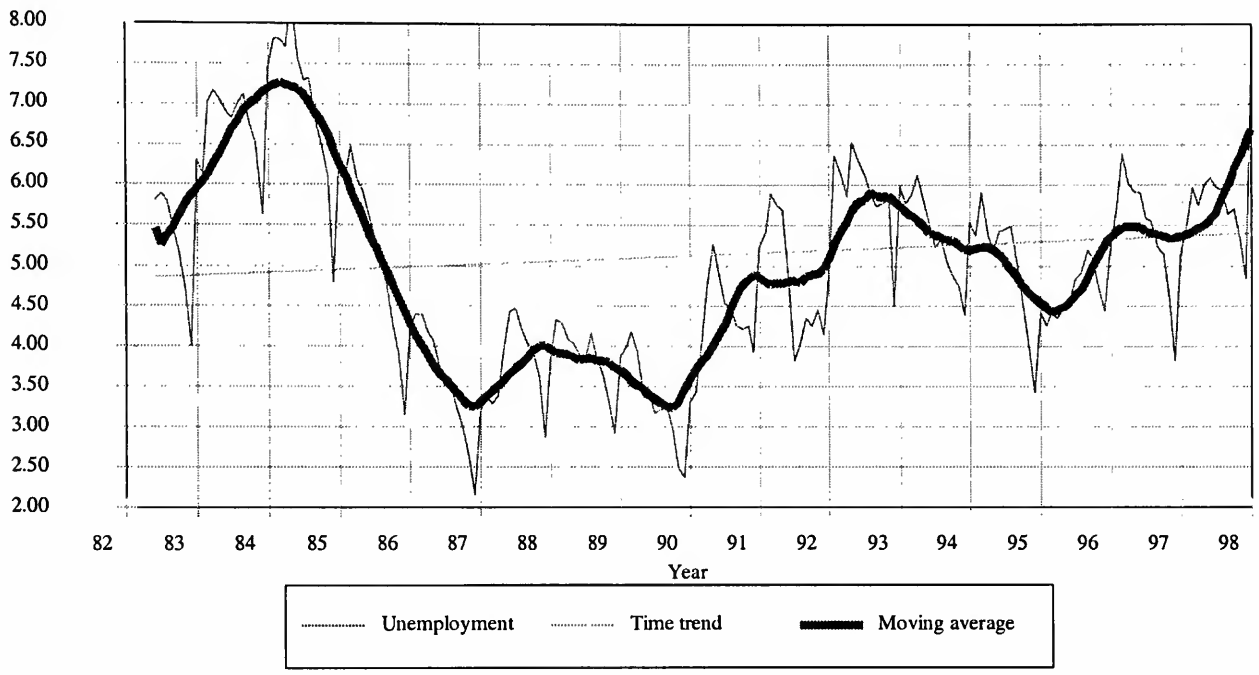
Source: IBGE.

4 To express this value in other periods we use the INPC index

Unemployment

Figure 2 reveals two different patterns on unemployment evolution. In fact, the evolution of unemployment is quite distinct between 80s and 90s. While there is a downward trend in the first period, the opposite is registred for the second one. There are exceptions in both periods mentioned above. There was a increase on unemployment rates between 1983-84 and a decrease between 1994-95, which are consistent with business cycle. Finally, it is worth mentioning that the unemployment fluctuations in the 1980s were much wider than in the 1990s.

