Distribution and Cost-Push inflation in Brazil under inflation targeting, 1999-2014

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1. Introduction

Since mid-1999, after the introduction of the inflation-targeting system, the Brazilian monetary authority pursues a single official objective, the control of inflation, which must remain inside a pre-defined range around a target value in each calendar year (defined since 2005 as 4.5% a year plus or minus 2%). Even though the upper limit of the target range was surpassed from 1999 to 2003, the central bank has been successful in keeping inflation within this range since 2004. However, from 2010 to 2014 inflation got very close to the upper limit.

There is a widespread (but incorrect) belief that in Brazil inflation is actually controlled through the management of aggregate demand, and the latter mainly through the manipulation of the basic interest rate by the Brazilian Central Bank. In reality, inflation in Brazil is a cost-push (not a demand-pull) phenomenon and the way in which interest rate policy actually operates is through the impact of interest rate differentials on the rate of change of the nominal exchange rate (in situations in which there is no external credit rationing nor strong political objections to further appreciation of the exchange rate). This means that a policy of high interest rates usually leads to a process of exchange rate revaluation which lowers the prices of inputs and tradable goods in local currency, which in turn also lowers the prices of a number of government-monitored private utilities and transport services (which are partially indexed to tradable prices) and thus tends to lower cost inflation in the economy. In Brazil, therefore, not only is inflation not caused by excessive growth of aggregate demand, but the only effective and systematic transmission mechanism of monetary policy is the exchange rate cost channel briefly described above.

In this paper we analyze the evolution of Brazilian inflation under the inflation targeting system according to this cost-push interpretation. We first discuss (in section 2) some essential characteristics of the Brazilian cost-push inflation process and the transmission mechanism of monetary policy. We then identify (in section 3) the main features of three quite distinct phases mentioned above (1999-2003, 2004-2009 and 2010-2014) and explain them in terms of tradable price trends in U.S. dollars and in local currency (i..e., converted by the nominal exchange rate),

changes in the dynamics of the so-called monitored prices[1] and behavior of wage inflation. Each of these three components is analyzed in more detail in the subsequent sub-sections, namely, tradable prices in local currency (section 3.1), monitored prices (section 3.2) and wages (section 3.3). In section 4 we look at the changes in the wage share that have resulted from these distinct phases of cost-push inflation. Final remarks are made in section 5.

2. Some structural and institutional features of Brazilian inflation under inflation targeting system

2.1 High but not complete inflation persistence and high sensitivity to tradable prices

Brazilian inflation tends to be on average both higher and more persistent than in most other countries. In addition, though the economy is not very open (with an import content coefficient of only 12.5% of aggregate demand in 2014 (Serrano & Summa (2015b)), Brazilian inflation is unusually influenced by the local currency prices of tradable goods (and thus, of course, by the nominal exchange rate) and other supply shocks.

In our view, these features are explained by the fact that the Brazilian economy still has a relatively high degree of formal and some informal indexation to past inflation. A large number of monitored prices of private utilities and services (and some publicly provided services too), as well as other non-monitored prices such as real estate rents, are still formally indexed to past inflation. Moreover, in many cases these monitored prices are indexed to a price index (the IGP-M index) that is extremely sensitive to the wholesale/producer price index (IPA), which in turn is strongly affected by the prices of tradable goods in local currency. This makes these non-tradable service prices quite sensitive to changes in international dollar commodity prices and changes in the nominal exchange rate. This rather unusual institutional arrangement was inherited from the privatization policies of the 1990s and, in spite of some changes discussed further below, is still mostly in place.

Note, however, that although inflation persistence is relatively high, it is far from being complete[2]. Therefore, the usual condition in new consensus macroeconomic models that the sum of effects on current inflation of past and expected inflation is equal to one, and the necessary implication that the effect of a single demand shock would be a permanent acceleration of inflation[3], have no empirical basis in recent Brazilian experience. It is instead a condition that is imposed rather than estimated in most macroeconometric models, with the excuse that agents would be irrational not to take expected inflation fully into account. But such theoretical argument is hardly reasonable as it

[1] Prices subject to government oversight or regulated by contract with local or federal authorities.
[2] For evidence for partial inflation persistence in Brazil, see Summa (2011).
[3] For a theoretical critique of the hypothesis of full persistence in the new consensus model, see Serrano (2006) and Setterfield and LeBlond (2003).

confuses the individual cognitive ability to foresee inflation with the very different question of agents having the political or market power to include such forecasts in their contracts[4].

In addition, in open economies, the full pass-through from expected to actual inflation for the economy as a whole also requires an exogenous real exchange rate. This relation clearly has also not been observed in the Brazilian economy over the period in question. So, in reality, full persistence is the exception rather than the rule outside very high inflation regimes and periods.

Partial inflation persistence, however high, leads us to the equivalent of an old (i.e. non-accelerationist) Phillips curve. This means that there would be a permanent (rather than a temporary as the new consensus model holds) trade-off between output (and employment) and inflation. This provided, of course, that we could postulate that demand shocks have a regular effect on inflation, which as we shall presently see, is *not* the case in Brazil.

2.2 Very low degree of nominal price (and wage) "flexibility"

The Brazilian economy also exhibits a very low (and in practice irrelevant) degree of either price or wage "flexibility", understood as the aggregate response of price markups to **deviations** of the actual degree of capacity utilization from its trend normal values and/or the response of wages (or unit labor costs) to **deviations** of the open unemployment rate from its longer run trend. Pro-cyclical markups are hard to find[5] and nominal (and real) wages seem to be strongly correlated with the longer term trend of the open unemployment rate, but not with fluctuations around this trend[6,7].

There are many reasons for this. In the case of prices, Brazil is a price taker in most world markets so almost all prices of tradable goods (including commodities which have very flexible international prices) are exogenously given relative to domestic demand conditions, once international prices and the nominal exchange rate are given. Moreover, monitored prices comprise a substantial fraction of the basket underlying the official consumer price index used for inflation targeting (the IPCA). Also, most of the non-tradable goods and services among the so-called "free" (i.e. non-monitored) prices tend to follow cost plus markup market pricing rules (supermarkets, beauty parlors, soft drinks factories, for instance). So price flexibility in Brazil is relegated to a few (mainly agricultural) goods which are both basically non-tradable and have "auction" markets (such

[4] See Serrano (2010b). See also section 3.3 and table 2 for data regarding the actual capacity of workers in getting real wage gains in Brazil.

[5] For empirical evidence of (mostly anti-cyclical) markups in Brazilian industry, see Feijo and Cerqueira (2010).

[6] The empirical inverse relation between the levels of real wage and the levels of the unemployment rate is known as the wage (bargaining) curve (Blanchflower and Oswald (2005)). Empirical evidence for Brazil can be found in Amitrano (2015).

[7] Summa and Braga (2014) disaggregated Brazilian overall price index in "services", "industrial goods", "food and beverage" and "monitored" prices and found that demand shocks are not important in any of the sectors. The inflation of free "services" is affected by the level of the unemployment rate, but not by deviations of unemployment rate relative to its trend.

as tomatoes). And, of course, the movements of such prices tend to reflect much more the instability of the supply (due to the weather or other disruptions in the wholesale to retail distribution) than aggregate demand conditions[8].

And in the case of money wages, at least in the formal market, their short run downward flexibility would entail costly increases in turnover, as labor laws still forbid most direct reductions of the money wage of an already employed worker.

