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Abstract:

The paper focuses some of the non-monetary structural causes of inflationary persistence in Brazil in the post-Real plan period. A connection is made between the de-industrializing trend and the emergence of primary pressures that set a floor to inflation levels. The framework is set up in terms of inter-sector dynamics in a widely indexed economic setting. Two primary pressures are taken into account, namely: (i) the increase in the services sector´s share of total value added in aggregate output combined with (ii) the change in the behavior of Statesupervised prices. Departing from a simple inflation accounting exercise and the structuralist assumption of price rigidity, a connection is made between relative price changes and the inflation rate. Volatility of the exchange rate affects the composition of aggregate supply and the ratio between prices of tradable and non-tradable goods; if prices display some degree of downward inflexibility, such volatility yields price increases in some sectors not offset by proportional price decreases in other sectors. A self-sustaining trend of cost-shift inflation is thus explained on the basis of exchange-rate-fueled structural changes with a bias towards labor-intensive sectors. The sluggish innovating thrust in these sectors sets limits to increases in labor productivity, while labor market regulations and widespread indexation render prices inflexible downwards. Empirical evidence is then garnered to support the analytical claim that de-industrialization engenders a floor to inflation rates.

Keywords: de-industrialization, inflation inertia, structural change, downward rigidity, Brazil

JEL Codes: CN16; O 54.

Structural change, de-industrialization and inflation inertia in Brazil

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André Roncaglia de Carvalho[1]

Resumo: O artigo analisa algumas das causas estruturais não monetárias da persistência inflacionária no Brasil no período pós-Real. Propõe-se que o processo de desindustrialização está associado à emergência de pressões primárias que impõem um piso à inflação. O esquema analítico contempla uma dinâmica intersetorial em contexto de disseminada indexação. Duas forças primárias são consideradas, a saber: (i) o aumento da participação do setor de serviços no valor adicionado agregado, combinado à (ii) mudança no comportamento dos preços dos bens administrados. Partindo de um exercício simples de contabilidade da inflação e da premissa estruturalista de inflexibilidade de preços, analisa-se a relação entre variação de preços relativos (entre bens comercializáveis e não comercializáveis) e a taxa de inflação. A volatilidade da taxa real de câmbio afeta a composição da oferta agregada e os preços relativos da economia. Nesse caso, se os preços apresentam algum grau de inflexibilidade para baixo, a volatilidade da taxa de câmbio resulta em aumentos de preços em alguns setores, os quais não são compensados por reduções proporcionais em outros setores. Com efeito, enseja-se uma inflação de custos explicada pela mudança estrutural induzida pela taxa de câmbio (desindustrialização) que concentra fatores produtivos em setores intensivos em mão de obra. A lenta reação inovativa desses setores estabelece limites ao crescimento médio da produtividade do trabalho, ao passo em que a legislação trabalhista e a disseminada indexação de preços e contratos tornam os preços rígidos para baixo. Por fim, evidência empírica é apresentada como suporte ao argumento analítico de que a desindustrialização engendra um piso à taxa de inflação no Brasil.

Abstract: The paper focuses some of the non-monetary structural causes of inflationary persistence in Brazil in the post-Real plan period. A connection is made between the de-industrializing trend and the emergence of primary pressures that set a floor to inflation levels. The framework is set up in terms of inter-sector dynamics in a widely indexed economic setting. Two primary pressures are taken into account, namely: (i) the increase in the services sector´s share of total value added in aggregate output combined with (ii) the change in the behavior of State-supervised prices. Departing from a simple inflation accounting exercise and the structuralist assumption of price rigidity, a connection is made between relative price changes and the inflation rate. Volatility of the exchange rate affects the composition of aggregate supply and the ratio between prices of tradable and non-tradable goods; if prices display some degree of downward inflexibility, such volatility yields price increases in some sectors not offset by proportional price decreases in other sectors. A self-sustaining trend of cost-shift inflation is thus explained on the basis of exchange-rate-fueled structural changes with a bias towards labor-intensive sectors. The sluggish innovating thrust in these sectors sets limits to increases in labor productivity, while labor market regulations and widespread indexation render prices inflexible downwards. Empirical evidence is then garnered to support the analytical claim that de-industrialization engenders a floor to inflation rates.

JEL: N16, O54.

Introduction

After a decades-long coexistence with high inflation, the Brazilian economy underwent a bold monetary reform in July 1994 – termed, henceforth, *Real Plan* - and achieved a successful and sustained disinflation. Two decades later, inflation presents downwardly rigid patterns and often dominates public agenda. We provide an alternative story to the country's inflation trends, in contrast to the vast literature that focuses credibility, fiscal dominance and interest-rate inertia. The paper entertains the hypothesis that the institutional framework that followed the stabilization attempt redefined the terms of the distributional conflicts and established a new basis for a downwardly rigid inflation trend, which is likely to entail

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higher costs to conventional demand-management-based monetary policy.[2] To a large extent, the plan redirected some and reinforced other distributive effects stemming from the preceding commercial and financial opening of the economy, coupled with the reduction in the role of the State in the economy. Such transformations affected the Brazilian productive structure and, consequently, its price-output dynamics. The paper provides empirical evidence on two sources of pressure on inflation levels in Brazil between 1994 and 2010, namely: (1) the inter-sector imbalance between those producing tradable and non-tradable goods, and (2) the behavior of State-supervised prices. These pressures are tied to the structural changes undergone by the Brazilian economy in the last 25 years, and have been largely overlooked in both academic and policy debates. Our effort is chiefly directed at clearing out how the inheritances from the previous repressed hyperinflation inflation regime, combined with these structural transformations, renewed the repertoire of inflationary pressures stemming from institutional and structural forces, reinforcing previously embedded rigidities and thus making disinflation measures more costly to society. In particular, we raise doubts as to the disinflationary effects of an overvalued currency in the face of these slow-moving and irreversible changes in the economy's productive structure. The paper is organized in four sections beyond this introduction. The second section provides a brief overview of inertial inflation in the post-stabilization period. The third part concerns the inflation accounting exercise that will organize the interpretation of the data. These are presented in the fourth section and purport to reveal the connection between relative prices and the inflation rate. The last section concludes the paper.

Stabilization, Institutional Changes and Inertial Inflation in post-1994 Brazil

In July 1994, following the monetary reform, the Real Plan's macroeconomic policy adopted a nominal anchor centered on the exchange rate, serving as the main control variable over inflation. (BOGDANSKI et al, 2000). The imbalances that followed disinflation measures launched in 1994 escalated progressively along the four and a half years subsequent to disinflation measures. The fixed exchange-rate nominal anchor deteriorated sharply as a sequence of crises broke out in developing countries that had some form of exchange-rate control. Mexico in 1995 underwent the "Tequila Crisis". Two years later, in 1997, massive capital flights erupted a large-scale financial crisis in the East Asian countries. In 1998, Russia was subdued by the same fulminant attack against its currency, and Brazil followed suit in January 1999. Under the strains of these external shocks, a new economic policy was announced a few months later, sponsored by the International Monetary Fund, under the terms of a loan provided to alleviate the severe currency crisis. The overvalued exchange rate was allowed to float after a massive capital flight in early January that year.

The Macroeconomic Stabilization Program (PEM, in Portuguese) consisted of fiscal austerity (enacted by the Fiscal Accountability Act, approved by the Senate in the year 2000), a floating exchange rate and an inflation-targeting regime to monetary policy. The new program placed the focus of macroeconomic management on the interest-rate-based inflation target regime. Inflation targeting has been the main focus of economic policy ever since, and has been fairly successful in maintaining price rises within the intervals stipulated by inflation targets along most of the 2000s, and has reduced inflation volatility (BEVILACQUA *et al*., 2007; CATAO *et al*., 2008). Nonetheless, when conflated with historical inflation patterns in developed countries (within the 1-3% range), the levels of inflation targets

[2] It is not far-fetched to state that persistent inflation has become a dominant aspect of Brazilian economic reality. In hindsight, from 1980 up to 1994, when a major disinflation took place with the Real plan, Brazil had four currencies, five price and wage freezes, nine stabilization plans, eleven price indexes to measure inflation, sixteen different wage policies, twenty-one proposals for external debt payment and fifty-four changes in price policy. Accumulated inflation in the fifteen-year period hit an impressive figure of 30.000.000.000 %. (FRANCO, 2005). In the nineteen-year period since disinflation in 1994 until September 2013, Brazil has endured around 234% accumulated inflation, if read by the Broad Consumer Price Index (IPCA-IBGE).

in Brazil (4.5% per year) are high (BARBOSA, 2008, p. 193). They reveal, on one hand, that inflation is under control – especially, when contrasted against the previous four-digit rates witnessed in pre-stabilization period. On the other hand, there seems to be a downward resistance of inflation levels coupled with a systematic attraction of inflation rates to the upper limit within the target range. Both aspects raise concerns over the effectiveness of the instruments available to the monetary authority (TOMBINI & ALVES, 2006).

The tenets of the economic policy scheme that ensured inflation remained under control until the last quarter of 1998 did not survive the currency crisis. The exchange rate was allowed to float and, a few months later, inflation targeting (IT) became the monetary policy regime, whereby the short-term interest rate was established as the inflation control mechanism. [3] It is without question that this regime has been the determinant factor for the Brazilian Central Bank´s growing credibility in managing monetary policy. Further measures to support stabilization were launched soon thereafter. First, the Fiscal Accountability Act (in 2000) constrained municipal, state and federal governments' ability to run deficits and increase debt and set primary deficit targets to cover debt obligations. Second, the De-indexation Act (in 2001) prohibited any formal contract in the economy from setting automatic price adjustment clauses for periods shorter than one year. A quick glance at the performance track of the IT regime (Table 1) reveals that both interest-rate and inflation volatilities within fiscal years have been consistently low.