Figure 2
Evolution of Unemployment

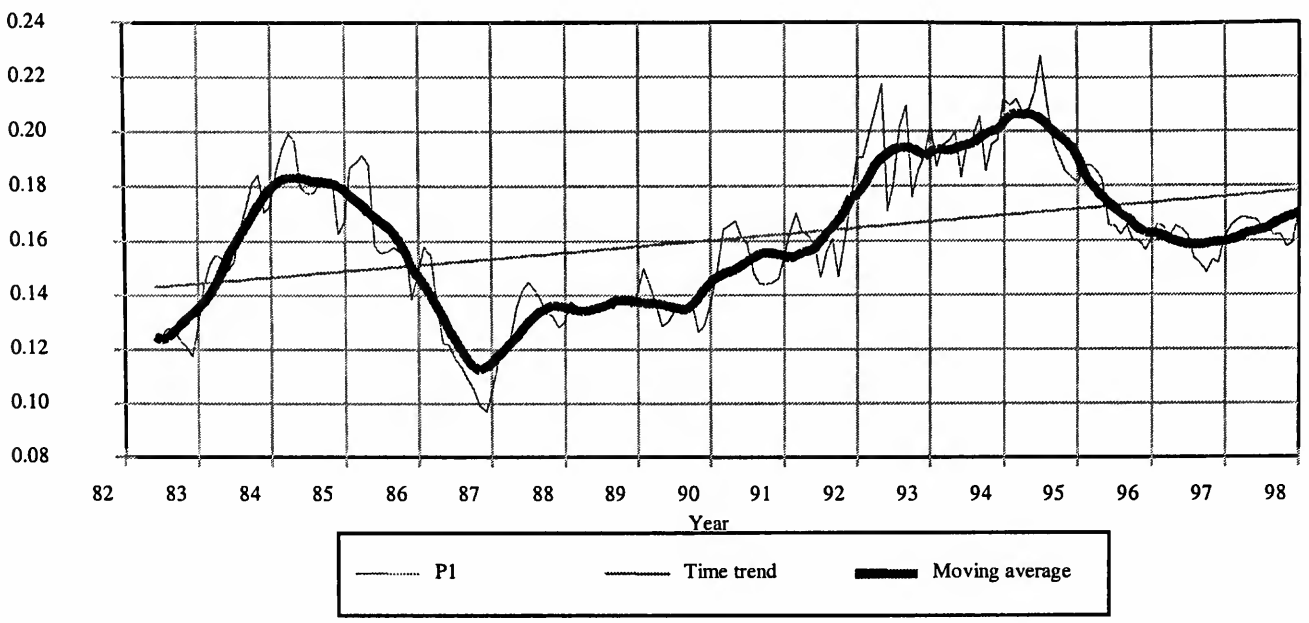


Source: Based on Pesquisa Mensal de Emprego (PME).

Poverty

Figure 3 reveals that poverty followed an upward trend, coupled with substantial oscillations around it. As a result of its upward trend, the average income gap was almost four percentage points higher in 1998 than in 1982. Overall, during this period poverty reached its highest value around mid-1994, on the eve of the Real Plan, and reached its lowest level at the end of 1986, nine months after the Cruzado Plan. Neri, Considera e Pinto (1999) also point a growth on poverty indices during the 90's, reaching a peak in 1994. As far as an eye-bowl analysis can identify, poverty seems to be related to unemployment and not too much to inflation.

Figure 3
Evolution of Poverty Average Income Gap - Poverty Line:R$50



Note: In terms of 1995 Reais.

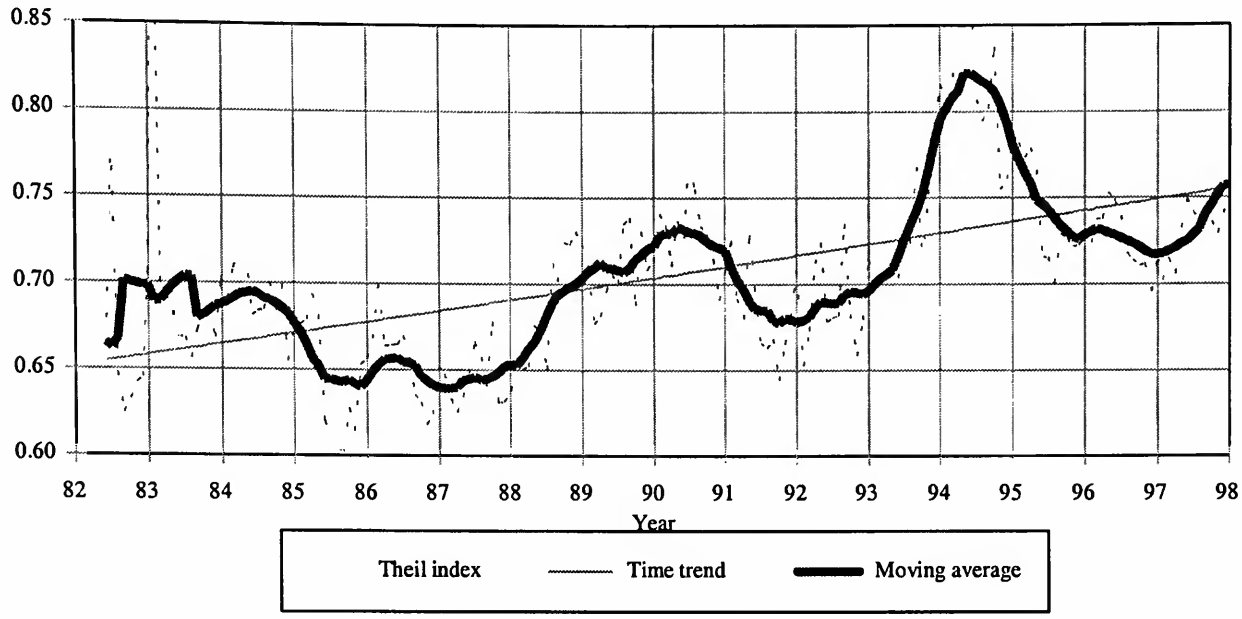
Source: Based on Pesquisa Mensal de Emprego (PME).