Moreover, the most important feature relating to money and real wage dynamics that we must take into account to understand recent Brazilian inflation is that, contrary to what the majority of economists think nowadays, positive nominal wage inflation may well happen way before the economy reaches "full employment". In fact, it is quite unlikely that true full employment is ever reached in peacetime in a capitalist economy, and this is even more unlikely in a developing economy with a large informal sector and disguised unemployment. But as the classical economists from Smith to Marx knew, persistently lower trend rates of unemployment strengthen the bargaining power of the labor force, especially under favorable political and institutional circumstances (Kalecki (1971), Rowthorn (1977)). In this view, wage inflation is understood as a consequence of 'workers "excessive" demands' (or claims) relative to productivity growth, instead of the usual neoclassical view of an 'excess demand for labor' (Palumbo(2015)[9]. And this can occur even if the economy is still far away from full employment. For other political or institutional reasons wage inflation may not appear at all even if the level of employment is growing fast (as in Brazil during the period of military rule). Thus, the relationship between wage inflation and the trend of the unemployment rate is not necessarily stable, and this relationship is mediated by political, institutional and cultural aspects that influence workers' bargaining power (Kalecki, 1971, Rowthorn, 1977, Stirati, 1994, 2001)[10,]. This point is very important, because the recent increase in money and real wages in Brazil has widely been incorrectly interpreted as evidence that the

[8] Bastos, Jorge and Braga (2015) estimated disaggregated inflation equations for 17 industrial sectors and found no systematic relationship between sectoral inflation and demand (measured by degree of capacity utilization), and the evidence of cost pressures as the main determinants of inflation, particularly changes in international prices and in the nominal exchange rate.

[9] Precisely because of the possibility of wage inflation arising much before full employment , Lerner (1951) created two different expressions :"*Low Full Employment"*, a situation in which current output level is below its potential, and it is still possible to expand the level of employment through increased spending, but workers bargaining power is strong and creates a wage-price spiral; and *"High Full Employment"*, the actual point of full employment with labor scarcity, at which it is impossible to expand employment level stimulating aggregate demand.

[10] Phillips (1958) says that both the level and the change in unemployment rate may be important to explain wage growth. Lower levels of unemployment lead to greater competition between employees, which leads to an increase in money wages. On the other hand, decreases in the unemployment rate (the rate of change of the unemployment rate) enhances the workers´s bargaining power and puts them in a stronger position to demand wage increases (Pollin, 2003, Palumbo(2015)). Moreover, persistence seems relevant since , in periods where the unemployment rate is kept high for a long period, this decreases the bargaining power of workers through the "discipline effect" (Kalecki (1943)).

economy is overheating, because it has supposedly reached full employment of labor (even by many who acknowledge that there is still spare capacity in the capital stock).

The upshot of the above discussion is that for various causes, a regular relation between any sort of demand gap and nominal prices and wages is very difficult to find in the data for the Brazilian economy[11].

2.3 The transmission mechanism of monetary policy: demand and cost channels

The lack of significant aggregate nominal flexibility would make controlling inflation through the manipulation of aggregate demand quite difficult even if the control of aggregate demand through changes in interest rates was easy (in other words if a stable IS curve could be easily identified).

However, in Brazil (as in many other countries) this is not the case. Private nonresidential investment tends to be entirely induced by expected demand relative to installed capacity and totally insensitive to interest rate reductions (and other incentives such low taxes or higher markups)[12]. Persistently lower interest rates do seem to encourage residential investment and autonomous consumption based on credit but even here the lags and shape of the credit cycle are strongly affected by institutional and regulatory changes in the banking system[13].

To make matters even more complex, in Brazil, in spite of the fact that the majority of Brazilian economists are strong trade elasticity optimists, the empirical evidence seems to show that real exchange rates have very small direct positive effects on net exports (in fact in most estimates they fail to meet the Lerner conditions so with given output they do not even improve the trade balance)[14]. On the other hand, there is also a lot of evidence that real wages tend to increase when there are nominal and real exchange rate revaluations[15].

These two things together usually mean that in Brazil (as in many other countries) exchange rate devaluations tend to decrease aggregate demand because the negative effect on real wages and consumption is much stronger than the possible positive direct effect on net exports. Conversely, a nominal and real revaluation tends to increase rather than decrease aggregate demand. This implies that when the central bank increases interest rates, if this increase is accompanied by a tendency for exchange rate revaluation (as is often the case in Brazil), then real wages and induced consumption

[11] For evidence see Braga (2013), Summa and Braga (2014), Bastos, Jorge and Braga (2015), Summa and Macrini (2014) and Summa (2011) for a survey.

[12] Dos Santos (2013), Dos Santos et alli (2015), Serrano and Summa (2015b).

[13] Serrano and Summa (2015b).

[14] For econometric evidence of a relatively low price-elasticity of imports and exports in Brazil, see Dos Santos et al (2015) and Padrón et al (2015), respectively.

[15] For the large impact of nominal and real devaluations on inflation see the references in footnote 11 above. The negative effects on the growth of the real wage can be seen in section 3 below, especially after the large devaluations of 2002 and 2009 (after 2011 this was contained by slower growth of monitored prices).

will tend to increase as well, even when higher interest rates slow down residential investment and credit for consumer durables. This relationship between the exchange rate, interest rates and real wages makes the so called IS curve quite unstable and unreliable.

Therefore the traditional transmission mechanism of monetary policy linking higher interest rates to lower aggregate demand and lower prices and wages can hardly be at work in the Brazilian economy.

2.4 The exchange rate cost channel of monetary policy

Given that the demand channel of monetary policy does not seem to work in Brazil, we should turn to the cost channel. The first element of the cost channel of monetary policy is the possible "perverse" effect of interest rate increases on cost inflation. In fact, there is evidence of the so-called "price puzzle" in Brazil. Moreover, there is also some evidence that gross profit markups tend to increase together with interest rates as both the borrowing and opportunity costs of capital for firms increase when interest rates are raised[16]. This effect makes the control of inflation through increases in interest rates even more difficult.

Luckily for the monetary authorities, this "perverse" effect of higher interest rate on inflation is just a level effect, i.e., a single change in nominal interest rates tends to lead to a single increase in gross profit markups. This being so, this effect is usually more than compensated by a much stronger effect through changes in the nominal exchange rate due to higher interest rates. As a higher nominal interest rate leads to a higher international interest rate differential and this is usually associated with a positive rate of change of the nominal exchange rate, a positive interest rate differential leads to a process of further changes of the exchange rate in the same direction due to the strong effect of the recently realized values of the actual spot exchange rate on exchange rate expectations[17,18]. So the positive interest rate differentials often lead in Brazil to a process of

[16] Summa and Macrini (2014) found a positive relation between the rate of change of the nominal basic interest rate and overall inflation, while Braga and Summa (2014a), using disaggregated data for inflation show that this relation is circumscribed to industrial goods. This effect seems to be particularly relevant in the short run because in Brazil circulating capital is financed by banks at very high nominal rates of interest that are also strongly affected by changes in the central bank rate (Manhiça and Jorge,2012). This effect makes the control of inflation through increases in interest rates even more difficult. Also, for empirical evidence of the relation between real interest rate and profit rate, see Bastos and Braga (2010).

[17] Notice that we are saying that the interest rate is exogenous, in the sense that the central bank sets the basic interest rate (and thus to influence also the expectations of long term rate) and there is no market mechanism capable of changing this rate (Serrano and Summa (2013)), even in an open economy (Lavoie (2000, 2001, 2014), Serrano and Summa (2015a)).

[18] The idea is that exchange rate expectations in Brazil are in part of the "adaptive" type. Thus, an actual change in the nominal exchange rate usually tends to change the expected exchange rate in the same direction, amplifying the process of revaluation or devaluation. For a theoretical explanation for this relation, see Summa (2012) and Serrano and Summa (2015a). For empirical evidence of this effect in Brazil, see Cieplinski, Braga and Summa (2015), that show that there is a relation between interest rate differentials and the change (not the level) of the nominal exchange rate. It is also shown that the relation between interest rate and changes in the exchange rate itself changes over time. In the period 1999- 2003 exchange rate devaluations forced the central bank to raise interest rate differentials. In the period since 2004, Brazilian Central Bank maintained large interest rate differentials and that

continuous nominal exchange revaluation, which has a strong effect of lowering tradable price inflation directly and monitored price inflation indirectly. As

prices in these sectors affect production costs in all other sectors of the economy, the interest rate differentials eventually reduce, with a lag, inflation in the so-called free price sectors. This is the effective channel of monetary policy in Brazil and it is this effect that explains how the authorities often managed to hit the inflation target band despite the inoperative demand channel of monetary policy (and the incomplete inflation persistence)[19].

3. Three Phases of Brazilian inflation

Looking at overall inflation we can distinguish three distinct patterns (Figure 1). First, from the beginning of 1999 until 2003, inflation was very high and in almost every year above the upper limit of the target range. After that, inflation was gradually controlled and oscillated around the center target rate from 2004 to 2009. Since 2010, inflation has again got very close to the upper limit of the target range.

