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**Income Distribution, Economic Growth and Capital
Accumulation Pattern of the Brazilian Economy in the
2000s**

Carmem Aparecida Feijo (CEDE/UFF)

Marcos Tostes Lamonica (UFF)

Julio Cesar Albuquerque Bastos (URRJ)

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Income Distribution, Economic Growth and Capital Accumulation Pattern of the Brazilian Economy in the 2000s

Abstract

This paper investigates the dynamic relationships among income distribution, debt ratio and capital accumulation in the Brazilian economy in the 2000s. One explanation for the relatively slow growth of the Brazilian economy is the relatively low rate of investment. However, consumption expenses have been the main responsible to sustain growth rates in the 2000s, which in a context of exchange rate appreciation, has contributed to de-industrialization of the country. The paper presents a Post Keynesian of income distribution model which discusses economic growth in terms of debt-led or debt-burdened patterns, in order to identify what are the causes of instability of the investment. Based in this approach an econometric model with VAR is used and found evidence of wage-led regime and debt-burdened pattern of capital accumulation in this period in the Brazilian economy.

Keywords: Brazilian economy, Growth regimes, Structural VAR.

JEL: O16, O11.

Carmem Aparecida Feijo^{*}

Marcos Tostes Lamonica^{**}

Julio Cesar Albuquerque Bastos^{***}

^{*} Associate professor at Fluminense Federal University; research fellow at Brazilian National Council for Scientific and Technological Development (CNPq - linked to the Ministry of Science, Technology, and Innovation); Coordinator for Evaluation of the Post-graduate Programs in Economics (2012-2012), carried on by the Coordination for the Improvement of Higher Education Personnel (CAPES - linked to the Ministry of Education).

^{**} Associate professor at Fluminense Federal University.

^{***} Associate professor at Federal Rural of Rio de Janeiro University.

1. Introduction

The Brazilian economy, one of the most dynamics after the post-War, lost its vigor in the 1980s, after the external debt crisis. During the period of the state-led-industrialization (1950-79), growth rates were 7.3% per year, on average. Since the 1990s, a neoliberal economic policy agenda is being followed, and the economy has not been able to restore its growth potential. Comparing its performance with a select number of emerging economies (Russia, India, China and South Africa), for instance, in the 1980-2010 period, Brazilian growth was 2.3% per year on average, against 6.7 % per year on average, of the emerging economies. One explanation for the relatively slow growth of the Brazilian economy in the last three decades can be found in the relatively low rate of investment, which was below the average reached in the period of fastest growth. Consumption expenses have been the main responsible to sustain growth rates in the 1990s and 2000s, which in a context of exchange rate appreciation, has contributed to de-industrialization of the country.

In spite of the relatively low rates of growth, one of the remarkable achievements of the Brazilian economy in the 1990s was to overcome high inflation regime¹ with the *Real Plan* in 1994. As high inflation regime hits most the working class, an improvement in the income distribution followed, which was further reinforced by well-succeeded social programs of income transfer and an economic policy to restore the purchasing power of the minimum wage. So, since inflation stabilization, as the wage share increased, this suggests that a wage-led demand regime might have prevailed along the last two decades.

The post Keynesian literature on demand-led growth models shows that in a wage-led regime, aggregate demand expands as the increasing wage share stimulates private consumption. In a virtuous circle, the stimulus of increasing consumption should encourage investment, expanding productive capacity accordingly.² But, as the increase in wages above productivity puts pressure on costs, productivity gains, due to the expansion of aggregate demand (the Verdoorn law) should compensate in the long run increases in real wages in order to keep economic efficiency and competitiveness. So, in a process of cumulative circular causation the interaction of demand regime and productivity regime will describe specific growth paths, that will be 'virtuous' of high and sustained growth, or 'vicious' of low and volatile growth, according to the institutional environment and political economy framework of the economy.

More recent developments in post Keynesian literature, inspired in Minsky, also considers the instability in the growth path generated by fluctuation in the investment rate in the short run which also impacts the growth potential in the long run. Nishi (2012) discusses economic growth in terms of debt-led or debt-burdened patterns, in

¹ For a reference of the high inflation regime in Brazil see Feijó and Carvalho (1992).

² Marglin and Bhaduri (1990) argument is straightforward. As savings rates of capitalists exceed those of workers, a shift in the distribution of income in favour of wage earners will boost aggregate demand, if effect outweighs any possible decreases in investment arising from the redistribution of income in favour of wages.

order to identify what are the causes of instability. According to Nishi (2011), if a rise in the debt ratio stimulates capital accumulation, then this capital accumulation pattern is referred to as debt-led. On the contrary, if the rise in debt ratio restrains capital accumulation, the capital accumulation pattern is referred to as debt-burdened.