Inequality

Figure 4 reveals that inequality also followed an upward trend coupled with substantial oscillations around it. As a result of this upward trend, the Theil index was almost 12 percentage points higher in 1998 than in 1982. Over this period inequality reached its highest level around mid-1994, on the eve of the Real Plan, and reached its lowest level by mid-1985, before the Cruzado Plan[5] The same preliminary observations about the connection on poverty and macro variables seems to hold for inequality.

5 Neri, Considera e Pinto (1999) also pointed the highest level for inequality indices in 1994 over the 90's.

Figure 4
Evolution of Inequalitry - Theil Index



Source: Based on Pesquisa Mensal de Emprego (PME).

3 Methodology

In its simplest form, the aggregated relationship between poverty (p) and inequality (q), on one hand, and inflation (i) and unemployment (u), on the other hand, can be expressed as

$$p = \alpha_p + \beta_p.i + \eta_p.u + \varepsilon_p \quad (1)$$

$$q = \alpha_q + \beta_q.i + \eta_q.u + \varepsilon_q \quad (2)$$

where α, β and η are parameters to be estimated and e captures a set of other explanatory factors. $\beta_p(\beta_q)$ measures the effect of inflation on poverty, while $\eta_p(\eta_q)$ measures the effect of unemployment on poverty (inequality). Hence, $\gamma_p = \eta_p/\beta_p$ ($\gamma_q = \eta_q/\beta_q$) measures the rate of substitution between unemployment and inflation along an iso-poverty (inequality) line, i.e., η/β measures by how many percentage points inflation has to drop to compensate for an increase in unemployment of one percentage point. Some estimates will also include variables with a lag for unemployment, inflation, poverty and inequality as some regression models.

To obtain some rough estimates of the magnitude of these two effects we regress measures of poverty and inequality on the level of the inflation and unemployment rate. We use a series

of alternative data sets and econometric models to estimate these regressions. The regression models vary slightly according to the data set been used. In some cases we allow the parameters to vary over time, while in others we allow the parameters to vary across regions. In this section we describe the alternative methodologies being used. Before we begin to describe these differences, it is important to emphasize that, in all cases, the dependent variables will be the measures of poverty (average income gap) or inequality (Theil index) that we introduced in section 2, whereas the independent variables will always be the inflation and unemployment rate also defined in section 2, as well as lags in poverty and inequality.

3.1 The series

As already mentioned, PME can be used to estimate monthly measures of poverty, inequality and unemployment. These estimates can be obtained for each of the six major Brazilian metropolitan areas, and for the six areas as a whole. Moreover, to this database we can add monthly data on inflation, both broken down into each metropolitan area and for all metropolitan areas together. As a result we can have two basic monthly databases. On one hand, we have a data set containing aggregated time series for all metropolitan Brazil. On the other, we have a data set containing time series for each of the six major Brazilian metropolitan areas. In this study we use both data sets: the aggregated time series and the pooling time series. To make use of their comparative advantages we estimate slightly different models in each case.