[Figure 1]

Let us take a closer look at the behavior of the main sources of cost increases, namely, monitored prices, money wages and tradable prices in local currency (Figure 2). In 2000-2003, Brazilian average annual inflation was 8.8%, as a result of a strong external shock (inflation of tradable goods of 20.4% basically due to exchange rate devaluations) together with high inflation of monitored goods and services (12.1%). Nominal wages grew only 2.9% on average, which surely helped to prevent an even higher level of overall inflation but resulted in a decrease in real wages. After this, in the years 2004-2009, overall average annual inflation was lower (5.2%). In this period nominal wages grow at an average of 8.4% a year. There was a series of changes in monitored prices' contracts (reducing some markups and the sensitivity of these in relation to the exchange rate) and annual monitored goods and services inflation fell to 5.3%. The low inflation of tradables (1.5%), due to the process of exchange rate appreciation and driven in part by the interest rate differentials, was thus crucial to lower overall inflation. Finally, in 2010-2014, a higher overall inflation was a result of the continued growth of money wages (average of 8.9%) together with much higher tradable goods inflation (6.8%). Inflation in this period was kept just below the upper range of the target (6,1%) thanks to a set of policy decisions that resulted in a lower inflation of monitored goods and services (4.0%).

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drove a process of almost continuous nominal exchange rate appreciation until 2010 (the 2009 devaluation having quickly reversed itself).

[19] For empirical evidence, see Barbosa-Filho (2008), Modenesi and Araujo (2012), Braga (2013), Bastos, Jorge and Braga (2015), Summa and Macrini (2014). Summa and Braga (2014) show that tradable inflation in local currency explains the evolution of inflation in all sectors, including also services (mainly restaurants) and monitored prices.

[**Figure 2]**

We now analyze each one of these three components of cost inflation in order to see why each of them behaved differently in each of the three periods.

3.1 Interest rate, nominal exchange rate and tradable prices in local currency

Changes in tradable prices in local currency comprises both international prices variations (in US$) and nominal exchange rate changes. Note also that "tradable" inflation refers to both imported goods as well as exportable final and intermediate goods which, through competition, influence domestic prices.

Tradable inflation in local currency behaved quite differently since 1999 in Brazil. International nominal prices in US$ for tradable goods relevant to Brazil were stable in the years 2000-2002, then rose fast from 2003 to 2008, fell quickly in 2009 and rose again until 2011. After that, prices in US$ fell gradually (figure 3).

The transmission from international prices to domestic prices, however, depends on the evolution of the nominal exchange rate, and in Brazil this regime consists, since 1999, of a very "dirty" form of managed floating. The Brazilian central bank plays a decisive role in managing the nominal exchange rate by accumulating (or selling) foreign reserves, setting nominal interest-rates and operating in futures markets.

[Figure 3]

Figure 4 shows the evolution of interest rate differentials (Brazil's nominal basic interest rate minus Fed funds rate plus the sovereign spread). Despite the very high nominal basic interest rates set by the monetary authority through 2003, interest rate differentials were low or even negative in this period, as a result of unfavorable external conditions and increasing sovereign spreads. As we can see in figure 5, there is a sequence of large nominal exchange rate devaluations in this period. The initial sequence of nominal devaluations tended to lead to expectations of further devaluations.[20]

With the improvement in external financing and trade conditions after 2003, which dramatically lowered the sovereign spreads of most developing countries[21], Brazil's monetary authority set the nominal interest rate significantly above the international rate (plus sovereign spread) between 2004 and 2009, thus gaining some control over the trend of the nominal exchange rate. As a result, there was a process of nominal appreciation of the Brazilian currency in this period, with the endogenous process of exchange rate expectations described above operating in the other direction, thus

[20] See footnote 17 above.
[21] See Freitas, Medeiros and Serrano (2015).

generating a trend of exchange rate appreciation (until mid-2011, despite the sudden, but quickly reversed, shock of the international crisis of late 2008).

Since mid-2011, despite the fact that Brazilian nominal interest rates remained well above international rates (plus spread), the international turmoil generated by financial turbulence in the Eurozone lead to the devaluation of the Real. As the new orientation of macroeconomic policy included the idea of devaluing the exchange rate, the government did not try to avoid this process of devaluation and allowed the initial sequence of nominal devaluation to generate into expectations of further devaluations.[22] As a result, between 2011 and the end of 2014, the domestic currency depreciated by 60% (figure 5).

[Figure 4 and 5]

Summing up, the inflation-targeting system in Brazil in practice operates likes this: when the Central Bank can increase or maintain a high interest rate differential and does not mind appreciation of the nominal exchange rate, it can keep inflation low. The higher interest rate increases the interest rate differential and speeds up the tendency of nominal appreciation of the currency. This can allow monetary authorities to transform, say, a negative supply shock in U.S. dollars, such as an increase in international commodity prices, into a positive one in Brazilian Real. However, when the Central Bank is not able to appreciate the nominal exchange rate, either because of deteriorating external conditions (1999-2003 and 2008) or for political reasons (2011-2014), tradable inflation in local currency goes up and makes it much more difficult to reach the inflation target (Serrano and Summa, 2012).

Figure 6 shows the behavior of tradable prices in local currency. Notice that international commodity prices in local currency (measured by the Brazilian central bank index of commodity prices relevant to Brazil – IC-Br) strongly influence the overall behavior of prices of both total imports and total exports for Brazil, as the Brazilian economy is a both a large importer and exporter of commodities.

[**Figure 6]**

3.2 The behavior of monitored prices

Monitored prices inflation,was higher than overall inflation during 2000-2003, decreased in 2004-2009 and then decreased even more in 2010-2014, helping to control overall inflation in the latter period.

[22] For the reasons that led the Brazilian government to change the orientation of macroeconomic policies after 2011 toward an new policy mix see Serrano and Summa (2015b).

After the privatization process in the mid-nineties, many contracts of monitored prices were indexed –to the IGP-M, a price index strongly affected by wholesale or producer prices, and hence by tradable prices. In figures 7 to 9 we present the behavior of monitored goods and services inflation (blue) as well as other services that are not considered strictly as monitored but are covered by formally indexed contracts (private health, education and housing rents). Figure 7 shows that prices for almost every monitored good and service between 1995 and 2003 (as well as other services included in the central banks category of free prices but that are in fact formally indexed service prices) grew faster than overall consumer prices (measured by the target index IPCA).

[Figure 7]

Up to mid-2005, monitored prices seemed in the aggregate to track the IGP-M index very closely and rise faster than the IPCA, amplifying the inflationary effects of the fluctuation of international commodity dollar prices and the nominal exchange rate. After 2006, the monitored prices begin to increase more slowly than IGP-M. These trends seem to be the result of a number of institutional changes that occurred in 2005 and 2006[23] in the indexing mechanisms of some administered or monitored prices and also a change in the pricing policy by Petrobras[24]. So it appears that after 2006 these regulatory changes were enough to reduce the degree of indexation of monitored prices in general, and the role of tradable inflation in local currency in particular[25]. Figure 8 shows that most administered goods and services prices grew more slowly than overall inflation during this period, including electricity and telecommunications fares, gasoline and gas.

[Figure 8]

Since 2011, the Brazilian government began a more aggressive and discretionary policy of controlling electricity and oil prices. The Treasury lowered indirect tax rates on gasoline to zero in June 2012 and has subsidized energy consumers and producers since 2013, this after a strong discretionary reduction in energy prices by the state-owned power company Eletrobras in the beginning of 2013. Also in the beginning of 2013, the federal government asked several municipal governments to postpone public transport fare increases. These price adjustments were postponed again in June 2013 as a reaction to earlier mass street demonstrations sparked by the announced increases (Martinez (2014)). These policies taken together reduced monitored price inflation to

[23] There was also a major overhaul of the regulatory framework in the electric power generation and distribution in 2004 and the introduction of new contracts regulating the pricing of private telephone companies' telephone call rates in 2006, with a new price index related to the actual costs of this sector and a variable "x per cent" reduction factor to take account of productivity growth. For more details see Martinez and Cerqueira (2013) and Serrano and Summa (2012).