The neoliberal policy agenda pursued by the Brazilian government in the 1990s and 2000s had inflation control and primary fiscal surplus as the main pillars. During this period, investment rate has been disappointing. Inflation target regime was adopted in January 1999, after the succession of speculative attacks against the domestic currency that forced governmental authorities to abandon fix exchange rate. One of the consequences of this policy orientation is that Brazil presents, still nowadays, one of the highest interest rates of the world. High interest rates differential, on its turn, has contributed to keep real exchange rate appreciated. The long overvaluation trend of the real exchange rate has been playing a role to reduce the share of manufacturing industry in total value added and to concentrate exports in products of low value added.³ So, since the neoliberal agenda has been adopted, a recurrent issue concerning growth of the Brazilian economy has been how to stimulate private investment, in a context of high domestic real interest rates, high and volatile real exchange rate, low public investment and increasing real wages, in order to boost capital accumulation.

The aim of this paper is to investigate the relationship between functional income distribution, debt ratio and capital accumulation in the Brazilian economy in the 1990s and 2000s. Following Minsky, capital accumulation is affected by the long-run expectation of firms with regard to cash flow. However, with capital accumulation, firms are more dependent on external finance, and so the firms' leverage ratio gradually increases, and their financial position thus become fragile. In this context, negative changes in the financial market or a reversion in expectations about future receipts can increase debt burden on private firms, and consequently debt ratio, without increasing capital accumulation. If the economy is profit-led, an increase in profit share can reduce debt burden and eventually improve capital accumulation, depending on how increased risk is perceived. Under the same token, if the economy is wage-led, an increase in the debt ratio might not be positively correlated with capital accumulation, if expectations about future returns on capital investment do not overweight the increase in the financial burden on private firms. There are many reasons for that, and one, that is of particular interest for the Brazilian economy in the 1990s and 2000s, is to suppose that the stimulus of an increase in private consumption might imply an increase in imports in order to satisfy domestic demand. If this is the case, investment rate does not improve, the degree of external fragility of the economy might be increased, and the economy will have a propensity to present relatively low and volatile rates of growth.

This paper is developed in the following sections. Section 2 presents the main characteristics of recent development of the Brazilian economy, highlighting

³ See, for instance, Feijó and Lamonica, 2012.

macroeconomic changes in the 1990s and 2000s, considering improvement in wage share, price stability but also relatively low growth and high degree of uncertainty. Section 3 presents Nishi's model (2012) which discusses the sensibility of capital accumulation to income distribution and debt regime. In section 4 we present the results of an econometric model developed for the Brazilian economy based on Nishi's model. A final section concludes the paper.

2. The Brazilian economy in the 1990s and 2000s:

High inflation has been a persistent characteristic of the Brazilian economy. The period of accelerated growth from post-war to the end of the 1970s, that corresponds to the period of the industrialization led by the State, in the ECLAC's terminology, chronic inflation was seen as the result of unbalanced growth between the structure of supply and demand. In a context of quick change in relative prices and structural bottlenecks in the productive structure, inflation pressures were quickly spread to the whole economy, due to the ability of some agents to maintain or expand their participation in the national income. In a sense, inflation in Brazil, and in most Latin American countries in the period, would be the outcome of the import substitution industrialization process, allowing the manufacturing industry to retain part of the productivity gains. The inflationary process, as the result of a social conflict, was adverse to wage earners, as the excess of labor supply and weak labour market institutions kept relatively low the share of wages in the national income.

Persistent high inflation can also be appointed as responsible for the inhibition of the development of private mechanism of funding the long-term investment. In this context, capital accumulation of non-financial firms had to rely on retained profits, external funding and public banks loans. According to Cruz (1994), the importance of domestic resources to funding long-term investment could have been sustained by a productive structure rather oligopolistic. Camara, *et al* (2013), based on econometric evidence about the sensitivity of aggregate demand components to income distribution, concluded that the Brazilian economy, from the post-war until late 1980s, had shown a profit-led demand regime given the scenario of persistent high inflation and wage squeeze.⁴

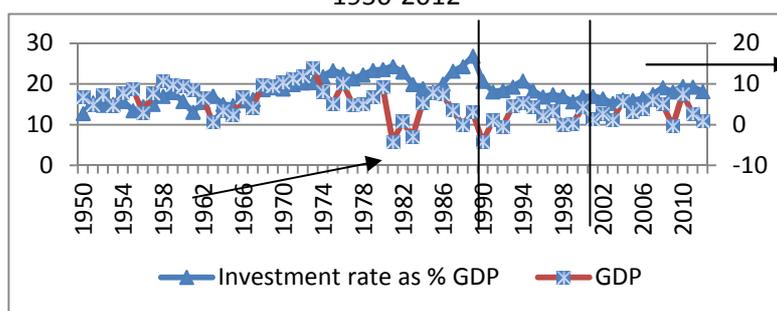
High inflation regime was controlled in 1994, after many unsuccessful attempts along the 1980s. Income distribution improved, and the wage share reached 50.6% in 2009, against 38.4% in 1985. Democratization of the political regime also helped to strenght labour bargain. In addition, economic policy convention changed sharply in the 1990s compared with the previous period. Besides price stability (average inflation rate was 6.3% aa from 1995 to 2012), the 1990s were also marked by the opening of the economy, following a more liberal approach to development, with less State intervention. Economic liberalization process came with an agenda of structural

⁴ The authors point out that this result would not be expected according to the demand led-growth literature for large developing countries. See, for instance, Bhaduri and Marglin (1990, p. 385).

reforms, ultimately aimed at creating a stable economic environment with an emphasis on market forces. It was believed that the introduction of structural reforms would 'naturally' encourage growth and attract foreign capital. (Erber, 2002). Trade and capital liberalization would promote a virtuous circle of growth as a result of structural reforms, designed according to the Washington Consensus. In this sense, economic policy should aim at price stability and the control of the public deficit.