						Volatility within Year*		
Year	**Target (a)**	**Lower Limit**	**Upper Limit**	**Inflation Rate (b)**	**Deviation (b-a)**	**Headline CPI (IPCA)**	**Interest-rate (SELIC)**	**Real GDP**
1999	8,00	6,00	10,00	8,94	0,94	0,54%	0,54%	3,61%
2000	6,00	4,00	8,00	5,97	**-0,03**	0,47%	0,09%	4,67%
2001	4,00	2,00	6,00	7,67	3,67	0,38%	0,12%	4,21%
2002	3,50	1,50	5,50	12,53	9,03	0,27%	0,11%	3,75%
2003	4,00	2,00	6,00	9,30	5,30	0,91%	0,22%	3,31%
2004	5,50	3,50	7,50	7,60	2,10	0,20%	0,21%	3,68%
2005	4,50	2,50	6,50	5,69	1,19	0,26%	0,14%	3,65%
2006	4,50	2,50	6,50	3,14	**-1,36**	0,25%	0,17%	3,73%
2007	4,50	2,50	6,50	4,46	**-0,04**	0,12%	0,10%	3,99%
2008	4,50	2,50	6,50	5,90	1,40	0,18%	0,08%	3,20%
2009	4,50	2,50	6,50	4,31	**-0,19**	0,12%	0,15%	4,26%
2010	4,50	2,50	6,50	5,91	1,41	0,26%	0,07%	4,46%
2011	4,50	2,50	6,50	6,50	2,00	0,30%	0,06%	3,48%
2012	4,50	2,50	6,50	5,84	1,34	0,15%	0,12%	3,74%
2013	4,50	2,50	6,50	5,91	1,41	0,22%	0,07%	4,10%
Average	**4,75**	**2,75**	**6,75**	**6,60**	**1,85**	**0,31%**	**0,15%**	**3,85%**

Table 1 – Inflation Targeting Regime Performance **–** 1999-2013 **–** various indicators.
*Volatility measures denote Monthly Index Standard Deviations within fiscal years.
Source: Central Bank of Brazil.

At first sight, these results would justify dismissing inflation as an uninteresting problem. Nonetheless, despite its achievements, inflation targeting in Brazil has faced some difficulties worth mentioning, namely: output volatility is high within fiscal years and average deviations of headline CPI inflation is on average 2% above target (6.6% per year). These two features indicate the presence of

[3] Further details on outcomes of the inflation targeting regime in Brazil can be found in Barbosa (2008) and Bevilacqua et al. (2007).

rigidities within the productive structure and point to distribution-related non-monetary inflationary pressures, either policy-induced or otherwise. We believe these aspects to account for deep-seated sources of downward inflexibility of prices, which add up to the more close-to-surface mechanisms making up for the persistence of inflation.[4] In this vein, the structuralist distinction between primary pressures over inflation and propagation mechanisms seems to fit our purposes quite well. This paper thus focuses chiefly on the primary pressures, which stem from rigidities in the productive structure and, only secondarily, the propagating properties of prices. The propagation mechanisms exclusively amplify the inflationary effects of the primary pressures; they imprint such price behavior in the society's collective memory, thereby affecting formal and informal price-setting behavior.

Much empirical work has been devoted to accounting for both inflation persistence and inertia in Brazil. Figueiredo e Marques (2009) show the existence of inertia in Brazil and detect a long-memory phenomenon embedded in the data-generating process. Tejada e Portugal (2001), Campêlo e Cribari-Neto (2003), Cribari-Neto e Cassiano (2005) e Araújo e Santos (2004) follow the same lines, and attempt to provide quantitative evidence on the effects – both temporary and permanent – of inflationary (or deflationary) shocks on the long run inflation trends in Brazil. Fasolo e Portugal (2003) formulate a nonlinear Phillips curve to the Brazilian economy and conclude in favor of a high persistence of inflation between 1990 and 2002, which is explained by an autonomous inertial component to price behavior.

A persistent downwardly rigid behavior of prices may be related to a variety of causes. The range and intensity of their impact over price trends are connected to how deep-seated in the social structure they are. Among several causes, we could mention informational asymmetries and imperfections, a permanently expansionary fiscal and monetary policies, changes of economic policy regimes, and the recurrence of systematic random shocks, both internal and external - which in turn make some key macroeconomic prices - such as the exchange rate - more volatile, transmitting transient impacts to prices; and, finally, the indexation of contracts and prices. A combination of these, and other types, and their systematic occurrence account for inertia and persistence, as modern macroeconomics sees it.

We take therein a different route, by delving into the "inherent momentum" observed in inflation patterns. These latter reflect an intricate web of short-, medium- and long-term forces associated with determinants of both supply and demand, all of these conditioned by the specific structural, historical and institutional features that characterized the economy under analysis. Amongst them, we can cite the patterns of income distribution and their implications in terms of mutually compatible compositions of supply and demand, the role that monetary forces play in inducing investment decisions under uncertainty, the primary pressures stemming from imbalances in the structure of production and the cost-push channels running from these forces to the price level combined with those emanating from monetary policy (TAYLOR, 1988; 2004, chapter 3; BALTAR, 2013, chapter 3).

That being said, it is readily understood how daunting is the challenge of breaking down a complex phenomenon like that of inflation. Given space constraints, we approach the problem by singling out two factors impinging on inflation behavior that provide good hypotheses for a methodical appraisal, namely: tradable/non-tradable relative prices and State-supervised prices. If these pressures are found to be significant, a sizeable portion of structural inflation inertia and persistence remain unexplained by conventional demand-pull inflation models. Likewise, monetary policy informed by these models'

[4] The literature on this matter has summarized four basic aspects: (1) interest rates on government bonds and public utility services are indexed to inflation rates, the latter embedding a autoregressive term in the economic structure of costs and the former limiting the wealth effect of rising interest rates and increases interest payments on the public debt in the process of curbing inflation; (2) private sector adopts indexation clauses in contracts, hindering the effects of disinflation measures; (3) supply shocks are frequently besetting the economy through the exchange-rate channels and are highly insensitive to interest-rate-based correctional measures; and (4) inflation targeting protocol requires the Central Bank to pursue a pre-established inflation rate, which might come to pre-index the economy through the price-expectation channel, therefore setting a "floor" to inflation rates. All of these forces are in fact at play, but they fail to provide a full picture, for they overlook or assume away some very important structural and historical-institutional traits to which we now turn.

conclusions is likely to impose higher costs to disinflation and stabilization measures when applied to different institutional schemes (SEGURA-UBIERGO, 2012).

This paper highlights two non-monetary forces pressing upon inflation rates, namely: (1) the increase in the services sector´s growth rates and its relationship to exchange rate variations; and (2) the new regulatory environment that leads privatized public utilities companies to raise price above inflation rates. Both elements stem from long-term processes, being the first strictly structural, the second a hybrid of primary and propagating factors. Let us briefly outline each component and explain how the fit into our story. First, the inter-sector dynamics is largely influenced by exchange rate behavior. In the Brazilian case, that has induced aggregate investment to get locked in the services sector, not being able to incorporate new activities endowed with substantial economies of scale. (BALTAR, 2013, p. 13).[5] That is, once investments are shifted to more service-oriented activities, in response to diminished incentives in manufacturing, they are unlikely to be reversed; hence the lock-in effect.

Second, both structural and institutional aspects of inflation can be ascribed to the State-supervised sectors. Government-managed, -regulated or -supervised prices are those defined or impacted by a public sector agency, whose variations are independent from current supply and demand conditions. Taken together these components account for around 28% of IPCA (Broad Consumer Price Index), reflecting their importance in daily expenditures of households in the income bracket from one to forty minimum wages.[6] In the sectors, productive capacity and variations in productivity imply an adverse supplying flow of basic goods and services, which tends to generate inevitable adjustments in prices and quantities in downstream sectors. Also, firms in such sectors follow price-setting rules that combine an index-linking component with a varying markup over costs. The former element builds persistence in the time series of these prices, whereas the second implies "exogenous shocks" on price trends, provided the markup rules follow non-market criteria negotiated in contracts of public utilities between private companies and the government.

In what follows, we provide some evidence on both sets of pressures. At the end, we entertain some rationale for the dynamic process. Before we get to that, an inflation accounting framework is provided in the next section to better guide our later discussions.

Some inflation accounting

The general price level is formally denoted by $P = \left(\hat{P}_N\right)^{\alpha}\left(\hat{P}_T\right)^{1-\alpha}$; that is, a weighted average of both the freely adjusting industrial and agricultural and some services, termed herein tradable goods prices (or P_T) and the downwardly rigid prices, which include both Services and State-managed prices, or non-tradable goods prices (or P_N). The markup behavior is depicted in the ϕ term. Taking logs on both sides and deriving them with respect to time we can formally define the inflation rate as follows:[7]

$$\pi = \alpha\hat{P}_N + (1-\alpha)(\hat{P}_T) \qquad (1)$$

[5] In addition, the services sector is suspected of facing lower average productivity when compared to secondary sector, although evidence on this is scant and controversial. For more details, see Aldrighi & Colistete, 2013).

[6] The major administered/regulated/State-managed prices are: 1) defined at the federal level: oil by-products, electricity fees, telephone and postal services fees, minimum wage; 2) defined at local governments' levels: water and swages fees, public transportation, property taxes. Still, 'managed' should not be understood as 'controlled', for a substantial part of these prices are public utility fees whose adjustments are based on concession contracts, which leave no room for discretion. (BOGDANSKI et al.,2001).