3.1.1 Aggregated time series

Based on the aggregated time series we estimated two types of models. The first assumes that all parameters in equation (1) and (2) are time invariant. The estimated parameters and their corresponding standard errors are presented in Table 1. The second model recognizes that the magnitude of the effects of inflation and unemployment may vary over time. As a result, instead of running a simple regression using the entire period, we run a regression series, each one covering a contiguous period of 36 months. The evolution of the estimated parameters is presented in Figures 5 and 6.

3.1.2 Pooling time series

The availability of time series for each of the metropolitan areas allows us to identify the impact of inflation and unemployment on poverty and inequality using both time and regional variations. Using this information as basis we also estimated two alternative models. The first one assumes that all parameters are time invariant and common to all metropolitan areas. The

estimated parameters and their corresponding statistical significant are presented in Table 3. The second model assumes that the impact of inflation and unemployment are common to all regions but that the level of poverty and inequality may vary across regions, i.e., this model assumes that all slope coefficients are common to all regions but the intercept is region specific. In other words, a fixed effect model is estimated. The estimated parameters and their corresponding statistical significant are also presented in Table 4.

4 Regression results

In this section we discuss our estimates of the relation between unemployment and inflation on the one hand and poverty and inequality on the other hand. Although we concentrate our attention just on the estimates for one inequality measure (Theil Index) and one poverty measure (Average Income Gap – P1), the results obtained from all other inequality and poverty measures considered are very similar. Due to high probability of endogenity of unemployment and inflation our results will not be interpreted in a causal context.[6]

4.1 Poverty

We estimated four different models based on monthly data. Three of them assuming the relations are time invariant. We begin by analyzing their results. Then we comment on the results obtained from the time variant parameter model.

4.1.1 Time invariant parameters

Aggregated time series

The estimates based on the aggregated time series reveal that both inflation and unemployment are harmful related with poverty. More specifically, Table 1 shows that a one percentage point increase in monthly inflation is associated to increases in the average income gap by 0.04 percentage point, whereas an increase in unemployment by a one percentage point is associ-

6 We mean that probably movements on inflation or unemployment do not cause movements on poverty or inequality. Rather there are probably other variables whose movements cause movements on all these variables at the same time.

ated to increases in the average income gap by 1.2 percentage point. Although the results suggests positive and significant relations, from a substantive point of view the movements associated to inflation could be considered rather slight. In fact, for instance, considering an increase in the inflation rate from 20% to 100% a year, the monthly poverty rate would have to increase by 4.4 percentage points. According to our estimates, associated to this increase in inflation would be an increase in poverty of 1/6 of one percentage point. This is certainly a rather weak movement on poverty compared to a fivefold increase in inflation.

Table 1
The Impact of Inflation and Unemployment on Poverty and Inequality Montly Aggregate Time Series

Dependent variables	Unemployment	Inflation
Average income gap		
Coefficent	1.16	0.04
Standart deviation	0.11	0.01
Theil index		
Coefficent	1.16	0.09
Standart deviation	0.27	0.02

Source: Based on Pesquisa Mensal de Emprego (PME) from may 1982 to december 1998.

In taking the extremes, consider the full variation in inflation over the period. Inflation over the period varies from essentially zero to 80% per month. Even this increase of 80 percentage points in monthly inflation would be associated to an increase on poverty of just 3.2 percentage points.

The relation between unemployment and poverty, as opposed to inflation, can be considered strong. For instance, an increase in unemployment by two percentage points would is related to an increase on poverty by almost 2.3 percentage points. To take the extreme case, note that over the past fifteen years the unemployment rate ranged from 2.2% to 8.3%, i.e., a change of 6.1 percentage points. According to our model a change in unemployment of this magnitude would be followed by an increase in poverty of 7.1 percentage points.

An illustrative way to see the relative importance of the macroeconomic variables considered is the slope of an iso-poverty curve. This information consist on the magnitude of the variation in one of the macroeconomic variable necessary to compensate an increase on poverty

due to a deterioration in the other macroeconomic variable. According to our result this slope is 29, which means that a one percent increase in unemployment rate should be compensated by a 29% drop of the inflation rate in order to keep poverty level unchanged.