[24] Petrobras held to a policy of stabilizing nominal domestic prices of oil fuels initially on its own; and then when it was not possible to keep prices from increasing due to the ongoing huge international oil dollar price increases in 2008, the Treasury helped to moderate the domestic price increases by temporarily lowering indirect tax rates on oil.

[25] These policies were also important to control and reduce the monopoly profit markups of some of these sectors.

4.2% in the 2011-2014 period, allowing the government to maintain overall inflation inside the inflation target range in each year, despite high tradables and wage inflation. Figure 9 shows that in this period prices grew above overall inflation only in those indexed services where the government has relatively less power to intervene, such as rents, private health and education.

[Figure 9]

3.3 Workers' bargaining power, wages and productivity

As discussed in section 2, nominal (and real) wages can grow even if the economy is far from a situation of general labor scarcity and this depends on the bargaining power of workers. The latter is a result of complex structural factors involving political and institutional aspects, but also depends on the concrete situation of the labor market. In this sub-section we analyze the role of some of these structural factors and of labor market conditions to shed light on the relation between workers' bargaining power and wage inflation in Brazil[26].

First of all, in the case of Brazil in recent times, it is very important to notice the role of the minimum wage policy. Real (nominal) minimum wage growth n averaged more than 5% (12.5%) annually between 2000 and 2014. This policy variable is important because it affects directly and indirectly both the labor market conditions and the general bargaining power of workers. As many Brazilian government social transfers (such as old age and disability pensions, unemployment benefits, etc, see Orair and Gobetti, 2010) are indexed to changes in the minimum wage, increases in the real minimum wage has a strong impact on family poverty rates and social insurance conditions (Amorin and Gonzalez 2009) and this influences the bargaining power of poorer workers, as well as their labor supply and reservation wages. In addition to substantial increases in minimum wages, in the recent period there was also an increase in the coverage of unemployment benefits[27] (Ibarra, 2013) and other welfare payments (some estimate that more than 50 million people were taken out of poverty in the 2000s in Brazil , see Serrano & Summa (2012)).

Increases in the minimum wage have both direct and indirect effects on labor market conditions in Brazil. The direct effects are that of increasing the wages of less skilled workers. This works through many channels, such as: (1) the direct effect on wages in the public and formal private sectors; (2) the positive effects on wages negotiated in the informal capitalist sector (called the "lighthouse" effect in Brazil) for urban and rural workers and (3) the positive effect on wages in

[26] Here we are inspired by earlier works such as Garegnani, Cavalieri and Lucii (2008) and Glyn (2006) applied to advanced countries in general and Pollin, R. (2002), Setterfield, M. (2005) and Setterfield, M. & Lovejoy, T. (2006) for the US.

[27] The coverage rate of unemployment benefit and "abono salarial" between 2000 and 2012 was relatively high, with the number of beneficiaries increasing 99.2% and 281.1%, respectively. (Ibarra, 2013, p. 259)..

the informal personal services sector (such as housemaids, for instance) for which the minimum wage (or fractions of it) are an accepted social norm (Medeiros(2015b)).

The indirect effects operate through higher average incomes for self-employed informal workers. A part of the higher income of both workers and recipients of government benefits that comes from higher minimum wages tends to increase the average income of self-employed informal sector workers who sell many of their goods and services to other low-income workers. Taken together with the generally positive formal sector employment effect of higher wage incomes and government transfers (whose recipients tend to have a high marginal propensity to consume), the indirect positive effect on the average income of the self-employed workers in the informal sector works both through more aggregate income being spent on the services of the self-employed and through the reduction of the relative number of people in this sector, as jobs in the formal sector increase. Through both of these indirect channels, higher minimum wages tend to increase substantially the average per capita income of informal workers.

Besides these effects of the policy of real minimum wage increases, we must take into account the role of labor unions.

Although the general degree of unionization has not increased in recent years and improvement in this regard has been restricted to rural areas (Cardoso, 2014), Brazil is one of the few countries in the world in which unionization levels did not fall in the last decade (Pichler (2011)). Also, again according to Cardoso (2014), there is no evidence that unions have lost strength in recent years, quite the contrary, as "union action, although invisible (because it does not cause the same commotion of other times), seems quite effective, and spread throughout the country, and in all economic sectors[28]".

Brazil experienced a great improvement in the labor market conditions between 2004 and 2014 (Figure 10), with a boom in formal employment as a result of faster economic growth combined with improvement in labor inspection, changes in tax laws[29] and greater legal awareness among workers[30] (Berg (2010)). Labor informality fell from 56.2 % in 1999 to 44.8% in 2012[31]. Open unemployment rates fell continuously from 2003 to 2014, as a result of faster employment growth

[28] Also, we cannot forget the very good relations between the major labor union (CUT) and the workers party which is governing Brazil since 2003.

[29] Berg (2010) points out the introduction of the SIMPLES law, which simplified and lowered taxes for small- and medium sized enterprises in exchange of then following formal labor laws. Another incentives for firms to enter the formal sector is that this gives them access to the formal credit market and allows them to make sales using credit cards, for instance.

[30] Formal workers in Brazil enjoy important benefits and protections that informal workers are not guaranteed, according to Berg (2010). Other important point is that formal jobs give workers access to the formal credit market, and this makes it desirable for workers to demand formalization in order to have access to bank accounts, overdrafts and credit cards, for example.

[31] Carvalho (2015) shows that labor informality rate dropped even sharply for more precarious kinds of jobs.

after 2004 [32] together with a very large reduction in the rate of growth of the labor force. The latter seems to be due to both a change in demographical factors and in the labor supply of some groups benefitted by social security policies (for an extreme example, a marked reduction in child labor (Chahad and Pozzo (2013)). The labor force grew on average 3% a year in the period 2001-2005 but only 1.2% a year in 2006-2014. And the rate of growth of the working age population fell from 1.9% to 1.3% in each period.

[Figure 10]

As a consequence of improved labor market conditions, greater coverage of social and labor insurance and an extended period of low unemployment , workers' bargaining power increased substantially and generated a tendency towards higher nominal real wages, especially after 2006. This tendency, furthermore, intensified after 2010. The number of strikes and labor hours spent on strike increased considerably in 2011 and 2012 (figure 11). , as did the number of collective bargaining agreements (9.8 thousand in 1997 versus 32.7 in 2008 according to Brazilian Ministry of Labor (MTE)). A large percentage of these agreements resulted in nominal wage increases higher than past inflation, a trend that became more evident after 2006, This contrasting sharply with the 1999-2003 period (figure 12). Taken together, these trends indicate that the general bargaining power of workers in Brazil increased rapidly and significantly after 2006.

[Figure 11 and 12]

The result of this increased bargaining power appears clearly in the behavior of real wages[33]. Table 2 shows that the pattern of real wage growth is quite distinct if we compare the years 2000-2005 with 2006-2014. In the first period, real wage growth is either low or in most cases negative, both in aggregate (average -2.4 and -3.2%, according to IBGE and CAGED respectively) and in disaggregated activities. Real wages begin to rise after 2006 (average of 3.2% and 3.1%, according to IBGE and CAGED, respectively).

As we discussed in section 2, the emergence of a process of real wage growth does not necessarily means that the economy is operating above full employment in the sense that real wages grows

[32] As Amitrano (2013) points out the sectors where employment grew faster were the construction industry, services (and commerce) and public administration, which are very labor intensive.

[33] Unfortunately, the quality of the data regarding wages in Brazil is not very satisfactory. In our view the most reliable source is the data from **CAGED/MTE**, which is concerned with **formal job contracts**. The main problem with this data, however, is that it do not encompass the wages of the whole formal labor force, but only the wages of new formal job contracts (admissions) and broken formal job contracts (terminations). The other source of data provided by **PME/IBGE** is related with average income received from all the workers, **both formal and informal**. The main problem with this source of data is that it is not a good proxy for wages in the sense of cost per working hour, since it includes self-employed workers in the informal sector whose average income is strongly affected by the level of sales in this sector.

because of labor scarcity[34]. Figure 13 shows that real wage growth starts in 2006 when the open unemployment rate was about 10% and despite the continuous fall in the latter, real wages continued to grow after 2006 at the same approximate average rate of 3% a year[35].