[7] We adopt continuous time to keep notation simple.

in which hats over variables signify time changes. The manufacturing and agricultural sectors account for the tradable goods prices.[8] Prices in these sectors are a combination of unit costs of production that rise proportionally with unit labor costs ($\widehat{ULC}$) and costs of non-labor inputs ($\widehat{CI}$).

$$\hat{P}_T = \beta_T(\hat{\phi}_T + \widehat{ULC}) + (1 - \beta_T)\,\widehat{CI}$$

or (2)

$$\hat{P}_T = \beta_T\left(\hat{\phi}_T + \hat{w}_T - \hat{q}_T\right) + (1 - \beta_T)\left(\hat{e} + \hat{P}_I + \hat{c}\right)$$

where tradable goods price rises amount to variations in markups ($\hat{\phi}_T$) plus the net result of changes in wages minus labor productivity variation ($\hat{w}_T - \hat{q}_T$). Changes in prices of non-labor inputs depend, respectively, on the changes of exchange rate, of prices of imported goods and of the quantity requirements of inputs for domestic production ($\hat{e} + \hat{P}_I + \hat{c}$). The parameter β_T (> 0) the weight of labor inputs in overall costs of tradable goods production.

The non-tradable inflation reflects the variations in both services and state-managed prices. Price changes of services ($\hat{P}_S$) are determined by changes in both markup by firms ($\hat{\phi}_S$) and the differing rates of growth of wages and the sector's average labor productivity ($\hat{w}_S - \hat{q}_S$). State-managed prices ($\hat{P}_{SM}$) follow some rule of price adjustment as a proportion to current inflation plus an exogenous markup ($\hat{\phi}_{SM}$) over one-year-lagged inflation. This markup may be either a future-revenue-anticipating factor aimed at self-financing investments in capacity expansion ($\hat{\phi}_S > 0$) or an eventual leeway for government-driven price controls as has recently taken hold for both electricity and gasoline prices ($\hat{\phi}_S > 0$). Thus, formally we attain equation (4):

$$\hat{P}_N = \beta_N \hat{P}_S + (1 - \beta_N)\hat{P}_{SM}$$

or (3)

$$\hat{P}_N = \beta_N(\hat{\phi}_S + \hat{w}_S - \hat{q}_S) + (1 - \beta_N)(\pi + \hat{\phi}_{SM})$$

By (1)-(3), after some arrangements we obtain the synthesis of our basic inflation accounting:

$$\pi = \Omega.\left\{\hat{\phi} + \alpha[\beta_N(\hat{w}_S - \hat{q}_S)] + (1 - \alpha)\left[\beta_T\widehat{ULC} + (1 - \beta_T)\,\widehat{CI}\right]\right\} \quad (4)$$

Equation (4) is a simple organizing device to guide us through the analytical rationale of price adjustments of which we will provide empirical evidence. First, the magnifying term $\Omega = \left[\frac{1}{1-\alpha(1-\beta_N)}\right]$ indicates that inflation levels tend to elevate when the weight of non-tradable goods in the price index (α) increases and the share of State-supervised prices in non-tradable price index ($1 - \beta_N$) increases. Within the range of this magnified effect, we have a few relationships worthy of note. To explain the markup behavior, we first assume, as usual, that tradable goods are subject to competition by imported goods, whereas non-tradable ones are sheltered from it due to location-dependent output. This aspect is captured by the markup rules followed by firms, defined as the sum of the rates of change in sectional markups as in

$$\hat{\phi} = \alpha\beta_N\hat{\phi}_N + (1 - \alpha)\beta_T\hat{\phi}_T + \alpha(1 - \beta_N)\hat{\phi}_{SM} \quad (5)$$

The non-tradable sector's markup is further defined as $\phi_N = \phi_N(\hat{e}, \lambda_N)$, a function of exchange rate variations and some degree of market power, respectively; we assume $\phi_N'(\hat{e}) < 0$ and $\phi_N{}'(\lambda_N) > 0$. The

[8] We assume for the sake of simplicity that all non-labor inputs are supplied by imports.

tradable sector's markup can likewise be written as $\phi_T = \phi_T(\hat{e}, \lambda_T)$, where $\hat{e}$ and λ_T represent, respectively, the protection from international competition by increasing prices of imported finished goods and some form of non-market protection (i.e. industrial policy) that raises the firms' market power in this sector. We assume, finally, that $\phi_T{}'(\hat{e}) > 0, \phi_T{}'(\lambda_T) > 0$. Therefore, the economy-wide markup behavior ($\hat{\phi}$) will depend on net effect of each sector's possibility of increasing prices due to market and non-market considerations. Next, the price change differential between services and tradable goods exerts pressure in the expected direction, that is, if services prices outpace those of tradable goods, we can expect a rise in inflation levels. In addition, the upward pressure stemming from prices of tradable goods is fueled by the changes in the exchange rate and in the cost of imported intermediate goods. At last, a constant cost-push force on inflation levels are ascribed to the State-managed prices' component that accounts for the markup over current inflation (*r*). So that if $\hat{P}_S = \hat{P}_T = 0$, then $\pi = \Omega[\alpha(1-\beta_N)]\hat{\phi}_{SM}$.

In order to get a clear view of the cost-push force originated in the labor market, let us rewrite equation (4). We further decompose $\hat{P}_S$ and $\hat{P}_T$ and assume, for the sake of simplicity, that $\hat{\phi} = \hat{e} = \hat{P}_I = \hat{c} = r = 0$ to yield equation (5a)

$$\pi = \Omega[\alpha\omega_{ST} + \beta_T(\hat{w}_T - \hat{q}_T)] \tag{5a}$$

where $\omega_{ST} = [\beta_N(\hat{w}_S - \hat{q}_S) - \beta_T(\hat{w}_T - \hat{q}_T)]$ represents the wage rate differential between the service sector and the tradable goods sector corrected for the respective sectors' productivity growth rates. If $\omega_{ST} > 0$ the level of inflation is likely to rise with downward rigidity. Contrariwise, innovation can boost productivity rates of growth ($\hat{q}_T, \hat{q}_S$) leading to $\omega_{ST} < 0$ and alleviating pressure originated in the tradable goods sector [second term on right hand side of (5a)], and thus exerting downward pressure on inflation levels.

The foregoing framework allows us to depict analytically both long-term pressures impinging on inflation levels. The **structural change**s entail the enlargement of the services sector's share of output, which, depending on the pace of this change, amounts to a widened gap in inter-sector productivity growth rates ($\hat{q}_T - \hat{q}_S$) that, according to equation (5a) increases ω_{ST} and hence π. Secondly, **State-supervised prices** are defined according to a regulatory environment furnished to oversee newly privatized public utilities companies. Such institutional underpinning exerts a constant pressure on inflation levels by both its indexation component and the exogenously determined markup rate over inflation. The propagation effect (Ω) transmitted by State-supervised prices are dependent on the weight of such goods' prices $(1-\beta_N)$ in the non-tradable price index, and becomes even more inflationary (disinflationary) when the exogenous markup rate increases (decreases), since $\frac{\partial \pi}{\partial r} = \Omega[\alpha(1-\beta_N)] > 0$.[9] With this preliminary framework in mind, we shall turn to the empirical evidence.

Relative Prices and Inflation Rate: some empirical evidence

We start out with some general output and price patterns. Figure 1 depicts the close connection between manufacturing and services output growth. This in turn reveals the complex nature of price adjustments,

[9] An immediate extension of the above accounting exercise would fit easily into a conflicting claims framework. This would allow the analysis of the patterns of income **distribution and the effects of Engel's law** on inflation. According to our accounting scheme, the increase in average income levels fueled the increase in households' outlays for the non-tradable sector, increasing its weight in the price index (α), provided that $\frac{\partial \pi}{\partial \alpha} = \frac{1-\beta_N}{[1-\alpha(1-\beta_N)]^2} > 0$. Adding this aspect would deliver a more complete story of inflation, by unveiling non-market forces that impinge upon the behavior of prices in a systematic fashion, given their institutional character; for instance, we could cite the government-driven policies of labor empowerment and institutionalized wage indexation affect ω_{ST}, which incites reaction by firms through price adjustment to costs increases via markup changes ($\hat{\phi}$) dependent on $\phi'_N(\lambda_N)$ and $\phi'_T(\lambda_T)$. However, these influences are nonlinearly related to the dynamical development of productive capacities by each economy. Its immense complexity would, thus, lead us to far astray from our present goals.

for prices of services tend to be more rigid downwards than those of manufacturing sectors, due to the latter's sensitivity to changes in the exchange rate. Therefore, when manufacturing faces a slowdown, services tend to decelerate as well and, with diminished activity, lower inflation is expected. However, such adjustments are likely to be sluggish in the services sector. We believe this strong linear relationship has misled economists into thinking that prices would follow *pari passu* adjustments in quantity. Therefore, it is usually assumed that a decrease in prices of manufactured goods due to a slowdown of income-fueled demand will likewise affect prices of non-tradable goods and services through the same channel. However, this would take hold only if prices in these sectors were fully flexible. As we claim below, this is not the case. Hence the relevance of this very specific channel that imposes a downward rigidity of inflation levels. Turning to sectional prices, the behavior of the three main groups of prices in Brazil, in Figures 2 and 3, makes clear that prices of services outpace industrial prices. Moreover, the acceleration of the State-supervised prices stands out after the year 2000.