Table 2 provides some estimates with lag variables. If the measurement for poverty is included with a lag between regressions, the contemporary relation between inflation and unemployment on poverty become much weaker. The unemployment and inflation coefficients, which are 1.16 and 0.04 respectively in Table 1, drop to 0.22 and 0.01.

Table 2
The Impact of Inflation and Unemployment on Poverty and Inequality Montly Aggregate Time Series

Dependent variables		Unemployment	Unemployment t-1	Inflation	P t-1	Theil t-1
Average income gap						
	Coefficent	0.65	0.57	0.05		
	Standart deviation	0.27	0.27	0.01		
Average income gap						
	Coefficent	0.22		0.01	0.86	
	Standart deviation	0.05		0.00	0.03	
Theil index						
	Coefficent	0.31		0.03		0.72
	Standart deviation	0.20		0.02		0.05

Source: Based on Pesquisa Mensal de Emprego (PME) from may 1982 to december 1998.

When the lag of poverty level is excluded, unemployment lag becomes significant, the contemporary inflation coefficient drops from 1.16 to 0.65 and the association between unemployment and inequality in the following period is similar to the contemporary association, with the estimate coefficient of 0.57.

The association between unemployment and poverty may have an explanation based on the firm's strategies to lay-off unskilled workers during recession periods. In this case poverty should rise during these periods.

Pooling time series

Tables 3 and 4 also give estimates of how close are inflation and unemployment to poverty based on pooling regional specific time series. Two models are estimated. They differ to the extent that one of them (the fixed-effect model) allows the intercept of the regression to vary across regions. These tables reveal that the pooled data estimates suggest a closer relation between the variables investigated than those obtained using the aggregated time series.

The results also reveal that the fixed-effect model estimates are closer to those obtained using aggregated data than are the estimate models without a fixed effect. This result indicates that cross-sectional estimates of the relation between macro variables and poverty tend to be much greater than those obtained from time series. As a matter of fact, the estimates based on a fixed-effect model are essentially the same as those obtained with the aggregated time series. However the estimates with the pooled data tend to be higher. Nevertheless, they are of the same order of magnitude of those obtained using aggregated time series.

Table 3
The Impact of Implation and Unemployment on Poverty and Inequality
Pooling Montly Regional Times (Without Fixed Effect)

Dependent variables	Unemployment	Inflation
Average income gap		
Coefficent	2.35	0.11
Standart deviation	0.10	0.01
Theil index		
Coefficent	2.58	0.17
Standart deviation	0.19	0.02

Source: Based on Pesquisa Mensal de Emprego (PME) from may 1982 to december 1998.

Table 4
The Impact of Inflation and Unemployment on Poverty and Inequality Pooling Montly Regional Times Series (With Fixed Effect)

Dependent variables	Unemployment	Inflation
Average income gap		
Coefficent	1.47	0.08
Standart deviation	0.06	0.01
Theil index		
Coefficent	1.39	0.13
Standart deviation	0.15	0.02

Source: Based on Pesquisa Mensal de Emprego (PME) from may 1982 to april 1997.

4.1.2 Time variant parameters

In the previous subsection we assumed that the relation between macroeconomic variables and poverty were time invariant. In this section we dispense this assumption. We estimate these relations by running a series of local regressions using a 36-month wide window. Figure 5 presents the estimated temporal development of the coeficients of inflation and unemployment, respectively. Figure 5 shows that the impact of unemployment remains relatively stable around 1.0 until 1991. From 1991 to 1993, the impact of unemployment collapses. The estimates from 1993 onwards reveal no impact of unemployment on poverty. Since 1996 there has been an increase in the effect of unemployment.

This figure also indicates that the impact of inflation was high in the early 1980s but declines significantly towards 1985. It remains low but stable from 1985 to 1991. In 1991 and 1992 the impact of inflation rose again. After 1992 it drops to stabilize at a moderate level and remains stable at this level until today.

Figure 5
Effects of Inflation and Unemployment on Poverty (Average Income Gap)

Note: Poverty line: R$ 50.

In short, over most of the period there is a strong association between unemployment and poverty and a weak one between inflation and poverty. However, at the end of the period unemployment seems to be unrelated to poverty while inflation become closed related to poverty. This evidence of recent major changes in the magnitude of the coeficients of inflation and unemployment indicates that estimates based on the overall period may not properly reflect the current situation.