Figure 1 helps to illustrate different moments of Brazilian economic development comparing the evolution of GDP and the investment rate. Up to the end of the 1970s, investment rates were increasing and GDP growth rates were accelerating. Growth decelerated after the external shock in 1981 and until the beginning of the 1990s, when Brazil was accepted in the Brady Plan to renegotiate foreign debts, the country was submitted to severe foreign constraint. As a result, GDP growth rates were very unstable as well as investment rate. From the 1990s onwards both investment rate and GDP move at lower levels, than the ones observed in the 1970s. After inflation stabilization, the main source of uncertainty came from the external attacks to the Brazilian currency, following the Asia and Russia crisis, in 1997 and 1998, respectively. In the 2000s the external scenario improved for the country, until the international financial crisis in 2008.

Figure 1: Investment rate as percentage of GDP and GDP growth rates 1950-2012



Source: IBGE National Accounts

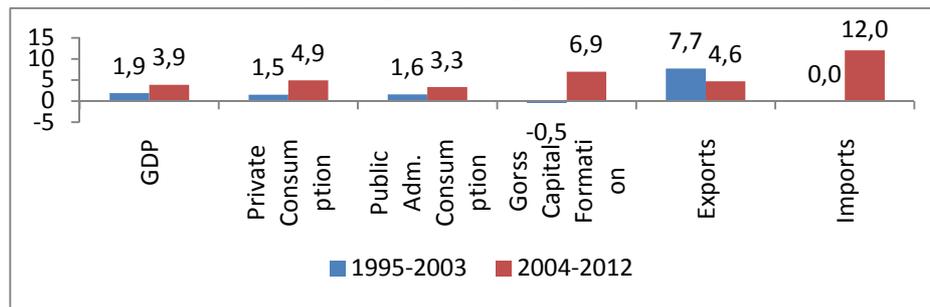
Additional to the foreign constraints, institutional changes in economic policy, as already mentioned, aiming mostly stabilization goals, can be appointed as one of the reasons why GDP growth rates from the 1990s onwards had been relatively low.⁵ As observed by Ocampo and Vos (2005), emerging economies financially integrate in the global economy, should preserve their policy space in order to make room for contra-cyclical policies. This does not seem to be the case followed by the Brazilian economic authorities, as interest rates are still today among the highest in the world, and real exchange rate has shown a persistent trend to overvalue along the 1990s and the 2000s.⁶ In order to better analyse economic evolution in recent decades, Figure 2 displays the components of aggregate demand in two different periods, with rather contrasting aggregate results: 1995-2003 and 2004-2012.

⁵ As Serrano and Summa (2011, p. 27) point out that, even when external constraints were relaxed in mid 2000s, "Brazilian authorities were a bit slow in realizing this and beginning to take advantage of the considerable policy space that was opened". They conclude that although the economic policy did not change the economy showed a better performance due to the boom of exports, which was interrupted after the international financial crisis.

⁶ About this, see Nassif *et al*, 2011.

The first sub-period, 1995-2003, registered annual growth of 1.9% per year and had been led by exports, whose average growth rate was 7.7% per year. This result is in part explained by the improvement in the terms of trade. After price stabilization, exchange rate tend to overvalue, and this helps to explain the modernization process of industrial park in the 1990s, recovering productivity growth after a long period of stagnation. But the process of modernization of the productive structure occurred with relatively low levels of investment. Indeed, in the period 1995-2003 the growth rate of gross fixed capital formation was negative (-0.5% per year)

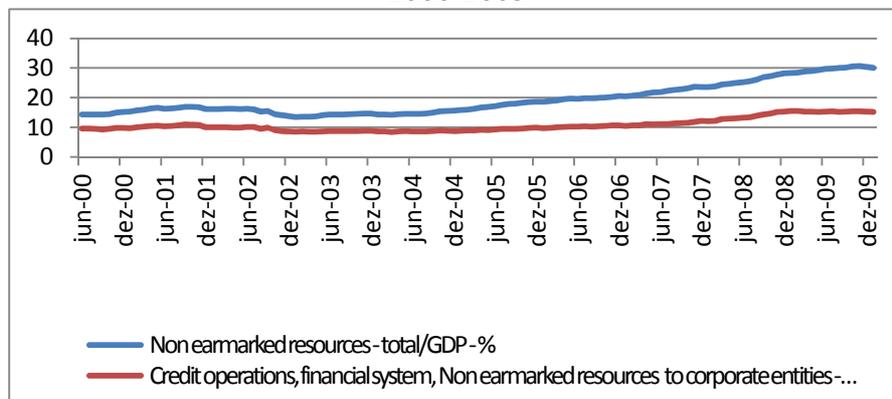
Figure 2: Average growth rate p.y of the components of Aggregate Demand 1995-2003 and 2004-2012