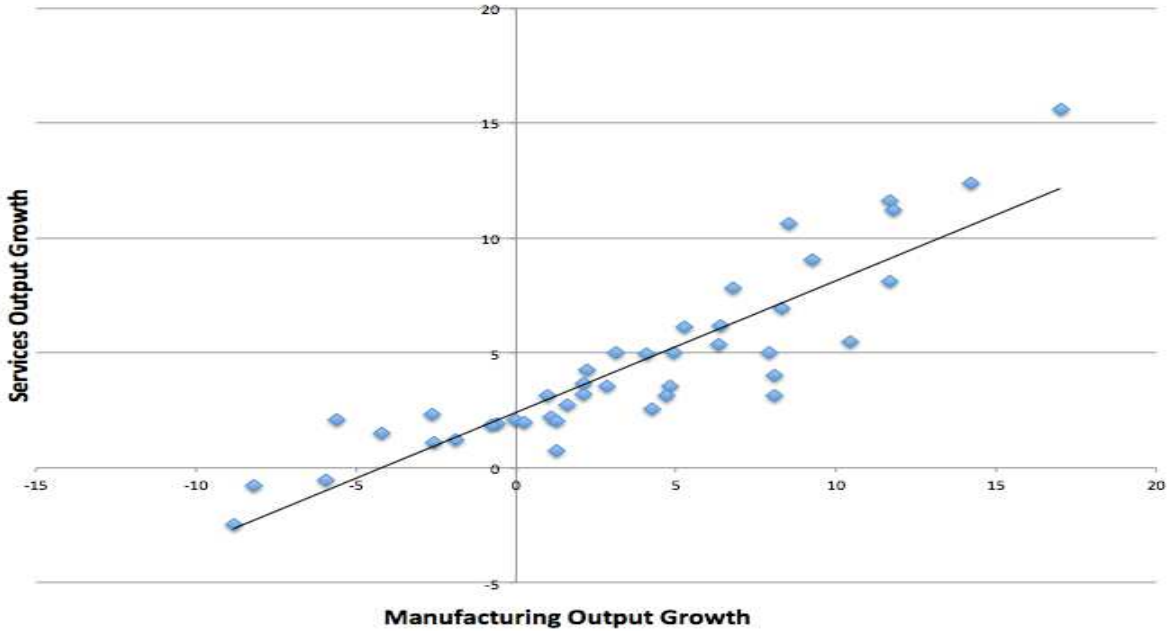

Figure 1 – Manufacturing vs. Services - Real Output Growth (1971-2013). Source: IBGE.

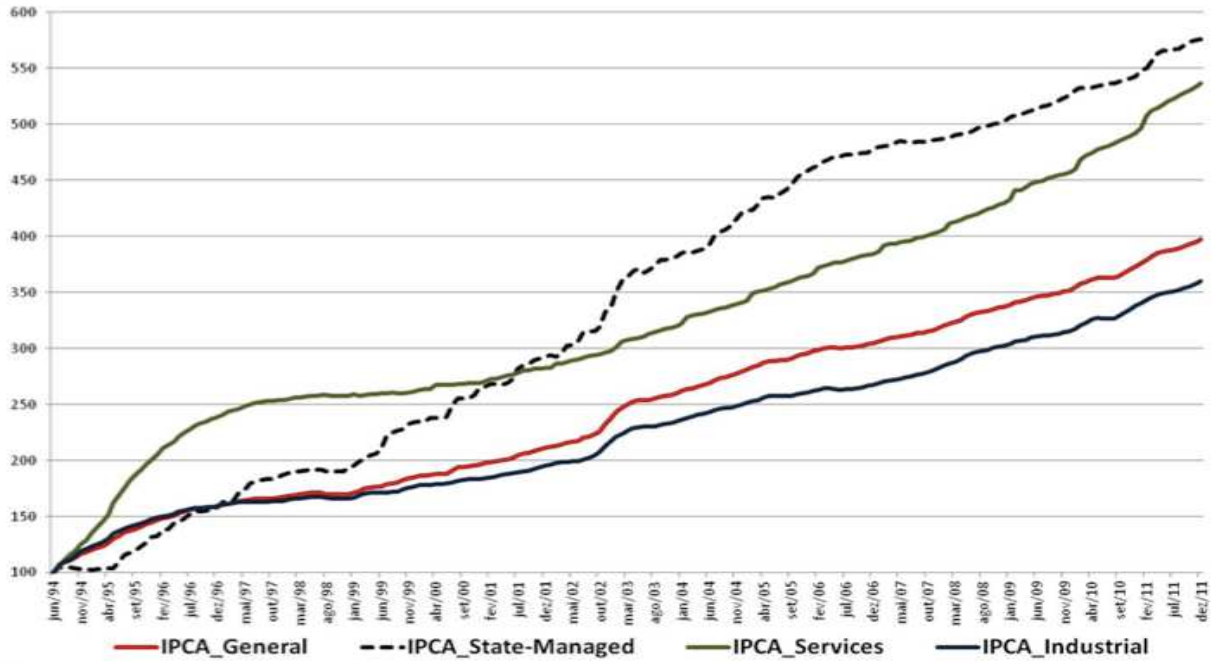

Figure 2 - Consumer Price Index – IPCA-IBGE – by large categories (jun 1994 = 100). Source: Brazilian Institute of Geography and Statistics (IBGE)

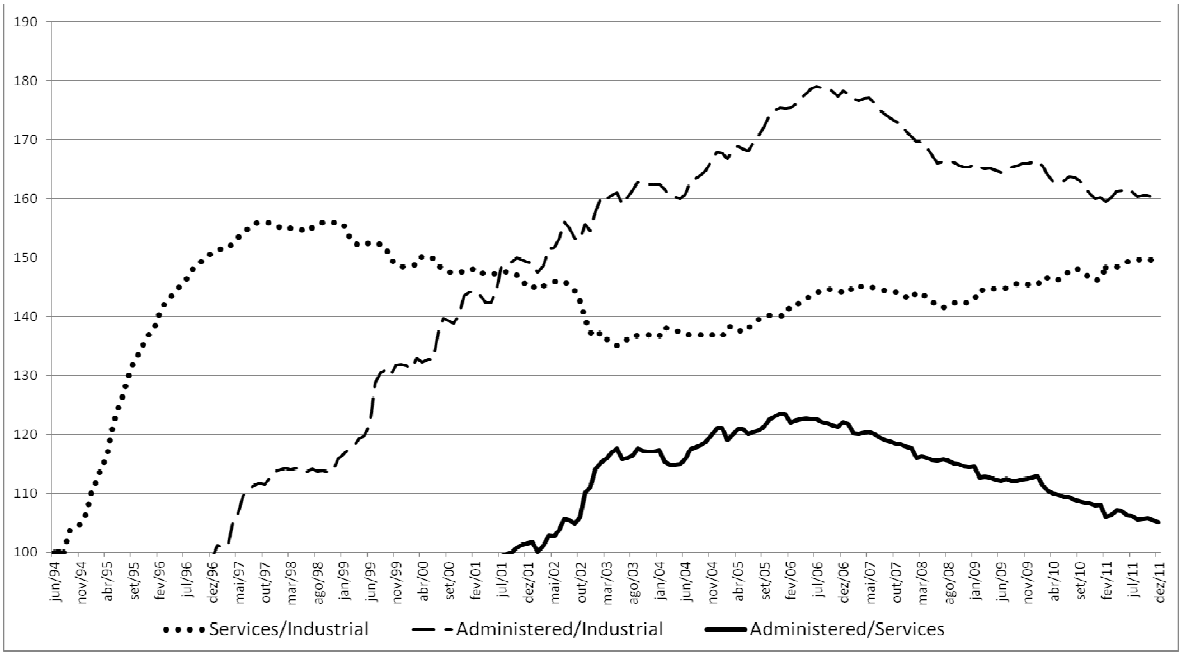

Figure 3 – Broad Consumer Price Index - Relative prices among large categories (June 1994 = 100). Source: IPCA - Brazilian Institute of Geography and Statistics (IBGE).

Administered or State-Supervised prices relate to public utilities, such as telecommunications, electricity, health insurance, taxes, public transportation etc. They are basic inputs of production, hence likely to act as basic levers of subsequent price increases downstream in the supply chain. Services and State-managed (supervised) prices have been largely benefited by the recent economic history to the detriment of industrial prices (Figure 3). The determinants of such price patterns are complex and difficult to decompose into separate and independent components. Supply and demand schedules undergo simultaneous determination, leading to the problem of identifying an instrumental variable that can provide some information about the pricing process. In this sense, an important effect runs from the exchange rate to prices and has been largely discussed in post-Keynesian literature - see Baltar (2013), for example. Trade and capital flows tend to turn the exchange rate volatile, thereby affecting price-setting behavior.

We will tackle here the problem of how these adjustments take place inside the economy. In order to do that, let us set up a simple illustrative model to provide more solid foundations for the assessment of data. The basic structuralist model follows Olivera (1967), Cardoso (1981) and Canavese (1982) and is adapted to the context as follows. Our model is highly stylized, but extremely concise in structure and substance. Demand (*D*) and supply (*Q*) for the non-tradable sectors vary both with time and with the level of relative prices of tradable and non-tradable goods ( ).