4.2 Inequality

As in the case of poverty, we also estimate four alternative models for inequality based on monthly data. Three of them assume that the relation between macro variables and inequality are time invariant. We begin by analyzing the results obtained with these three models. Then we discuss the results obtained with the time-varying parameter model.

4.2.1 Time invariant parameters

Aggregated time series

The estimates based on the aggregated time series reveal that both inflation and unemployment are somehow connected to inequality. More specifically, Table 1 reveals that a one per-

centage point increase in monthly inflation is associated to an increase in the Theil index by 0.09 percentage point, whereas an increase in unemployment by a one percentage point is associated to as increase in the Theil index by 1.2 percentage points. Although these coefficients are positive and significant from a substantive point of view, they could be considered rather small.

For instance, consider, as in the case of poverty, an increase in inflation from 20% to 100% per year, implying that the monthly inequality rate would increase by 4.4 percentage points. Given the estimated coefficient of inflation, it would be accomplished by a 0.4 of a percentage point increase on inequality, which is certainly a rather small change in inequality compared to a fivefold increase in inflation. However, if we take the total variation in inflation over the entire period we get a equivalent significant variation on inequality. In fact, inflation in the period varied from zero to 80% per month. Such variation in monthly inflation would be associated to an increase in the Theil index of 7.2 percentage points.

The coefficient for unemployment on inequality is 12.9 times greater than the corresponding one for inflation. As a consequence, from a substantive point of view, the relation between unemployment and inequality can be considerably stronger than the one between inflation and inequality. For instance, an increase in unemployment by four percentage points will be accomplished by an increase on inequality by more than 4.8 percentage points. To take the extremes, note that over the past fifteen years the unemployment rate ranged from 2.2% to 8.3%, i.e., a change of 6.1 percentage points. According to our estimation there should be an increase in inequality of 7.3 percentage points, which is certainly significant.

The inclusion of the Theil index with one lag in the regressions makes unemployment no more significant at a 10% level and makes the coefficient drop from 1.16 to 0.31. The inflation coefficient is also substantially reduced from 0.09 to 0.003 (Table 2).

Cardoso (1993) shows strong relations between inflation and unemployment in one hand and inequality on the other hand, according to PME data between 1981 and 1991. Hoffmann (1995, 1998) find a positive relation between inflation and inequality, which contrast with Cardoso's results.[7] Bonelli e Ramos (1995) point a negative relation between per capita GDP and Gini index which holds only during the period 1977/86. During the second half of the 80's the significative rising of inflation rate tend to dominate the inequality evolution, according to the authors.

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7 When the author consider the average income in his estimations the relation between inflation and inequality shows a inverted U shape, but the negative slope is reached only when really high inflation rates are considered.

The unemployment and inequality link may be justified as we did for unemployment and poverty on section 4.1.Cyclical variations tend to take unskilled workers away from their jobs which tend to rise the inequality.

Hoffmann (1995) suggests that the relation between inflation and inequality may be due to a higher rigidity of wages than profits and interest. Moreover those in low wage jobs tend to have lower bargain power. Another problems pointed by Hoffmann (1995) during high inflation periods in the higher volatility of wages which tends to increase the inequality.