[Figure 13]

4 The Wage Share

Changes in the functional distribution of income are the end result of the process of cost-push or conflict inflation. They depend on the behavior of nominal profit margins (of both monitored and free goods and services), the growth of money wages and labor productivity as well as the changes in the rates of interest and the exchange rate[36]. We can thus relate the changes in the dynamics of cost inflation to the observed changes in the functional distribution of income. The wage share in Brazil, fell gradually from mid-1990 until 2004, when the trend is reverted and the wage share starts rising (Figure 14).

[Figure 14]

In 2000-2003, the wage share fell as real wages fell. The higher inflation was a result of a strong external shock (due to the exchange rate devaluations) together with a high inflation of monitored goods and services (which grew more than overall inflation) that increased the markups of monitored goods and services plus a higher level of real rate of interest, which appears to have allowed also higher markups for "free prices" (Table 1).

After that, from 2004-2009, the wage share started rising since the productivity of the economy grew less than real wages. The lower overall inflation was a result of very low tradable goods inflation - due to the process of exchange rate appreciation (in spite of very fast growth of international prices in dollars) - and institutional changes in monitored prices' contracts, which reduced some markups (and the sensitivity of these in relation to the exchange rate) and lowered monitored goods and services inflation. A downward trend of nominal and real interest rates also helps to explain this shift in income distribution.

Finally, in the years of 2010-2014, despite a higher level of tradable goods inflation, real wages continued to grow at the same pace (faster than overall productivity). This was possible because

[34] Baltar (2015) argues that enterprises are not facing difficulties in finding workers willing to work, i.e., there is no scarcity of labor, but they have difficulty in keeping the employees working in the same enterprise because of a high turnover rate.

[35] Also data of unemployment rate from other sources suggests that this rate is higher than the official one from IBGE, as for example data from SEADE/DIEESE shows that total unemployment rate was in average 10.9% in 2011-2014 and 10.4% in 2014, as it incorporates also the disguised unemployment of 2.3% and 2.0 respectively. Also data from PNAD/IBGE shows that if you consider the whole country and not the most dynamic metropolitan areas (as data from PME/IBGE), unemployment rate was higher, 6.8% in average in 2014. Besides that also according to PNAD/IBGE, there were in average 6 million of domestic workers employed in Brazil in 2014, which amounts to 6.6% of total employment.

[36] From the relation between cost-push inflation and changes in the functional distribution of income, see Serrano (2010b) and Stirati (2001).

authorities held back the increase of some monitored prices, resulting in monitored price inflation lower than overall inflation. The real interest rate was also even lower than in the previous period. So, although our National Accounts data series ends in 2011, the rise of the wage share seems to continue in the years 2012-2014.

5 Final remarks

A structural trend of wage inflation emerged due to the substantial increase in workers' bargaining power in the Brazilian economy since 2006. The wage increases were initially accommodated by exchange rate revaluation, but this policy was abandoned more recently under complaints from firms in the tradable sectors having difficulty in passing on wage cost increases to prices. More recently, a policy of delaying adjustments of monitored prices prevented the large exchange rate devaluations from either accelerating inflation too much and/or reducing real wages.

The improvement in the bargaining power of workers, a result of relatively fast growth with social inclusion from 2004 to 2010, led to steady increases in real wages (starting from quite low levels in 2006) and a gradual increase in the wage share. As there was no really binding longer term foreign exchange constraint on economic growth after 2003 (in spite of the 2008-9 world crisis) and the socially inclusive growth pattern actually tended to stimulate private investment through the expansion of the internal market, the political reaction against these changes in distribution (and more generally the marked improvements in social conditions in Brazil) was bound to take the form of attempts to make the government shift the orientation of macroeconomic policies in order to dismantle this growth regime. This is not too different from what happened at the end of the Golden Age in many developed economies in the early 1970s.[37]

Thus, starting in 2015 there was a further shift in the orientation of economic policy in Brazil. The new policy consists, simultaneously, of allowing further major exchange rate devaluations, announcing large increases in monitored prices, with the government suspending the pursuit of the inflation target for this year (curiously with virtually no complaints from entrepreneurs or the media), together with a shift to a strongly contractionary monetary, credit and fiscal policy in an economy that is already in recession. The new policy orientation is in fact strictly necessary, as the beginning of an attempt to weaken the bargaining power of labor and the institutional capacity and power of the Brazilian State (and help to create the climate necessary for conservative reforms on labor laws and the welfare state pass through congress). It is clear that these new policies, have already caused a deep and possibly prolonged recession, and risk condemning the economy to a path of stagnation (Serrano &Melin, 2015).

[37] See Kalecki(1943), Garegnani et alli(2006), Serrano(2004).

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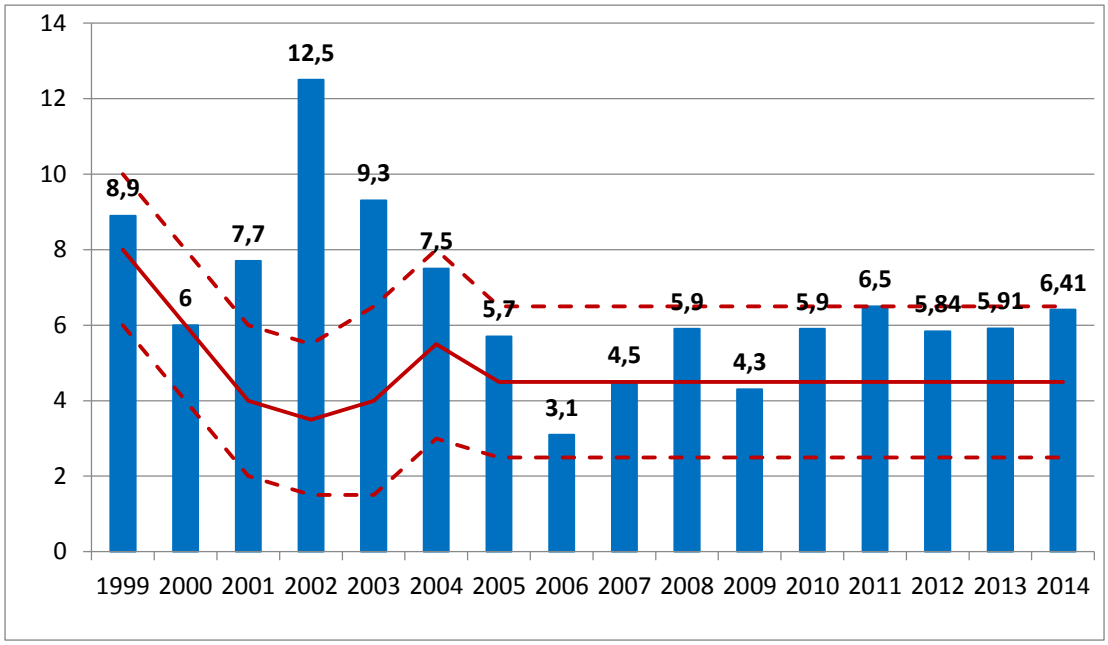
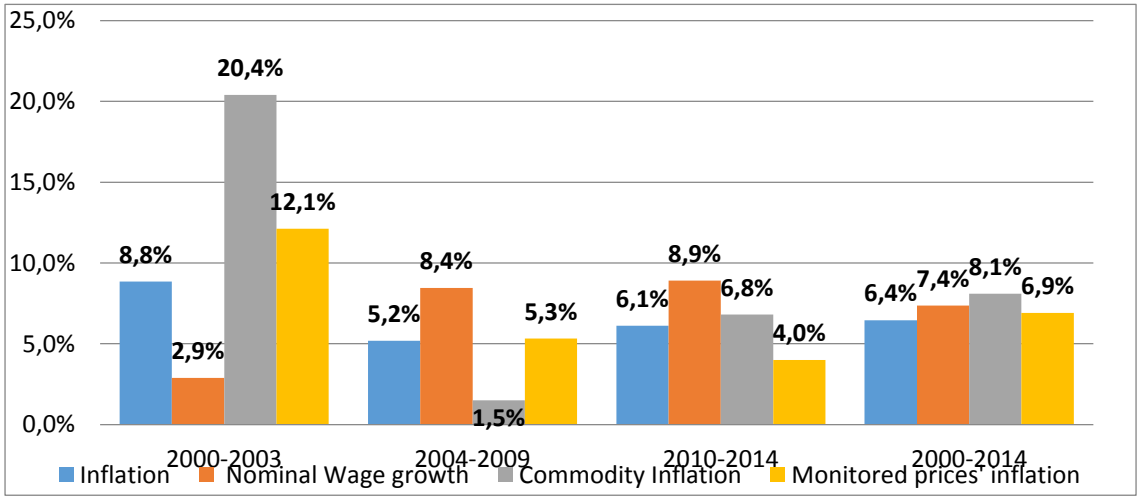
Figure 1 – Overall Inflation and the inflation target