— — — — — —

By multiplying through both sides by — and assuming that $Q = D$, after some rearrangements we attain

— — — — — — — —

hence, ; and, finally,

$$\hat{P}_R = \frac{\delta - \sigma}{\epsilon + \eta} \tag{6}$$

This straightforward expression points out that relative prices depend on the excess demand over available supply as a proportion of the sum of the respective price elasticities of supply and demand ($\epsilon + \eta$). The dynamics of the model goes as follows: $\hat{P}_R = \hat{P}_{a,t} - \hat{P}_{b,t} = \frac{\delta - \sigma}{\epsilon + \eta}$; so that relative prices will change as a discrepancy between rates of change of prices in each sector. An overheating of the economy implies greater competition for tradable goods, due to real exchange rate appreciation, and higher demand for non-tradable goods does not find complementary supply from current account channels of the balance of payments, at least not to a sizeable extent. Therefore, excess demand ($\hat{P}_R$) implies changes in non-tradable price rises relative to tradable prices and it is found by $\hat{P}_R = \hat{P}_N - \hat{P}_T$. Substituting the latter in (1) and rearranging yields

$$\pi = \alpha \hat{P}_R + \hat{P}_T \tag{7}$$

We proceeded to test the explanatory power of this model by way of an econometric exercise. The Ordinary Least-Squares (OLS) regressions below were performed for inflation rates and relative price rates. First, the monthly data on inflation rates was obtained from the Central Bank of Brazil for the Headline Broad Consumer Price Index (IPCA) as composed of a tradable good price index and a non-tradable one. The range from July 1994 until April 2014 yields the following output of the estimated equation (t-statistics in between brackets):

$$\pi = 0.10 + 0.384\ \hat{P}_R + 0.898\ \hat{P}_T + \epsilon$$

$$[5.75] \quad [24.68] \qquad [44.13]$$

$$R^2 adj = 0.90 \qquad Observations: 238 \qquad DW: 1.27$$

Estimated parameters are statistically significant at the 1% level and have signs as expected. It should be noted, however, that the selected period for the exercise encompasses two different policy regimes, which could restrict the robustness of the aforementioned results. From 1994 to 1999, the exchange rate was set at lower levels, as part of the stabilizing effort. A myriad of factors came to affect the behavior of prices, during this first period. They are associated with lagging adjustment of the structure of relative prices following the monetary reform of July 1994. Both stabilizing measures (high interest rates, tax rate increases, overvalued exchange rate) and structural reforms (mainly privatization, leading to corporate downsizing) account for a prominent increase in the tradable/non-tradable relative price, thus reducing the explanatory power of the tradable-non-tradable relative price. Under the strains of the sequence of currency crises along the second half of the 1990s, the Brazilian currency debacle of January 1999 led to the overshooting of the exchange rate and the change in the policy regime. As a consequence, the exchange rate became a floating price and, as we contend, clearly overrode the relative price behavior between tradable and non-tradable sectors. Nonetheless, narrowing down the time range to January 1999-April 2014 does not affect the results substantially, as we can see in the following estimated regression:

$$\pi = 0.11 + 0.334\ \hat{P}_R + 0.85\ \hat{P}_T + \epsilon$$

$$[4.15] \quad [9.19] \qquad [20.03]$$

$$R^2 adj = 0.73 \qquad Observations: 184 \qquad DW: 1.36$$

In this second estimation, the constant term rises only marginally and both parameters accounting for relative prices and tradable goods inflation rate are mildly diminished; nonetheless, their statistical significance is maintained at the 1% level. This exercise indicates that relative prices are in fact correlated with the general inflation, that is, excess demand. From Olivera's (1964) relative prices theorem, we can

further state that excess demand of non-tradable goods is the ratio of excess demand (δ) over supply (σ) and the sum of the relative price elasticities of supply (ϵ) and demand (η). Therefore, if autonomous supply is outrun by autonomous demand and/or the elasticity of supply is low, inflation rises.

In a seminal influential paper, Olivera (1964, p. 325) spelled out the consequences of a relative price variation upon the money price level. He further underlined that, in the presence of any degree of nominal price inflexibility, such changes in the price level are not reversible. This means that, following a displacement of equilibrium relative prices, restoring the previous position will not wipe off the increase in the price level brought about by an alteration of that situation. In fact, a movement aiming to reset the previous configuration of relative prices would most likely cause an additional increase in money prices. Thus, if adjustments are carried out in oscillating patterns, the total increase in the latter is bound to be much greater, depending on the amplitude and frequency of the intervening fluctuations.

It has become a commonplace in economics to assess the effects of exchange rate volatility on inflation rates by way of increasing prices of imported goods and inputs for production, the so-called pass-through effect, which eventually phases out (DORNBUSCH, 1976). Copious research material has shown that an overshooting of the exchange rate might lead to contraction of activity with accelerating inflation, if the economy undergoing stress is highly dependent of imported inputs. We grapple with a less acute process. In what follows, we purport to show a different process by which exchange rate volatility exerts a primary pressure on inflation. Our results also conflict with the ones found in the literature. That is, whereas it is beyond doubt that sharp currency depreciation will lead to higher inflation, an appreciation of the currency might not be entirely disinflationary, in the face of downwardly inflexible prices. Ergo, oscillatory movements of the exchange rate, even in a downward trend, are likely to prompt the price level upwards.

The mechanism by which it takes hold is, however, subject to variable and indeterminate lags, due to the structural adjustments entailed by relative price changes. In a nutshell, exchange rate variations lead to changes in relative prices between tradable and non-tradable sectors, which in turn affect the composition of aggregate supply. The mismatching of the latter with the structure of demand, under some specific conditions, tends to reinforce the upward adjustment of prices. Our explanation draws on the works by Díaz-Alejandro (1963) and Frenkel & Ros (2006). We take into account the pressures arising from "the underlying physical flows, real prices and sectional disequilibria", as Olivera (1964, p. 322) would have it. The rationale is laid out for both cases of an appreciation and a depreciation of the exchange rate as follows.

The rationale is spelled out as follows. Departing from a moderately devaluating currency, the tradable sector is provided protection against competition from abroad and faces improved potential to accrue greater profit margins, if its reliance on imported inputs is not too extensive. Activity in tradable goods sectors is increased, allowing for a more competitive demand for labor inputs with respect to non-tradable sectors and, as a result, acting on slowing down inflation by reducing the inter-sector wage gap. Should economies of scale be present, higher productivity may in fact boost returns to investments and exert decelerating effects on inflation. The non-tradable sector at first faces shrinking revenues in response to deteriorated ratio between wages and exchange rate, which shift households' expenditures in direction of tradable goods. Under such circumstances, provided that, initially, aggregate income and productivity are constant due to time lags between depreciation and augmented exports, higher prices in the tradable sector imply either adjustments in the quantity demanded for the latter or a reduction in demand for non-tradable goods. Such shortage of demand can generate a reduction either in volume or price of the non-tradable sector, or both. After some time, the upturn in manufacturing output triggers multiplier effects on aggregate demand, which in turn increase demand for services ($\uparrow \lambda$, in our baseline model), compensating partially for the previous slowdown that followed adjustments to exchange rate variation. The evidence from Brazil indicates that prices in the non-tradable sector decelerate, but continue to rise, which suggests that adjustments are likely to affect quantity more than they do prices (see Figure 4 below).

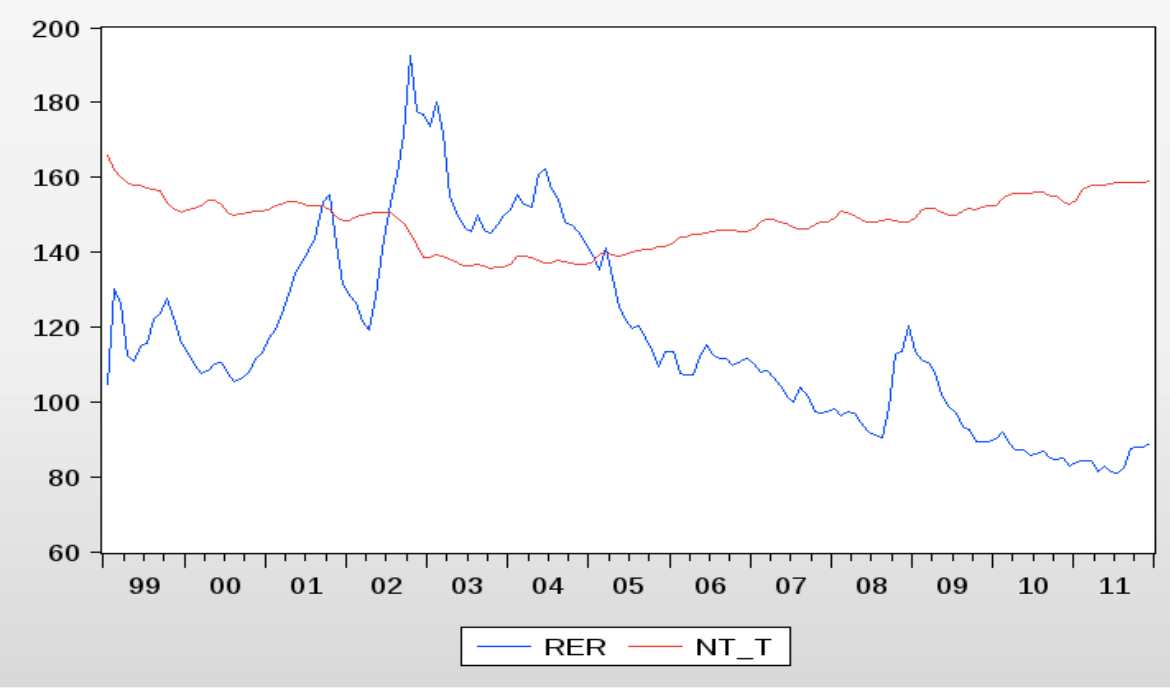

Figure 4 - Real exchange rate (RER) vs. relative prices between non-tradable and tradable goods (NT_T) – January 1999 –December 2011 (June 1994 = 100). Source: Central Bank of Brazil – Department of Economic Research.