Pooling time series

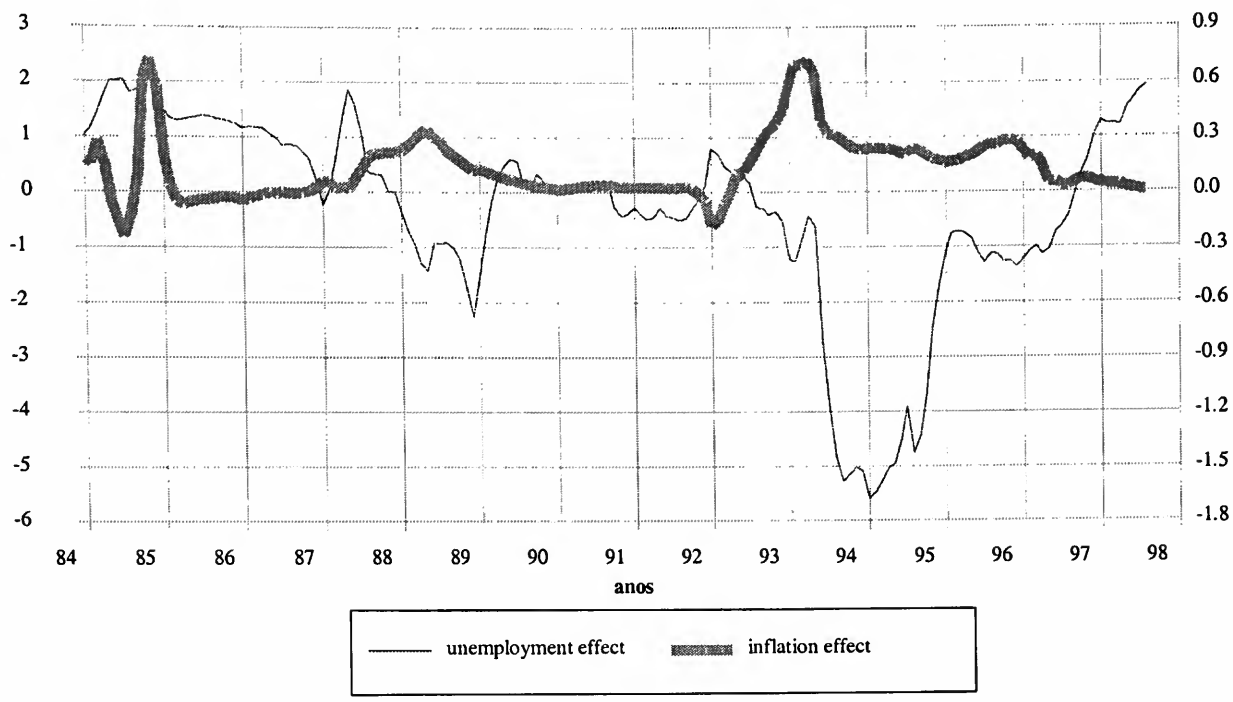
Tables 3 and 4 also give estimates of the relation between macro variables on inequality based on pooling regional specific time series. The same two models considered for poverty are estimated for inequality. These tables show that, as in the case of poverty, the estimates of the coefficients of inflation and unemployment using pooled data are higher than those obtained using the aggregated time series. This table also shows that the fixed-effect model estimates are very close to that obtained from aggregated time series, indicating that cross-sectional estimates of the relations mentioned tend to be greater than those from time series. Although the estimates with pooled data tend to be higher, they are of the same order of magnitude as those obtained using the aggregated time series.

4.2.2 Time variant parameters

In the previous subsection we assumed that the relation between macroeconomic variables and inequality were time invariant. In this section we dispense this assumption. We estimate these relations by running a series of local regressions using a 36-month wide window. Figure 6 gives the estimated temporal evolution for the coefficients of inflation and unemployment. Figure 6 reveals that the relation between unemployment and inequality remains relatively stable around 1.0 until 1987 From 1987 to 1992, this relation is insignificant. The estimates from 1993 onwards reveal a surprising negative relation between unemployment and inequality and, after 1994, the estimates of this coefficient rises at an increasing rate.

This figure also indicates that the relation between inflation and inequality was unstable in the early 1980s, and stable but very weak from 1984 to 1987. From 1991 to 1992 the coefficient of inflation increases significantly. After 1992 it drops to stabilize at a moderate level, and remains stable at this level until today.

Figure 6
Effects of Inflation and Unemployment on Inequality (Theil Index)



5 Conclusion

Over the past seventeen years the Brazilian macroeconomic performance has been considerably weaker than in previous decades. Inflation reached unprecedented levels and economic growth declined considerably. In this study we use monthly and annual time series to access if this weak and unstable macroeconomic performance is somehow related to poverty and inequality.

The basic descriptive analysis was also able to identify, at least qualitatively, that inequality is more sensitive to inflation than poverty, while poverty is more sensitive to unemployment than inequality.

A more detailed regression analysis, using aggregated and pooling time series, were then conducted to obtain quantitative estimates of how inflation and unemployment are associated to poverty and inequality.