Source: IBGE: National Accounts

In the next period, 2004-2012, the average growth rate of GDP increased significantly to 3.9% per year, as well as private consumption and gross fixed capital formation which grew 4.9% and 6.9% respectively per year. The increase in the growth of domestic absorption with relatively low growth of the manufacturing sector (average growth rate of 2.4% per year) implied a dramatic increase in imports of 12.0% per year. Investment recovery was observed from 2004 on, but decelerated after the international financial crisis in 2008, following the sudden change in expectations about the return of long term commitment of resources. Another difficulty in the recovery of the investment rate is that profit margins have been depressed, as wages have been going up above productivity. Indeed, corporate savings have decreased from 73.3% in 2000 to 65.1% in 2009. On the other hand, total credit has been expanding more to families than to firms (Figure 3).

Figure 3: Total credit and corporate credit as percentage to GDP 2000-2009



Source: Central Bank of Brazil

Evidences suggest that the Brazilian demand regime has changed to wage-led regime since the 1990s. A standard wage-led growth regime is defined when capital accumulation is induced by changes in income distribution in favor of wages. As growth rates have been relatively low and unstable we suggest that the macroeconomic environment has not privileged capital accumulation in Brazil in the last decades. On one hand, the combination of high rates of interest and real exchange rate misalignment might have reduced the degree of confidence in expectations that

would support long term commitment of resources. On the other, the overvaluation trend of the real exchange rate implies that part of demand impulses are transferred abroad, and little stimulus is given to the development of local technology to increase the value added of final products domestically produced. In this context, predicability about the future generation of revenues by non-financial firms to match committed expenses is blurred and decisions about capital accumulation might be postponed. In order to move forward in our investigation we shall test next the sensitivity of the investment in fixed capital to income distribution and the degree of indebtedness, describing first a theoretical model, and after testing it empirically.

3. The theoretical model

Our aim in this section is to discuss a theoretical model to evaluate the sensibility of income distribution and private indebtedness in the capital accumulation process. Many post Keynesian studies, inspired by Robinson, Kaldor, and Kalecki writings on growth and distribution, have focused on the relationship between income distribution on growth regimes, that is to say, how distribution impacts the growth of aggregate demand components. Following the seminal work of Marglin and Bhaduri (1990), a profit-led growth regime indicates a phase wherein the output expands as the profit variables increase, in opposition to a wage-led growth regime, where the output expands as the wage variables increase. Recent post Keynesian literature, inspired on Minsky and Kaleckian models with debt accumulation, distinguishes two situations: one in which increase indebtedness is positively correlated to increase in investment in capital formation, leading to a debt-led pattern and one in which increase indebtedness is positively correlated to the carrying on of past debt, leading to a debt-burdened pattern (Nishi, 2012). In this latter case, debt increase by firms discourages capital accumulation. Therefore, as Dutt (1995); Hein (2007); Taylor (2004) and Nishi (2012), this section exploits how the distribution of income and debt dynamics of firms are both important determinants of the performance of the firm with respect to accumulation of capital, which is so critical to the growth of potential output over time.

We start the presentation of Nishi's (2012) theoretical model with the conventional definition of aggregate equilibrium for a closed economy without government:

$$S_t = I_t \quad (1)$$

where S and I are respectively aggregate savings and aggregate investment and the subscript t stands for period of time.

Following Nishi (2012), Hein (2007) and Taylor (2004), we assume income distribution among workers, firms and rentiers and define their saving shares. Income of the rentier, that is to say, interests and dividends received, is all spent on consumption. Workers save part of their wage income and firms save all retained profits. Aggregate savings can be written as:

$$S_t = s_w(1 - \pi)Y_t + s_R[(1 - s_F)(\pi_t Y_t - iD_t) + iD_t] + s_F(\pi_t Y_t - iD_t) \quad (2).$$

where:

s_W is the propensity to save out of wages that varies between 0 and 1,

s_R is the propensity to save out of the rentier's income that is assumed to be zero

s_F is the propensity to save out of the firm's retained profits, that is assumed to be equal to 1

π is the profit share exogeneously given,

$(1 - \pi)$ is the wage share,

Y is the national income,

i is the market interest rate,

D is the stock of debt.

Given that rentiers do not save, we can write

$$S_t = s_W(1 - \pi_t)Y_t + s_F(\pi_t Y_t - iD_t) \quad (3),$$

Aggregate investment I is determined by accumulation of capital (g), assuming that the initial capital stock (K) is given:

$$I_t = g_t K_t \quad (4).$$

Substituting equations (4) and (3) in (1), the equilibrium condition in the market of goods and services can be expressed in terms of the rate of capital utilization (u), that is to say, the ratio output-capital ($Y/K = u$):

$$u_t = \frac{g_t + i\delta_t}{s_W(1 - \pi_t) + \pi_t} \quad (5).$$

where δ is the degree of indebtedness, or the ratio of debt to capital ($D/K = \delta$).