In the opposite direction, an appreciation of the exchange rate have the double effect of reducing the costs with non-labor imported inputs faced by the tradable sector whilst compressing the profit margins due to increased competition by imported finished goods. This releases resources from the distressed tradable sector to the non-tradable sector, which still faces sustained demand carrying over from periods prior to appreciation. This lagged effect of manufacture activity on services leads to the luring in of workers from the tradable goods sectors, who are now facing greater job insecurity. An increased wage bill ensues, provided that non-tradable producers rely heavily on human labor input. If the economic system is able to generate highly productive opportunities for labor inputs forgone by the tradable sector, the wage increase can be at least partly offset by enhanced productivity. If it is not, as is suspected of Brazil, unskilled workers tend to be accommodated in precarious job conditions, hence with lower productivity and a more inelastic supply of services ($\downarrow \epsilon \rightarrow \uparrow \hat{P}_R$). In this case, a larger wage bill for low-productivity employment implies upward-pressing costs. Given the "natural" protection from external competition enjoyed by non-tradable sectors, higher costs are transmitted to prices. Hence the causality shown by equation (7) running from relative price changes between tradable and non-tradable sector to inflation levels ($\downarrow \epsilon \rightarrow \uparrow \hat{P}_R \rightarrow \uparrow \pi$).

This preliminary analytical result provides a valuable insight into Brazilian inflation's recent history based on primary pressures arising from relative price changes. Figure 9 indicates the presence of an asymmetry in relative price dynamics that calls for closer inspection. Since both data series are stationary, an OLS regression yields the following results:

$$\hat{P}_{R,t} = 9.44 + 1.51\,\hat{P}_{R,t-1} - 0.77\,\hat{P}_{R,t-2} + 0.22\,\hat{P}_{R,t-3} - 0.016\,e^{r} + \epsilon_t$$

[4.86] [19.28] [-6.094] [3.11] [4.86]

$$R^2adj = 0.988 \qquad Observations: 153 \qquad DW: 2.09$$

The above estimated OLS equation reveals that the dependent variable has a third-order autoregressive behavior. This trait derived from the partly autoregressive behavior displayed by its components - namely, tradable and non-tradable goods price index. This can be noted in the alternate

signs of the parameters as lag structure stretch further into the past. Finally, the real exchange rate (e^r) displays, as expected, a negative relation with the relative price under analysis; that is, a depreciation of the exchange rate will lead to decreased relative prices, that is, tradable goods price increases are not offset by non-tradable goods price decreases.

This result has important implications, namely: if the exchange rate deploys non-neutral effects on relative prices, these will in turn affect the inflation rate in a rather unintuitive and complex fashion. It is commonly believed that inflation may be kept under control with the use of overvalued exchange rate, via decreases of tradable goods prices. However, a secondary effect has been largely overlooked, which thrusts inflation upwards through relative price changes. This means that an offsetting mechanism imposes a lower bound to price changes such that, whilst enforcing a "ceiling" to inflation, also sets a upwardly-biased "floor" from below.

At least two connected channels of transmission become active, namely: (1) by promoting further deindustrialization (which takes a toll on the economy's productivity) and thereby, (2) impairing medium- and long-term engines of economic growth via substitution of imports for domestic output. Manufacturing sector faces growing distress, for productivity increases are not sufficient to offset labor costs increases, while profit margins are squeezed due to exchange rate appreciation. Besides, the forces that slow down the manufacturing sector (falling exchange rate) leave the non-tradable-goods-producing sectors fairly free to adjust prices upwards. An increase in labor costs then aggravates the burden of adjustment forced upon the industrial sector as a result of an appreciation of the domestic currency.[10] Between the year 2000 and 2009, unit labor costs (US$ per man/hour) varied from US$ 3.6 to US$ 6.8, a 90% increase. (DIEESE, 2011, p. 224).

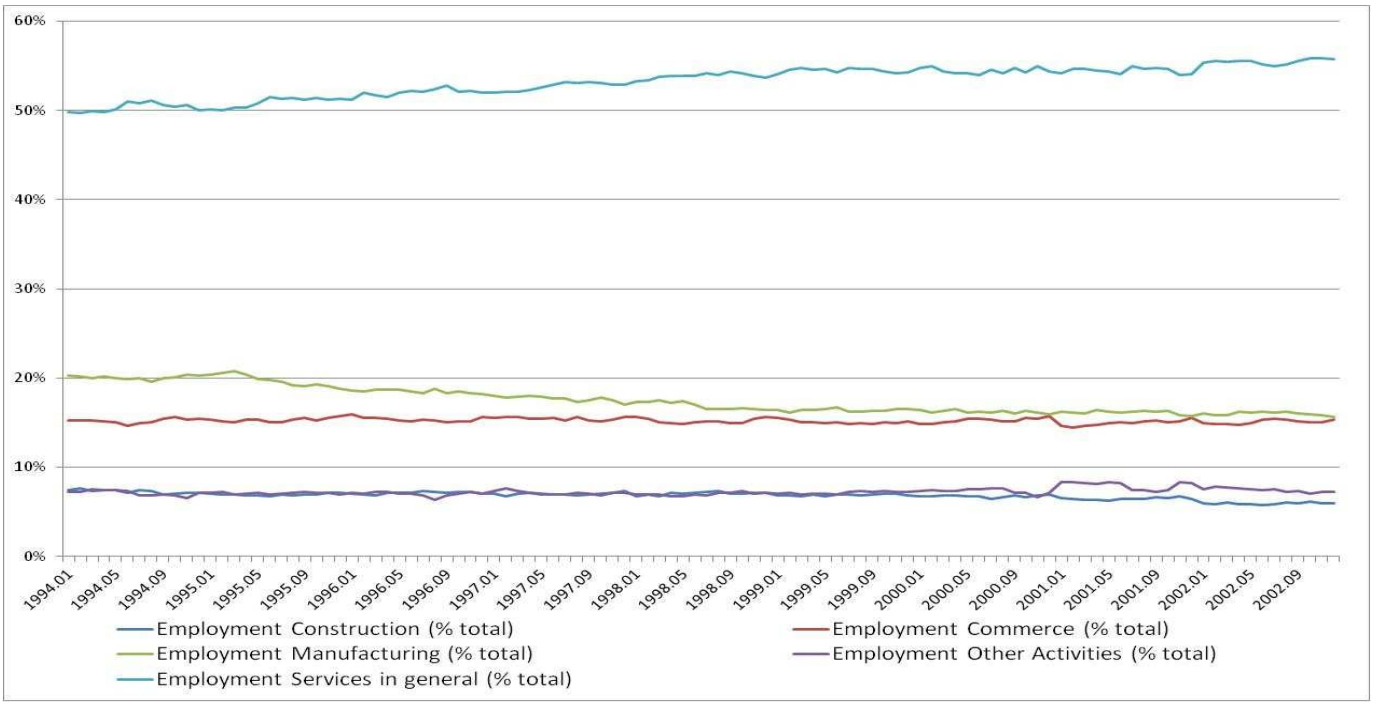

Figure 5 – Share of Total Employment – by selected aggregate sectors - Source: Brazilian Institute of Geography and Statistics (IBGE) – Monthly Employment Survey – past methodology (IBGE/PME antiga). Obs.: sums may exceed 100% due to partial overlap between categories arbitrarily defined.

[10] Agriculture faces more complex and adverse dynamics and is thus assumed to face near-neutral effects due to the volatility in international prices, which may or may not provide offsetting forces to devaluation, via increased net exports. It suffices to recognize that, after 2003, the international boom stoked up commodities international prices, which stands in support of our admittedly *ad hoc* assumption. It is nonetheless acknowledged that prices of foodstuff and other agricultural goods have significant, albeit transient, primary effects on inflation, and second-order ones via cost-of-living adjustments of wages.

It follows from the foregoing statement that, if prices of manufactured goods are held down in the face of rising income levels, household outlays are channeled to non-tradable services. Once this holds, labor demand is shifted toward labor-intensive production of services, which faces lower productivity scores (Figure 5). The latter implies higher costs and, given overall labor market legal institutions, there emerges a higher propensity to transmit costs rises onto prices. Moreover, the presence of hidden unemployment imposes qualitative restrictions on the nature of newly created job opportunities. Thus a greater share of the labor force is pushed onto tasks characterized by lower productivity - at least, when it is compared to industrial-sector economies of scale.

Table 2 illustrates this job allocation pattern. Note that non-registered labor reaped an increase of 200% in average real earnings from September 2001 to December 2013, with both registered and self-employed lagged behind changes in average earnings perceived by overall occupied people. Non-registered labor is connected to temporary contracts (which may involve both skilled and unskilled labor) and underemployment (such as house maids, retails sales persons, private security personnel and so forth).

Occupied People	Registered	Nonregistered	Self-employed	Private Sector	Public Sector
132%	124%	200%	99%	148%	175%

Table 2 – Accumulated Change in Real Average Earnings, sorted by type of labor contract and by sector (private or public), from September 2001 to December 2013. Source: Author's calculations based on the Monthly Employment Survey (new methodology) - Brazilian Institute of Geography and Statistics (IBGE).

Finally, from the evidence marshaled in Figure 6, it becomes clear that State-Supervised prices (506% increase) are, along with prices of services (535%), the period's great victors in the inter-sector distributional struggle following stabilization, between July 1994 and December 2013.