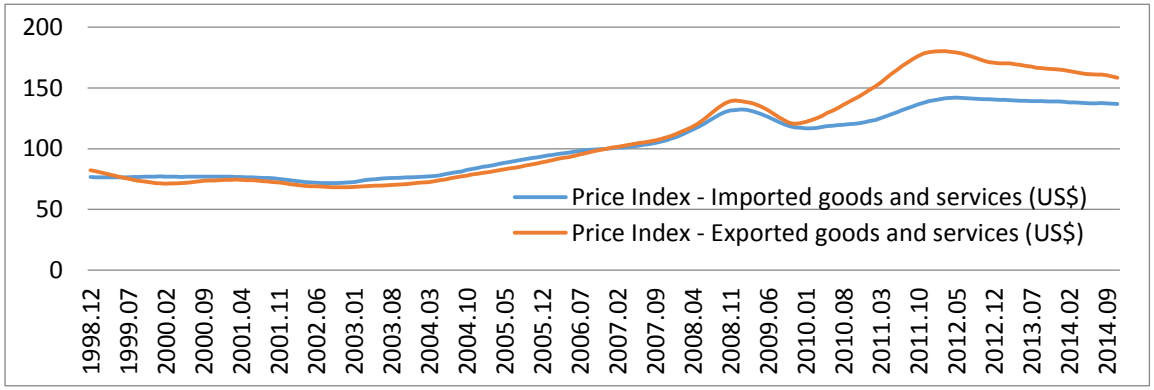
Source: IPCA/IBGE; BCB

Figure 2 – Overall Inflation and its cost-push determinants



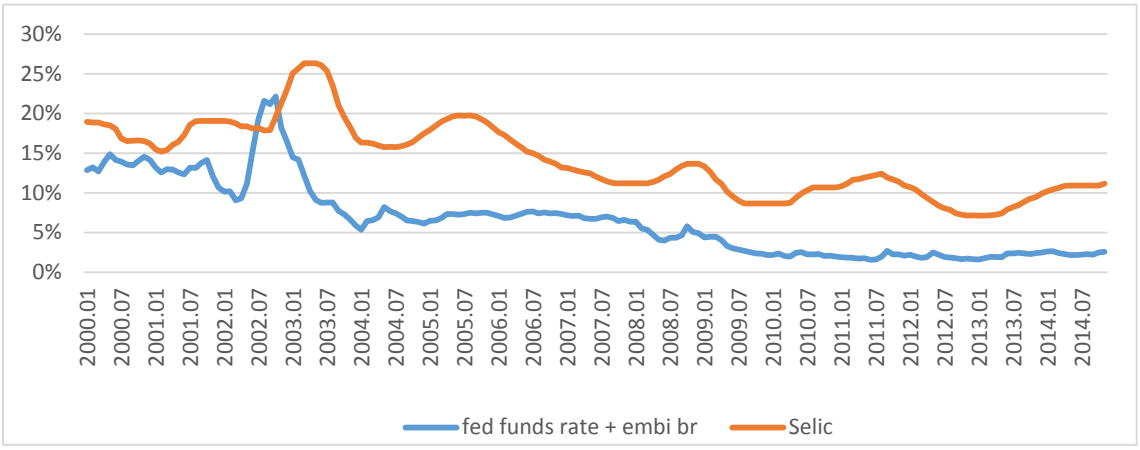
Source: IBGE; CAGED/MTE; BCB.

Figure 3 – Level of Brazilian Import and Export prices in US$



Source: FUNCEX. Moving average for 12 months, 1998:12 = 100.

Figure 4 Interest rate differentials



Source: FED, Morgan Stanley (IPEADATA), BCB.

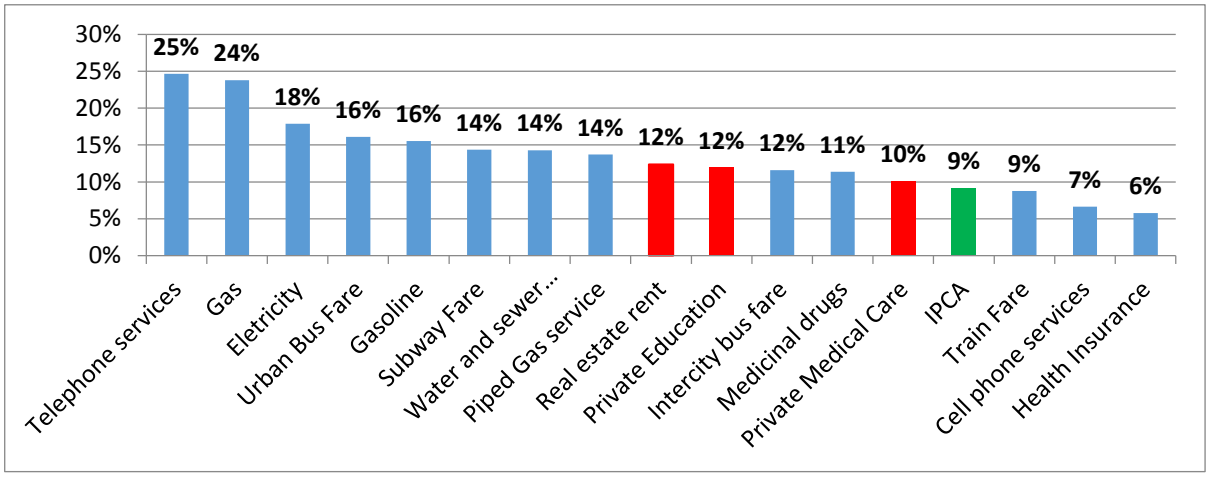
Figure 5 Nominal exchange rate

Source: BCB.

Figure 6 Tradable prices in local currency

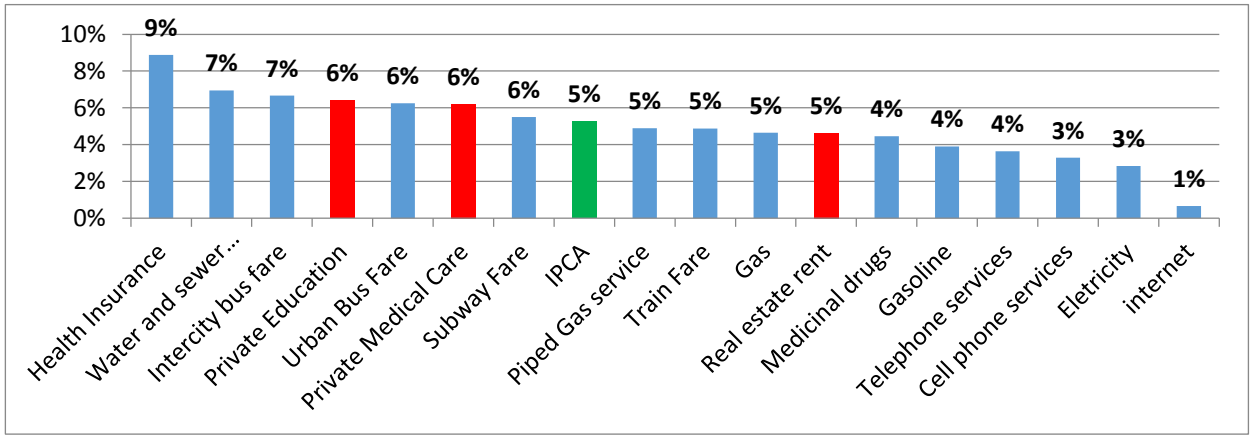
Source: Funcex; BCB. Moving average for 12 months, 1998:12 = 100.