The dynamics of the model can be developed considering the desired rate of accumulation by firms, g^d , which is to be compared with the current rate of capital accumulation, g_t . The desired rate of capital accumulation is defined as:

$$g_t^d = f(k_t, i\delta_t) \text{ considering that } f'(k) > 0 \text{ and } f'(\delta) < 0. \quad (6)^7$$

where k_t stands for rate of profit and depends on the expected profitability on new investment each moment, so

$$k_t = \pi_t u_t.$$

The dynamics of adjustment is expressed as follows, considering $\alpha > 0$:

$$g_{t+1} - g_t = \alpha[g_t^d - g_t] = \alpha[g^d(k_t, i\delta_t) - g_t] \quad (7)$$

⁷ See, Hein and Schoder (2009), and Ndikumana (1999).

Considering equations (5) and (7) we can write:

$$g_{t+1} - g_t = \alpha \left\{ g^d \left(\frac{\pi(g_t + i\delta_t)}{s_w(1 - \pi_t) + \pi_t} i\delta_t \right) - g_t \right\} \quad (8)$$

Assuming $g_{t+1} - g_t = 0$, we can write:

$$g_t = g^d \left(\frac{\pi(g_t + i\delta_t)}{s_w(1 - \pi_t) + \pi_t} i\delta_t \right) \quad (9).$$

The effects of the income distribution (π) and of the degree of indebtedness (δ) on the accumulation rate (g_t) are given by equations (10) and (11), respectively:

$$\frac{\Delta g_t}{\Delta \pi_t} = g^d \left(\frac{1}{(s_w(1 - \pi_t) + \pi_t)^2} \right) (g_t + i\delta_t) s_w < 0 \quad (10)$$

$$\frac{\Delta g_t}{\Delta \delta_t} = g^d \left(\frac{\pi_t i}{s_w(1 - \pi_t) + \pi_t} \right) + g^d i \quad (11)$$

In equation (10), the growth regime is profit-led if g^d increases when π increases. By analogy, if π decreases and g^d increases, the growth regime is said to be wage-led. This is so because when the wage-share, $(1 - \pi)$, increases, this implies that aggregate savings also increase which allows an increase in investment and an acceleration in the rate of capital accumulation, for a given level of interest rates and constant debt.⁸

In equation (11), the first term on the right side implies that an increase in δ can lead to an increase in the consumption of rentiers, and thereby stimulate aggregate demand, which in turn would increase the capacity utilization, which then stimulate an increase in capital accumulation due to the accelerating effect (Nishi, 2012, pp. 696).⁹ The second term implies the impact of the increase in the cost of financing on capital accumulation, and so the sensitivity of accumulation in relation to the interest rate should be taken into account. Therefore, an increase in the degree of indebtedness can be a result of an increase in capital accumulation or an increase in the interest rate, that is to say, in the cost of financing. Thus, the model indicates that if the first term prevails, the economy shows a debt-capital accumulation regime and, accordingly, if the second term prevails, the accumulation regime is debt-burdened. Thus, the effect of the debt on capital accumulation is ambiguous.

⁸ Note that in the case of $(\Delta g_t / \Delta \omega_t)$, we get:

$$\frac{\Delta g_t}{\Delta \omega_t} = g^d \left(\frac{-s_w}{(s_w(1 - \pi_t) + \pi_t)^2} \right) (g_t + i\delta_t) i\delta > 0$$

⁹ In the case that consumption of rentiers is irrelevant, capital stock could still increase via increased investment, given a greater willingness and ability of firms to borrow for this purpose.

In order to clarify this ambiguity, it is possible to present an indebtedness equation in which the variation in the degree of indebtedness of firms is a function of the rate of accumulation itself, that is to say, the first rises when the latter is increased:

$$\delta_t = f(g_t) \quad (12)$$

In this case, accumulation will depend on the:

- (a) increase in the profit share, which will increase debt capacity, such as that $g_t = f(\pi_t)$ to $f' > 0$,
- (b) fall of indebtedness, via decreasing the cost of loading, such as that $g_t = f(D_t)$ for $f' < 0$.
- (c) increase in debt due to the decrease in risk perception and increased ability to issue new bonds, such as that $g_t = f(D_t)$ for $f' > 0$.

Considering all possibilities above, we can now rewrite equation (12) in the following way:

$$\delta_t = f(g(\pi_t, \delta_t)) \quad (13)$$

where: the sign of $\Delta\delta/\Delta\pi$ will depend if $f' > 0$ or $f' < 0$.

Therefore, the reaction of entrepreneurs in relation to the accumulation of capital, when income distribution improves for them, will depend on how the risk of greater indebtedness is perceived. In the case when the increase in the profit share lead entrepreneurs to take more risks, it is assumed that their expectation is that the increase in their income and wealth will more than compensate the greater debt commitments to be paid in the future. However, the model also shows that an increase in profit share can induce entrepreneurs to redeem debt and move to more liquid forms of wealth, when the risks of a greater indebtedness is negatively perceived.