The estimates reveal that a ten percentage point increase in the monthly inflation rate is accomplished to increases in the average income gap and Theil index by less than one percentage point. From a substantive point of view, this result indicates that inflation seems to be weakly related to inequality and particularly to poverty. However, since the variation in the monthly inflation rate over the past seventeen years has been very substantial, inflation for the

period ranging from 0% to the astonishing level of 80% per month, variation on poverty became quite significant. In fact, an increase in monthly inflation by 80 percentage points would be associated to an increase in the poverty income gap of 3.2 percentage points and 7.2 percentage points in the Theil index, which are certainly significant changes.

As far as unemployment is concerned, the estimates indicate that a one percentage increase in unemployment would be associated to an increase of the average income gap and the Theil index by 1.2 percentage points. Overall, the magnitude of the coeffients should be considered relatively small. Note that, while inflation is stronger related to inequality, unemployment is stronger related to poverty. Over the past seventeen years the unemployment rate has varied six percentage points between 2% and 8%. This variation is associated to an increase in the average income gap of 7.1 percentage points and an increase in the Theil index of 7.3 percentage points, which are certainly significant changes. The inclusion of the Theil index and the average income gap with one lag in the regressions substantially reduces the coefficients of inflation and unemployment.

Finally, the time-varying regressions indicate that the major results of this study, although applicable to most of the period analyzed, may not necessarily reflect the current situation. In fact, the time-varying estimates reveal a sharp recent decline in the coefficients of unemployment on poverty and inequality, consistent with the drop in poverty and inequality in 1995, despite a considerably increase in the unemployment rate. There is also evidence that the coeficients of inflation on poverty and inequality declines as inflation accelerates. This decline in the importance of inflation is consistent with the idea that, as an inflationary process progresses, society creates institutions (indexing mechanisms) in order to neutralize the real effects of inflation.

References

Barros, Ricardo Paes de; Neri, Marcelo e Mendonça, Rosane. *Poverty and inflation in Brazil: an investigation of their aggregated relationship*. Rio de Janeiro: IPEA, 1995.

Bonelli, R. e Ramos, L. Distribuição de renda no Brasil: avaliação das tendências de longo prazo e mudanças na desigualdade desde meados dos anos 70. *Revista de Economia Política*, v. 13, n. 2 (50), abril-junho 1993.

Cardoso, E. Cyclical variations of earnings inequality in Brazil. *Revista de Economia Política*, v. 13, n. 4 (52), out.-dez. 1993.

Cardoso, Eliana; Barros, Ricardo Paes de; and Urani, André. Inflation and unemployment as determinants of inequality in Brazil: the 1980s. *In: Reform, recovery and growth.* Chicago: University of Chicago Press, 1995, p.151-175.

Ferreira, Francisco H. G. and Litchfield, Julie A. *Growing apart: micro and macroeconomic factors behind the Brazilian income distribution, 1981-1990.* Rio de Janeiro: IPEA, 1996, 32p. (Série seminários, 22).

Hoffmann, R. Desigualdade e pobreza no Brasil no período 1979-90. *Revista Brasileira de Economia*, v. 49, n. 2, p. 277-294, abril-junho 1995.

_____. Desigualdade e pobreza no Brasil no período 1979-97 e a influência da inflação e do salário mínimo. *Economia e Sociedade* 11, p. 199-221. IE-UNICAMP, dez. 1998.

IPEA, http://www.ipeadata.gov.br (2000)

Kuznets, Simon. Economic growth and income inequality. *American Economic Review*, v. 45, n. 1, p. 1-80, March 1955.

Neri, M. Dynamics of income distribution in Brazil. 25° Encontro Nacional de Economia, ANPEC, *Anais*, v. 2, p. 1141-56, Dez. de 1997.

Neri, M.; Considera, C. e Pinto, A. A evolução da pobreza e da desigualdade brasileira ao longo da década de 90. *Economia Aplicada,* v. 3, n. 3, p. 383-406, julho-setembro 1999.

Ravallion, Martin and Datt, Gaurav. Is targeting through a work requirement efficient? Some evidence for rural India. *In: Public spending and the poor: theory and evidence*. Baltimore: Johns Hopkins University Press, 1995. p. 411-444 (World Bank Book).