Figure 7 – Annual Average Monitored prices' inflation :1995-2003



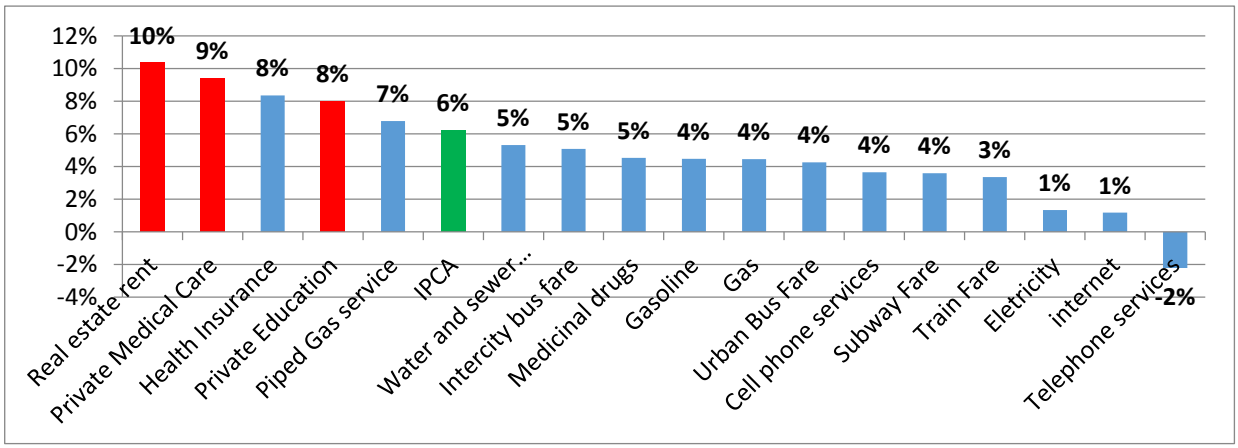
Source: IPCA/IBGE.

Figure 8 – Annual Average Monitored prices' inflation: 2004-2010



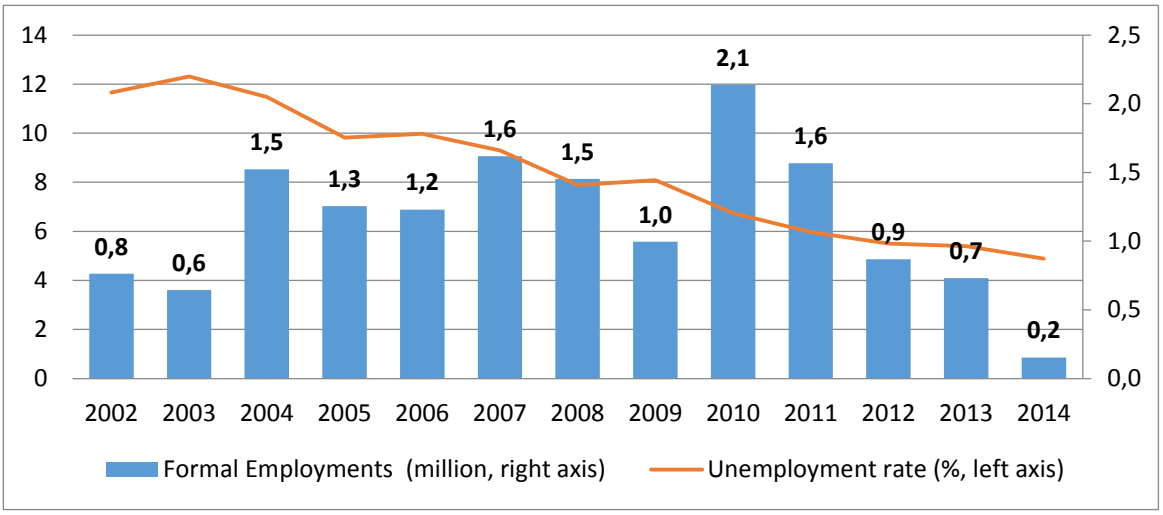
Source: IPCA/IBGE.

Figure 9 – Annual Average Monitored prices' inflation: 2011-2014



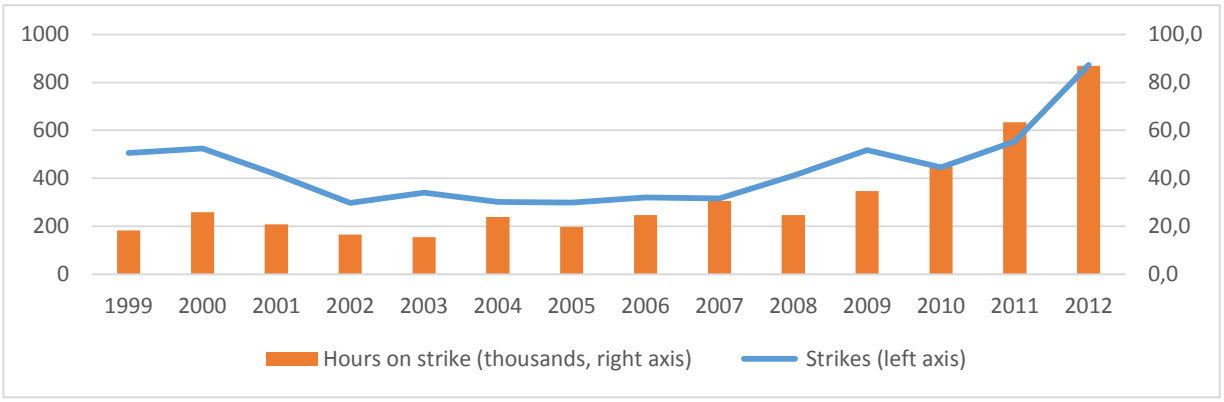
Source: IPCA/IBGE.