Whether or not an economy is following a debt-led situation, as in the first case, or a debt-burdened situation, as in the second case, is an empirical question. In this sense, our aim in Section 4 is to work on the relationship among the variables g , π and δ in an econometric model for the Brazilian economy in the 2000s.

4. Empirical evidence: applying a Structural VAR Model

Following Nishi (2012), we will investigate in this section which accumulation pattern Brazilian economy presented in the 2000s, estimating a structural VAR model. The structural VAR that comprises income distribution (ps), capital accumulation ($accum$), and debt ratio (dk), using equation (13) for the identification of a simultaneous relationship, is expressed as:

$$\begin{pmatrix} ps_t \\ accum_t \\ dk_t \end{pmatrix} = \begin{pmatrix} 0 \\ \alpha ps_t + \beta dk_t \\ \theta ps_t \end{pmatrix} + c + A(L) \cdot \begin{pmatrix} ps_t \\ accum_t \\ dk_t \end{pmatrix} + \begin{pmatrix} \varepsilon_{ps_t} \\ \varepsilon_{accum_t} \\ \varepsilon_{dk_t} \end{pmatrix},$$

where c is a constant vector; A is a coefficient matrix, which concerns the lagged variables and L represents a lag operator; ε_{it} is a structural shock to each variable. We define the variables in empirical terms as:¹⁰

- ps (profit share) is obtained by dividing the Gross Operating Surplus - including self-employed - by the sum of Gross Operating Surplus and Wages and Salaries¹¹.
- $accum$ (capital accumulation rate) is defined as the ratio between Gross Fixed Capital Formation and Gross Domestic Product.
- dk (debt ratio) corresponds to the evolution of the balance of loans to private firms.

As we work with quarterly data, all the series were seasonally adjusted, using the Census X-12 method.

Let $x_t = (ps_t, accum_t, dk_t)^T$, where T denotes the transformation of the vector. Assuming that B denotes the coefficient matrix of the simultaneous relationship of the model, the following structural VAR model yields:

$$Bx_t = c + A(L)x_t + \varepsilon_{it}$$

where

$$B = \begin{pmatrix} 1 & 0 & 0 \\ -\alpha & 1 & -\beta \\ -\theta & 0 & 1 \end{pmatrix}.$$

As there are three zero constraints on the coefficients, the model satisfies the identification condition. Coefficients of the matrix B assume a simultaneous relationship among the variables, according to the proposed model in the previous section.

Empirical analysis

Before applying the econometric analysis we first investigated if the series are stationary. Therefore, the augmented Dikey-Fuller (ADF) test was used for testing whether each of these time series variables comprised a unit root. Table 1 shows the results.

¹⁰ The period of analysis runs from 1995Q1 to 2009Q4. The series are available at the website of the Central Bank of Brazil and at the Brazilian Statistical Office (IBGE).

¹¹ Gross Operating Surplus and Compensation of Employees estimates are only available as a total for the year, so they were transformed into a quarterly series according to the evolution of quarterly Gross Domestic Product estimates.

Table 1: ADF test

Series	ADF				
	Lags	I/T/N	Test	Critical Values 1%	Critical Values 5%
<i>accum</i>	1	N	-6.296	-2.606	-1.946
<i>ps</i>	0	I/T	-0.245	-4.121	-3.487
<i>d_ps</i>	0	I/T	-7.774	-4.124	-3.489
<i>dk</i>	3	I/T	-6.538	-4.133	-3.493

Note: the final choice of lag was made based on Schwarz Info Criterion. The term *d* is an operator for considering the first-order differences of the series.

According to the results of the ADF test, the profit share presented a unit root, that is, I(1). The non-stationary series were included in the estimation of the VAR model. Enders (2010) indicated that Sims *et al.* (1990) advised against the stationalization of variables even if they contain a unit root. According to Sims *et al.*, the VAR analysis aims to determine the interrelationship among the variables, rather than parameter estimates. The primary argument against stationalization is that it disregards the information regarding co-movements in the data. Moreover, Sims *et al.* (1990) presented the implication that the OLS estimator remains consistent irrespective of whether or not the VAR contains integrated components, provided that the innovations in VAR have enough moments and a zero mean, conditional on the past values of a series. However, it must be noted that if the VAR models include nonstationary series, then the confidence intervals obtained are not appropriate.

The dynamic analysis of the impulse response functions in the structural VAR permits evaluation of the impulse caused by shocks (or innovations) provoked by residual variables over time on key variables (Sims, 1980). As pointed out by Lutkenpohl (1991), the conventional method applies “orthogonality assumption” and thus the result may depend on the ordering of variables in the VAR. The choice of the VAR lag order was determined by using the Akaike Information Criterion (AIC) and Schwarz (SC) information criterion. It was found that the VAR lag order is 2 and that the best-fit model is without constant, which is the lowest value for the criteria AIC and SC. Table 2 and the Figure 4 show the results for lag order and the stability of the VAR, *i.e.*, every one of points are inside the unit circle.