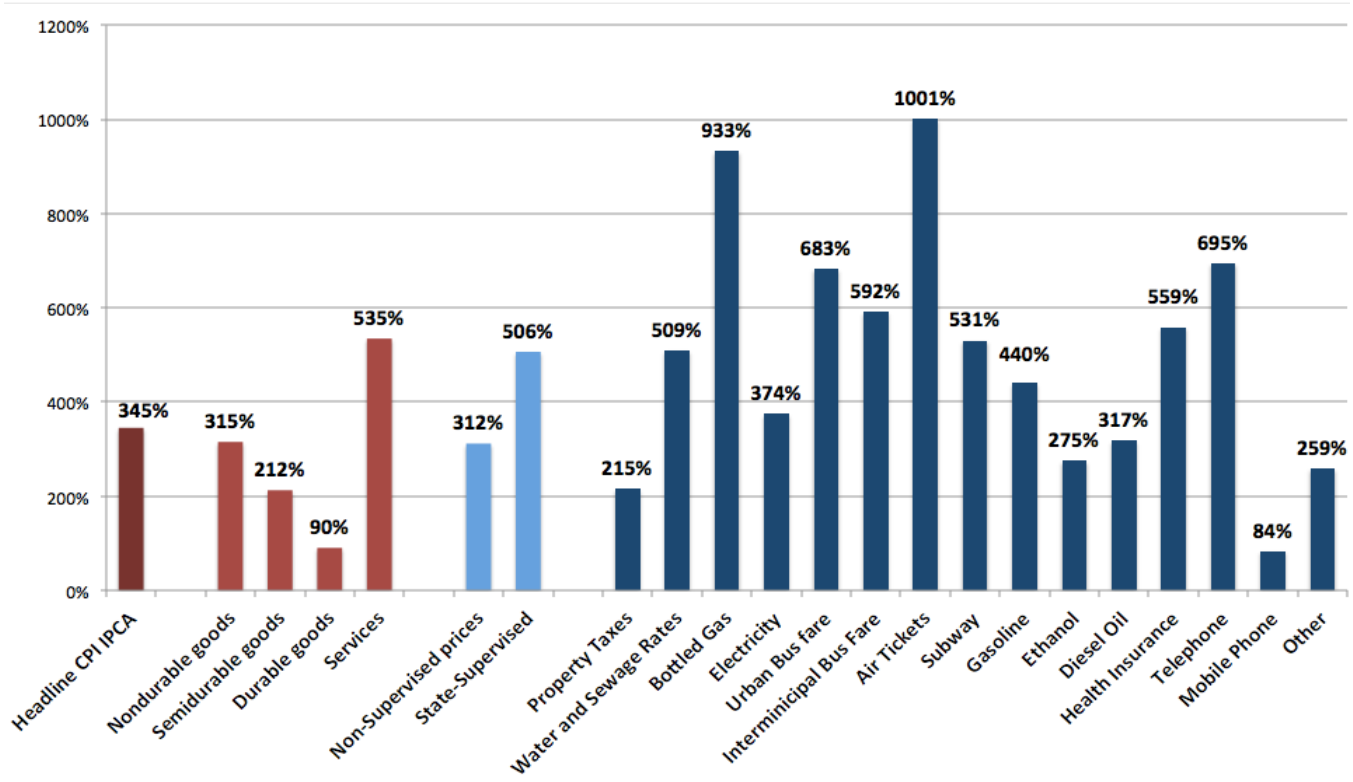

Figure 6 – Accumulated Inflation from July 1994 to December 2013 **–** sorted by different categories: Headline CPI Inflation (IPCA), Nondurable, Semi-durable, Durable Goods, Services, Non-Supervised vs. State-Supervised Prices and Components of State-Supervised Price Index (*dark blue bars on the right hand side of the chart*). Source: Central Bank of Brazil.

As regards State-supervised prices, Franco (2006, p. 251) has noted that the new regulatory environment that resulted from the process of privatization of State-owned companies has induced a change in strategic price behavior on the part of the private companies that acquired the rights to exploit the market potential for public utilities and services. Such companies are suspected of anticipating future revenues through price rises in order to finance investments in future capacity expansion. Given the monopolistic structure of the market for such goods and services, a low price elasticity of demand and regulatory measures endorse such pricing behavior. So, even if wages, productivity and labor input requirements were to have equal rates of change between tradable and non-tradable sectors, inflation would still have a nonzero value. Additionally, we should note that these prices are strategically situated upstream within the productive process and therefore exert a continuous pressure over prices located downstream. The data show that most State-supervised prices outpace inflation in systematic fashion, which supports our analytical inflation accounting scheme in equations (4) and (5). Figure 7 displays this behavior by way of tracking State-supervised prices and the headline inflation trend (this latter obtained by means of Hodrick-Prescott Filter with a smoothing factor of 14400). In addition, the blue line indicates de deviations of State-supervised prices from the headline inflation trend, denoted by $\hat{\phi}_{SM}$ in equation (5). Data reveals that such factor has stabilized, although strong inflation persistence is noted in the behavior of supervised prices.

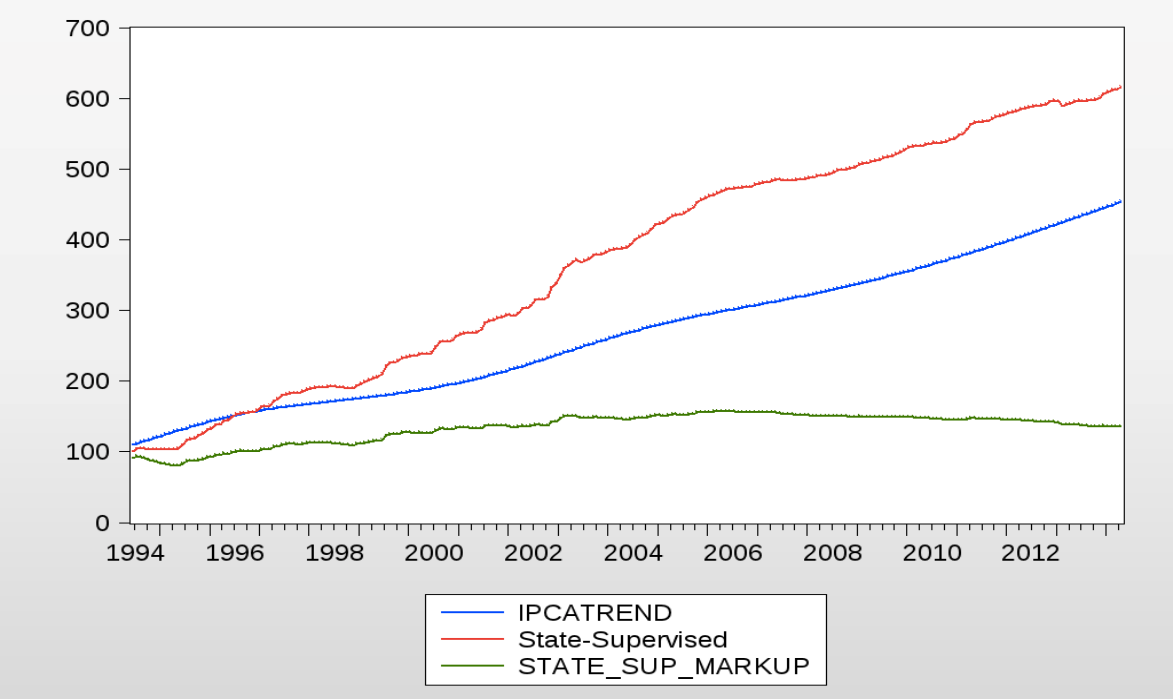

Figure 7 – Headline CPI Inflation trend (HP filter, smoothing factor 14400), State-supervised prices and Estimated Mark-up for State-Supervised Sectors ($\hat{\phi}_{SM}$) - July 1994 to December 2013 **–** Author's Calculations. Data Source: Central Bank of Brazil.

In sum, there are two baseline supply-side upward pressures lurking beneath Brazilian inflation, namely, the large effect that deindustrialization-fueled services inflation exert over the price index and the self-sustaining pressure arising from the State-managed price changes. Both have an auto-regressive component built in their price setting behaviors. This downwardly rigid price behavior is explained by the widespread indexation that runs rampant in the economy, as stated previously, which can be either formally stated in contracts or informally practiced by backward-looking price-setters. Adding harm to foul, the public utilities companies (termed in "State-supervised prices" in Figure 7) present pricing strategies that, given their upstream location in the price structure and the infrastructural nature of their activity, tend to impose a floor to price adjustments by firms positioned downstream in the production process. This is a however a slow-moving phenomena. Its effects take time to be captured by the array of economic indicators that inform economic policy and, given that conventional theory to a large extent

establishes what is to be measured and how to interpret the data, this underlying chain of causation tends to go unnoticed.

Concluding remarks

Our paper ties the de-industrializing trend of the Brazilian economy to the emergence of a lower bound to inflation rates. Two primary pressures were analyzed, namely: the increase in the tertiary sector´s share of total value added in aggregate output and its relationship to exchange rate variations and the new regulatory environment that leads privatized public utilities companies to price rises above inflation rates. This was done by way of an inflation accounting framework spelling the aspects worthy of note, and by a simple two-sector model that divided the economy in tradable and non-tradable sectors. In such a scheme, long-term forces affecting the composition of both supply and demand were considered, which include the structural changes undergone by the Brazilian economy shortly before and following the Real plan. We made the case that Brazilian inflation presents downward inflexibility due, amongst other causes, to a de-industrialization process, which has been enhanced by exchange rate volatility.

In a nutshell, we claim that the disinflationary effects of an appreciated currency are impaired by the sluggish productivity growth of the non-tradable sectors, as a reaction to the diminishing share of manufacturing in total employment and output. As a consequence, non-tradable goods and services become more prominent in the economy. Since these sectors are to a large extent protected from external competition, their prices are less flexible and thus more prone to downward rigidity in the face of shortages of demand. In turn, a less-than-fully-adjusting relative price structure exerts primary pressures on average price levels, thereby sustaining inflation rates, in the absence of unanticipated shocks. Therefore, an oscillating exchange rate alternates inflationary rises transmitted by tradable goods (under depreciation) and non-disinflationary results (under appreciation), hence the exchange-rate-fueled inflation persistence.