Figure 10 – Formal employment and unemployment rate



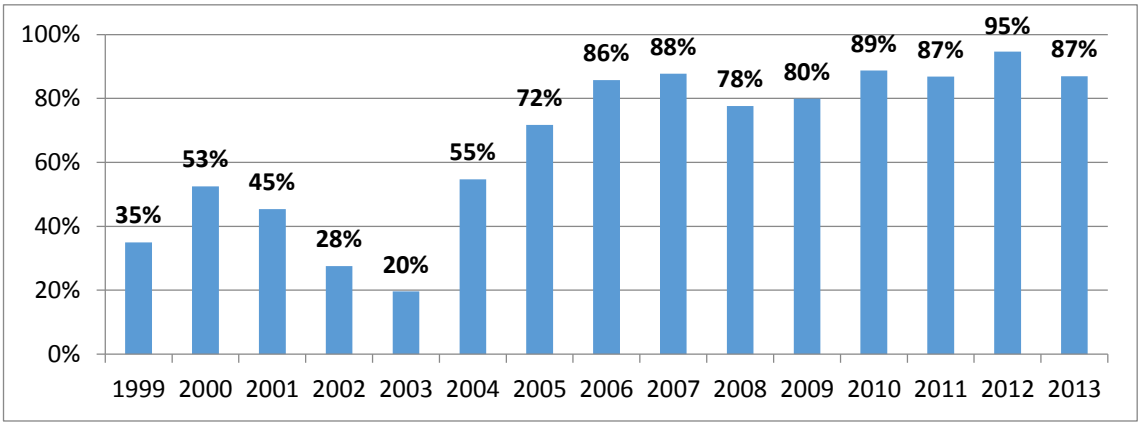
Source: IBGE/PME; CAGED

Figures 11 – Strikes and hours on Strike: 1999-2012



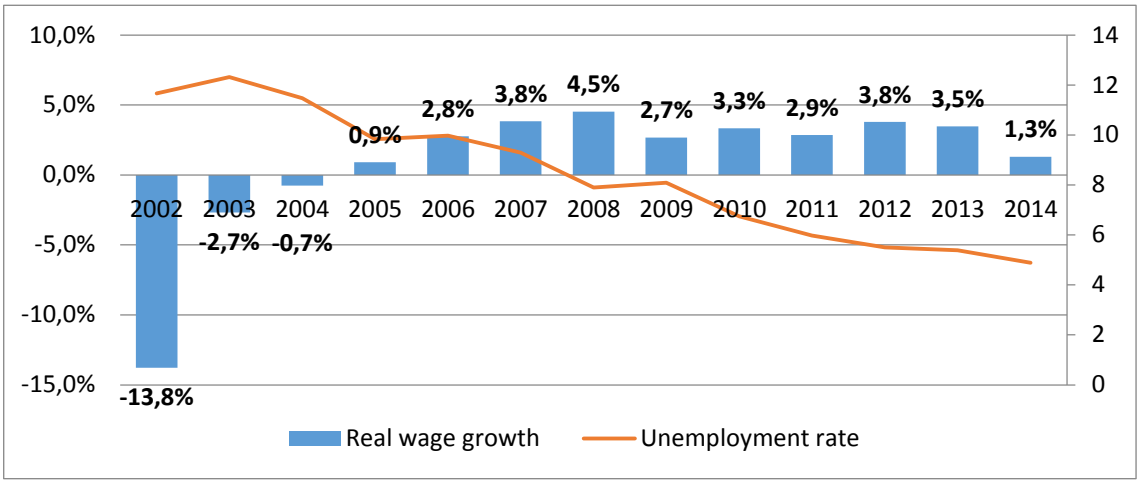
Source: SEADE/DIEESE

Figures 12 –Percentage of workers with real wage gains



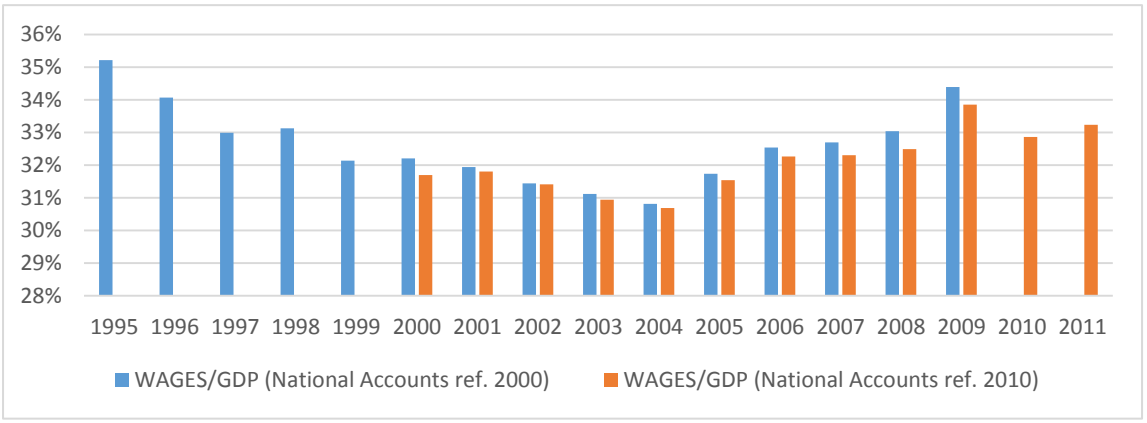
Source: SEADE/DIEESE

Figures 13 Real wage growth and unemployment



Source: CAGED; IPCA/IBGE; PME/IBGE

Figure 14 – Wage Share



Source: SCN/IBGE.

Table 1 – Average annual nominal rates of change

		2000-2003	2004-2009	2010-2014	2000-2014
Prices	Food and Beverages	14.2%	4.9%	8.4%	8.1%
	Industrial goods	7.9%	3.9%	3.5%	4.7%
	Services	7.2%	6.5%	8.8%	7.3%
	Monitored	12.1%	5.3%	4.0%	6.9%
	Overall Inflation	8.8%	5.2%	6.1%	6.4%
Wages	Overall wages	2.9%	8.4%	8.9%	7.4%
	Manufacture industry	4.1%	8.4%	8.9%	7.8%
	Service sector	-0.1%	7.3%	8.3%	6.0%
	Agriculture	5.7%	10.9%	10.4%	10.7%
	Minimum wage	16.0%	12.3%	9.5%	12.5%
Productivity	Agriculture	7.1%	3.0%	8.6%	5.1%
	ufacturing Industry (PIM/PI	2.2%	3.4%	-0.8%	1.6%
	Serviços	-0.9%	1.3%	2.4%	0.9%
	Total	0.0%	1.2%	3.3%	1.3%
radable goods in loc currency	Commodities (IBC-Br)	20.4%	1.5%	6.8%	8.1%
	Imports	20.3%	0.8%	4.3%	6.7%
	Exports	18.7%	2.7%	6.9%	8.3%
	All Commodities (FMI)	30.2	4.6%	9.2%	12.8%
Real Interest Rate	Real Interest Rate	9.6%	8.5%	3.5%	7.1%

(1)Overall inflation from IPCA/IBGE; (2) Monitored prices inflation from BCB; (3) "Food and Beverages", "Industrial goods" and "services" inflation from Martinez (2014) (time series goes until dec. 2013); (4) Overall and sectorial nominal wages from MTE/CAGED, average nominal wage (admission and termination) (time series goes until dec. 2013); (5) Nominal minimum wage from MTE; (6) Agriculture, Services and productivity of the economy from SCN/IBGE, calculated as Value Added/Employed Workers, deflated by sectorial deflators (Fevereiro and Freitas (2015)) (data goes until 2011); (7) productivity of manufacturing industry calculated as physical production of manufacturing industry (PIM/IBGE) divided by working hours in industry (PIMES/IBGE); (8) IC-Br from BCB; (9) Import and Export in R$ calculated as Import and Export prices in US$ from FUNCEX times nominal exchange rate (BCB); (10) All Commodities prices in US$ from IMF times nominal exchange rate (BCB); (11) Real interest rate as yearly average nominal selic (BCB) deflated by IPCA/IBGE;

Table 2 – Labor Market, Institutional and policy variables and real wage growth

Labor market	2001-2005	2006-2014
Formal Employment (average, millions)	1	1.2
Unemployment rate	11.3	7.1
Labor Force (PEA)	3.0%	1.2%
Working age population (PIA)	1.9%	1.3%
Labor informality rate	53.9%	48.1%
Institutional and policy Variables	**2001-2005**	**2006-2014**
Real minimum wage	5.3%	5.2%
ber of benefited workers (million) -unemployment benefit and "abor al'	7.8	16.3
Public Social Transfers	6.3%	5.7%
Workers Bargaining Power	**2001-2005**	**2006-2014**
Turnover Rate	43.7%	50.3%
Strikes (number)	331	491
Strikes (thousand hours)	19	44
Percentage of workers with real gains	43.8%	86.0%
Real Wages	**2001-2005**	**2006-2014**
Manufacturing Industry	-2.3%	3.3%
Construction Industry	0.0%	3.8%
Commerce	-1.5%	2.9%
Services	-5.3%	2.3%
Agricuture	1.8%	5.1%
Total	-3.2%	3.1%
Workers average income	-2.4%	3.2%

(1) Formal Employment CAGED/MTE; (2) Unemployment rate, Labor force and working age PME/IBGE (beginning 2002); (4) Labor Informality rate PNAD/IBGE-IPEA/IPEADATA; (5) Real minimum wage = nominal minimum wage (MTE) deflated by IPCA/IBGE; (6) Number of benefited workers: MTE (data goes until 2012) see Ibarra (2013); (7) Public Social Transfers from DIMAC/IPEA; (8) Turnover rate RAIS/DIEESE (until 2011) see Ibarra (2013); (9) Strikes – Number and hours from SEADE/DIEESE; (10) Percentage of workers with real gains form SEADE/DIEESE; (11) total and sectorial real wages: Overall and sectoral nominal wages from MTE/CAGED, average nominal wage (admission and termination) deflated by IPCA/IBGE (time series goes until dec. 2013); (12) Workers average income form PME/IBGE (beginning in 2003).