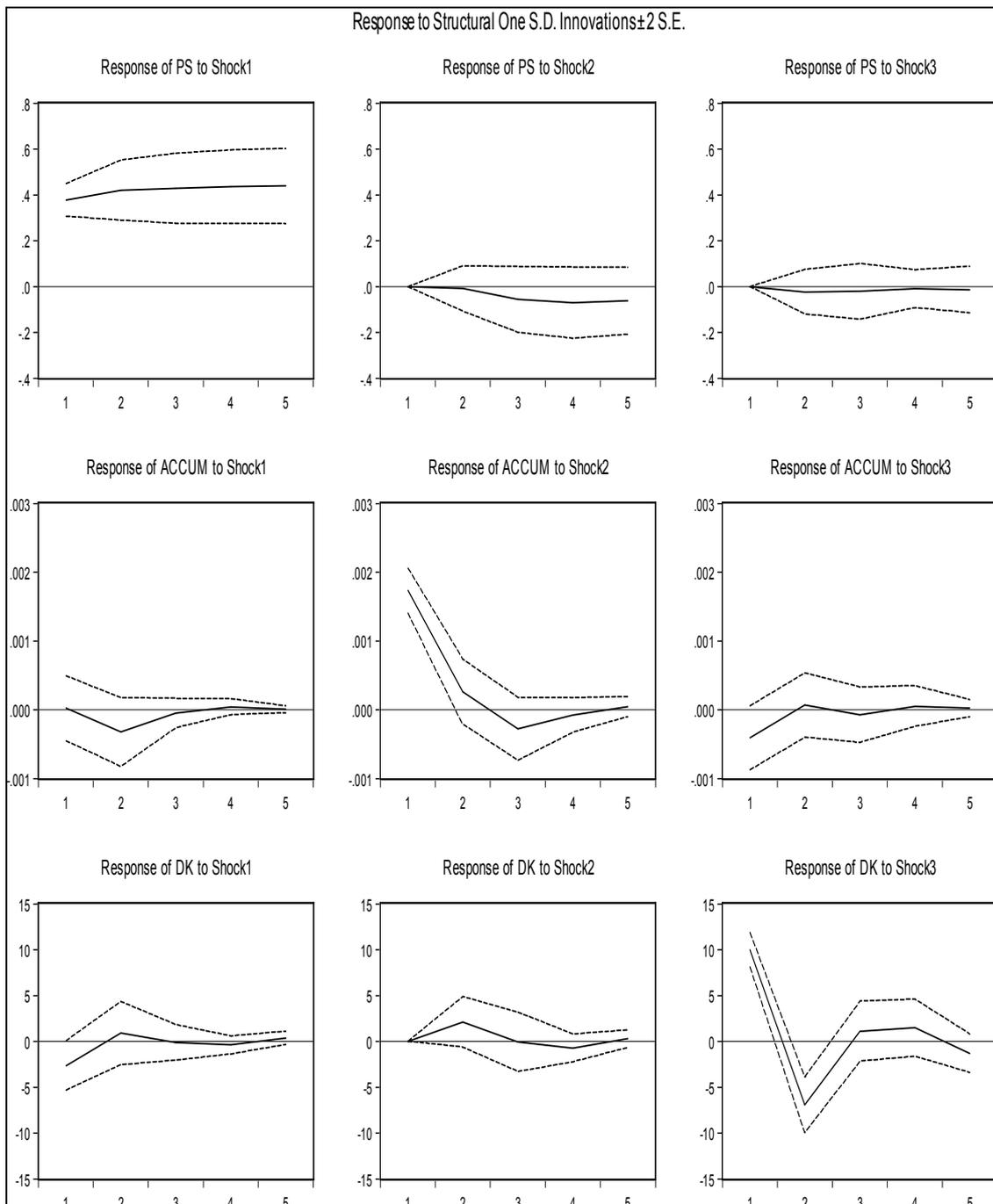
Table 2: AIC and SC criteria for VAR

With Constant			Without Constant		
Lags	AIC	SC	Lags	AIC	SC
0	-16.717	-16.603	0	-	-
1	-19.901*	-19.446*	1	-19.919	-19.578*
2	-19.876	-19.081	2	-19.937*	-19.255
3	-19.653	-18.516	3	-19.739	-18.716
4	-19.600	-18.122	4	-19.684	-18.320
5	-19.505	-17.687	5	-19.558	-17.854
6	-19.266	-17.107	6	-19.338	-17.293
7	-19.409	-16.909	7	-19.457	-17.071

These are the most relevant findings, according to the interpretation of the theoretical model. Other interpretations are:

- (c) A positive shock on ps , reduces dk for only one quarter;
- (d) A positive shock on dk basically does not impact the ps . This is the less clear result of the empirical model.
- (e) A positive shock on $accum$ does not affect ps during two quarters, initially. Thereafter ps decreases, suggesting a wage-led pattern.
- (f) A positive shock on $accum$ increases dk for a period of approximately two quarters. This is consistent with the findings on (c) - a positive shock on ps reduces dk but for only one period - and (e) - a positive shock on $accum$ reduces ps but after two quarters.