Our story is complete with allusion to the supporting character. State-supervised prices have gone over a cycle of inflation-outpacing behavior. Not only an index-linking practice was in effect –which by itself would ingrain inertia into the memory of the price system – sectors overseen by the new regulatory agencies managed to reap a larger piece of the income pie, by adding a varying markup over the headline CPI inflation trend. This forward-looking behavior acted as a lever on the lower bound imposed on inflation rates.

Our intent was to provide both some evidence and a rationale for the interplay of these structural forces, in order to tell a different story about inflation, one that singles out the inflexibility of the price structure. The argument is couched on a long-standing Latin American structuralists' claim that the imbalance between the composition of demand and that of supply combined with the failure of the price system to fully adjust to structural changes – especially downwards – tends to excite distributional conflicts among economic groups – however defined -, thereby making inflation the promptest – albeit not the only - way to restore consistency to the economic system. The reason why inflation is a recurrent adjusting variable should not be solely construed as the favorite policy "choice variable" of an inflation-tolerant government. Although there might be more than occasional truth to this statement when it comes to Latin America, inflation persistence in Brazil has also to do with an entrenched inflationary memory in

society's institutions, reflected most clearly on the persistence of indexation practices, even after disinflation.

Therefore, in the context of partially institutionalized backward-looking price-setting behavior, the institutional changes that followed disinflation and the ensuing structural reforms on the recent history of Latin America have both altered the terms and the nature of the underlying conflicts that sustain inflation, requiring sharper changes in monetary policy in order to counteract these forces. However, if monetary policy is not neutral in its effects, inflation targeting monetary policy may instill further instability in the output-price dynamics, rendering its measures ever more ineffective. One of them is slightly touched upon by the foregoing analysis, namely: interest rate increases attempting to curb inflation by way of currency appreciation may be partly self-defeating. However, several other issues can be raised as to the neutrality of an interest-rate based policy, but we will not pursue it here.

A second topic this paper sidestepped concerns the role income distribution plays in inflation trends. We believe this to be crucial in the Brazilian case. The fast-paced process of policy-guided income distribution accounts for an important propagating mechanism of underlying pressures. Distributive patterns resulted largely from three different effects: (1) the wealth and income effects associated with lasting disinflation; (2) full-blown redistributive policies (such as the federal conditional cash-transfer program Bolsa Família, amongst several other grants provided by the government, not to mention systematic and increasing expenditures in healthcare, education and social security, and the minimum wage and index-linking of overall wages); and (3) an international commodity price inflation that fostered a foreign currency bonanza along from 2003 until 2008, when the financial crisis broke out. The combination of rising incomes in the bottom brackets of the distribution schedule with an appreciated exchange rate has shifted the bulk of newly created aggregate demand onto services, decreasing the share of household expenditures in both agricultural and manufactured products, which suggests the occurrence of a variant of Engel's law in Brazil. However, there is still scant empirical evidence in support of such claim, although the massive income redistribution, bolstered by a downward trend in real exchange rates, was accompanied by a sustained increase in the growth rate of output in the services sector. This latter's importance in our inflation story is beyond dispute, but it deserves by itself greater attention than the one permitted by the narrow limits of a paper and shall be pursued in future endeavors.

Finally, the foregoing evidence further suggests that a structuralist interpretation of inflation patterns in the post-Real plan period is not only very fruitful but is likely to be extended to other experiences as well. This effort provides an alternative account of the relative rigidity of price behavior in Brazil, by considering a wider range of determinants beyond those encompassed by the new-Keynesian approach. We believe that a richer story can be told by the structuralist framework, and that further research in this area will provide greater support for the view that inflation is tightly connected to development issues and not only to, albeit important, central banking good practices.

References

ALDRIGHI, Dante; COLISTETE, Renato Perim. (2013) *Industrial Growth and Structural Change: Brazil in a Long-Run Perspective*. Department of Economics FEA-USP – Working Paper, Nº 2013-10.

ARAÚJO, Eurilton, SANTOS, Tatiana Teles. *A dinâmica da Inflação Brasileira após o Plano Real* In: Insper Working Paper, WPE 054, IBMEC: São Paulo, 2004, p. 1-32.

BALTAR, Carolina T. (2013) *Economic growth and inflation in an open developing economy: the case of Brazil*. (PhD Dissertation) University of Cambridge – Darwin College.

BARBOSA-FILHO, Nelson (2008). *Inflation Targeting in Brazil: 1999-2006*. International Review of Applied Economics, v. 22, n. 2, p. 187-200.

BEVILAQUA, A.; MESQUITA, M.; MINELLA, A. *Brazil: taming inflation expectations*. Brasília, DF: Banco Central do Brasil, jan. 2007. (Working Paper Series, n. 129). Available at: <http://www.bcb.gov.br>.

BOGDANSKI, J., TOMBINI, A.A. and WERLANG, S.R. *Implementing Inflation Targeting in Brazil* In: Working Papers Series, Banco Central do Brasil, July-2000, 1-29.

BOGDANSKI, J., FREITAS, Paulo Springer, GOLDFAJN, Ilan & TOMBINI, A.A. (2001). *Inflation Targeting in Brazil: Shocks, Backward-Looking Prices, and IMF Conditionality*. Central Bank of Brazil. Working Papers Series. Brasília n. July 24th, p. 1 – 52.

CANAVESE, A. (1982). "*The Structuralist Explanation in the Theory of Inflation*", **World Development**, vol. 10, No. 7.

CARDOSO, Eliana A. (1981). *Food supply and inflation,* **Journal of Development Economics**, Elsevier, vol. 8(3), pp/ 269-284, June.

CAMPÊLO, A. K.; CRIBARI-NETO, F. *Inflation inertia and 'inliers': the case of Brazil*. Revista Brasileira de Economia, v. 57, n.4, p. 713-719, 2003.

CATAO, L. et al. (2008) *Monetary Transmission in an Emerging Targeted: The Case of Brazil*. IMF Working Paper 08/191.

CRIBARI-NETO, F.; CASSIANO, K. *Uma análise da dinâmica inflacionária brasileira*. Revista Brasileira de Economia, v.59, n. 4, p. 535-566, 2005.

DÍAZ-ALEJANDRO, Carlos F. (1963) "A Note on the Impact of Devaluation and the Redistributive Effect". *The Journal of Political Economy*, Vol. 71, No. 6 (December), pp. 577-580.

DIEESE (2011). *Anuário dos trabalhadores: 2010/2011*. 11.ed. São Paulo: DIEESE.

DORNBUSCH, Rudiger (1976). "Expectations and Exchange Rate Dynamics". *Journal of Political Economy*, 84 (6): 1161–1176.

FIGUEIREDO, Erik Alencar, MARQUES, André M.. *Inflação Inercial como um Processo de Longa Memória: Análise a partir de um Modelo Arfima-Figarch* In: Estudos Econômicos, São Paulo, v. 39, n. 2, abril-junho de 2009, p. 437-458.

FRANCO, G. H. B. (2005) Auge e declínio do inflacionismo no Brasil In: Giambiagi, Fabio, André Villela, Lavinia Barros de Castro e Jennifer Hermann, *Economia Brasileira Contemporânea (1945-2004).* Elsevier Editora, 2005.

FRANCO, G.H.B. (2006) *Crônicas da convergência: ensaios sobre temas já não tão polêmicos*. Rio de Janeiro: Topbooks Editora.

FRENKEL, Roberto; ROS, Jaime (2006) "Unemployment and the Real Exchange Rate in Latin America" ***World Development*** Vol. 34, No. 4, pp. 631–646.

HAUSMANN, R. (2008) *In Search of the Chains that Hold Brazil Back*. Harvard Center for International Development, Working Paper 180, 2008.

KIRSTEN, José Tiacci. *A indexação está de volta na classe média*. Informações FIPE, agosto de 2013, p. 13-14.

MAIA, A.; CRIBARI NETO, F. *Dinâmica inflacionária brasileira: resultados de auto-regressão quantílica*. Revista Brasileira de Economia, v. 60, n. 2, p. 153-165, 2006.

MOLLO, M. L., SAAD FILHO, Alfredo. *Reconhecimento social da moeda: observações sobre a inflação e a estabilização de preços no Brasil* In: Revista de Economia Política, v. 21, n.2 (82), abril-junho/2001, p. 24-42.

OLIVERA, J. H. (1964). *On Structural Inflation and Latin-American 'Structuralism*. Oxford Economic Papers, Vol. 16, N° 3, pp. 321-332.

Olivera, J. (1967). “Aspectos dinámicos de la inflación estructural,” Desarrollo Económico , vol. 7, No. 27.

SEGURA-UBIERGO, Alex (2012). *The Puzzle of Brazil's High Interest Rates*. IMF Working Papers, WP/12/62, February, 19 pp.

TAYLOR, Lance (2004). Reconstructing macroeconomics: structuralist proposals and critiques of the mainstream. Harvard University Press.

TEJADA, C.; PORTUGAL, M. (2001) *Credibilidade e inércia inflacionária no Brasil: 1986-1998*. Estudos Econômicos, v. 31, n. 3, july-september, p. 459-494.

TOMBINI, A. S.; ALVES, S. A. L. (2006) *The recent Brazilian disinflation process and costs*. Central Bank of Brasil, June, (Working Paper Series, n. 109).

VALOR ECONÔMICO. (2012) Indexação ainda afeta 38% da inflação. Reportagem de 06/07/2012. Online. Disponível em: http://www.valor.com.br/brasil/2740704/indexacao-ainda-afeta-38-da-inflacao#ixzz228MjwydB. Access on July 7th 2012.

VERA, Leonardo. (2005). *Can recession feed inflation? a conflicting claims framework.*Review of Political Economy, Volume 17, Number 4, 1–19, October.