Figure 5: Accumulated impulse response functions for VAR



Note: The dotted lines represent ± 2 standard error (S.E.) values of the accumulated response function; however, they are not appropriate because the VAR includes nonstationary series

5. Final remarks

The aim of this paper was, based on Nishi's (2012) model, identify the accumulation pattern that prevailed in the Brazilian economy in the 1990s and 2000s. Our motivation was to shed some light why Brazilian accumulation of capital has been relatively slow after price stabilization and the opening of the economy in the 1990s.

Our main hypothesis is that macroeconomic environment keeping high interest rates and high real exchange rate did not favoured investment by firms. Economic policy agenda has privileged stability, maintaining its essential feature unchanged since the adoption of inflation targeting in 1999. Until nowadays, the institutional framework of the macroeconomic policy is based on the so-called tripod of economic policy, which consists of inflation target, flexible exchange rate regime and large targets for the primary budget surplus.

The theoretical model discussed highlighted the role of finance to capital accumulation, as this is an important link to explain why in Brazil investment rate does not rise significantly in order to increase growth rate. On one hand, the maintenance of high interest rates establishes a too high level of return on financial investments, making difficult competition with expected returns in investment in capital formation. Also, high interest rates limit external funding to firms, and so investment opportunities. On the other hand, high real exchange rate set up high competition with imports, desstimulating investment mainly in the higher technological industries. Low and unstable rates of GDP growth were influenced by relatively low investment rate, and, as implicit in the theoretical model, instability in investment impacts short and long term growth. According to Nishi, instability in the rate of investment in finance dominated economies is explained as the accumulation of debt increases the firm's risk, which compromises future investment decisions in capital accumulation.

Indeed, the period under our investigation is characterised by high level of uncertainty in the Brazilian economy, despite the sucess of price stabilization in 1994. The second half of the 1990s was marked by external crisis following speculative attacks to the domestic currency. Growth did not resume until mid 2000s when external constraint was relaxed, due to the good performance of the external balance, favorable terms of trade and expansion in domestic consumption, boosted by the increase in real wages and well succeeded policies of income distribution. This short recovery was interrupted by the international financial crisis in 2008 and the rise of uncertainty worldwide, as expectations about the future turned very pessimistic. During the period of greatest growth, 2004-2008, the real exchange rate appreciation trend made part of the domestic demand effect leak out, reducing incentives to domestic investment in more technologically elaborated goods. As this trend continued until 2012, further incentives to boost aggregate demand through domestic consumption induced higher imports of consumer goods, and decrease in indutrial production.

Therefore, the important role of the real exchange rate as an instrument to help to combat inflation has had the effect of inhibiting investment decisions in capital accumulation in the development of local technology. De-industrialization has been a consequence of exchange rate misallignment for such a long time.¹² In a scenario of real

¹² See, on this Bresser-Pereira and Marconi 2008. Also, it should be mention, de-nationalization occurred. During the mid 1990s domestic manufacturing firms faced increasingly effective import competition caused by the rising value of the Brazilian currency. In many cases the option for Brazilian entrepreneurs was to give up managerial control in favor of foreign take overs. In fact, Brazil, as other emerging countries, were one of the economies that received large amount of foreign investment in the second half

exchange rate overvaluation, a wage-led regime would hardly imply an increase in capital accumulation. On the opposite, exchange rate misalignment increased wage costs, reducing industrial competitiveness, negatively affecting the growth rate of the economy .

In sum, the neoliberal convention to growth,¹³ while keeping stabilization policies, reduced the policy space and so growth opportunities, given that the degree of uncertainty in the economy was still high either for domestic reasons, or for external reasons. An improvement in income distribution and the growth of mass consumer market, with credit inclusion, in mid 2000s, was not strong enough to boost and sustain productive investment in order to outset a virtuous growth cycle following a chain of forward and backward links inducing re-industrialization.

In our econometric model we found that the Brazilian economy seems to be in a wage-led regime of demand and in a debt-burdened pattern of capital accumulation. These findings are consistent with an institutional framework of political economy aiming at stability and the macroeconomic scenario of relatively high uncertainty which inhibits long term commitment of resources. Financial integration without meaningful instruments to capital control, resulted in overvalued and volatile exchange rate. So we conclude that the Brazilian economy, since economic opening in the 1990s, performs a case of low capital accumulation.

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of the 1990s even after the Asian and Russian crisis. Moreover the flow of foreign investment did not result in an increase in capital accumulation in the same proportion, as a great part were assigned to the aquisition of existing firms, many of them in the privatization process launched by the government. In this period foreign investment went mostly to services industries such as telecommunications, eletric energy, and financial services. After 2005 foreign capital went most to agriculture and mining sectors, due to the export boom. See Laplane and Sarti (2002) and Laplane *et al* (2001).

¹³ For a discussion about conventions to growth, see, Nassif and Feijo, 2013.

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