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Universidade Federal Fluminense
Faculdade de Economia
Rua Tiradentes, 17 - Ingá - Niterói (RJ)
Tel.: (0xx21) 2629-9699 Fax: (0xx21) 2629-9700
http://www.proac.uff.br/econ/
Editor: Luiz Fernando Cerqueira; lcer@uol.com.br; lfcerqueira@economia.uff.br.

# Inflation, Growth and Distribution: The Brazilian Economy after the post-War

**Felipe Figueiredo Câmara***
**Carmem Feijó****
**Luiz Fernando Cerqueira*****

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 * PhD Student in Economics at Federal Fluminense University.
** Full Professor at Federal Fluminense University, Researcher of CNPq. E-mail: cfeijo@terra.com.br
*** Associated Professor at Federal Fluminense University. E-mail: lcer@uol.com.br.

ABSTRACT

Following Marglin and Bhaduri, the purpose of this paper is to investigate empirically the interaction between income distribution and growth of aggregate demand during the 1951-89 period in Brazil. Applying Hein and Vogel's (2008) methodology we conclude that the Brazilian economy showed a profit-led demand regime. In a context of high inflation, high concentration of markets and wage control, retained profits were the main source to finance new capital. In this sense, we found a large sensitivity of investment relative to the wage share, a result that is compatible with the consumption pattern based on high income, which supported the growth trend with low wages observed in the period.

KEYWORDS: demand-led regime, Brazilian economy, industrialization via import substitution.

JEL: E12, E25, O11

## 1. Introduction

Since economic opening in the 1990s and the change of the economic policy agenda towards more liberal orientation, the performance of the Brazilian economy has been considered mediocre compared to its growth in the post-War period until the end 1980s: 2.7% growth rate in average per year in the 1990-2012 period, compared with 7.5% in average per year in the period of 1947-1989.[1] Inequality, on its turn, major characteristic of the Brazilian economy, has been reduced since the end of the high inflation regime[2] in the mid-1990s, associated with well-succeeded social programs of income transfer and an economic policy to restore the purchasing power of the minimum wage implemented since mid-1990s. These apparent conflicting evidences bring about an old debate in Brazil about how to conciliate income distribution and growth. In this sense, our focus in this paper is to discuss how the functional income distribution affected the behavior of aggregate demand in Brazil before economic opening and the implementation of a liberal economic policy agenda (since post-War until 1989), based on recent literature on growth regimes. During that period, economic growth has not been lavish in redistributing income, and more than that, during the period of accelerated growth income distribution was more perverse for wage earners.

Based on the seminal work by Marglin and Bhaduri (1990), that defines demand regimes according to the profile of the income distribution, this paper investigates the demand regime that prevailed in the Brazilian economy before economic opening, that is to say, during the period of accelerated growth, high inflation and higher social

[1] Actually, growth rates were high until 1980, just before the Mexican debt crisis. After 1981 growth rates in Brazil were unstable and much lower than in the previous period: from 1981 until 1989 average growth was only 2.2%.

[2] For a reference of the high inflation regime in Brazil in the 1980s and 1990s, see Feijó and Carvalho (1992).

inequality.[3] In our econometric investigation, we found that the Brazilian demand regime since post-War until the end of the 1980s was profit-led. This is an interesting result as the literature suggests that in rather closed economies with large share of consumption in GDP, as the Brazilian economy since post-War, a wage-led regime should prevail.[4] In our view, specificities of the Brazilian development should be taken into account in order to explain how a rather closed economy could conciliate accelerated growth and increase in profit share for over three decades, since the end of the War until the end of the 1970s. The 1980s was a decade characterized by severe macroeconomic imbalances that resulted in low growth and acceleration of inflation rates.

The paper is divided in six sections, besides this introduction. In Section 2, we provide a brief analysis of the evolution of income distribution and investment rate. In Section 3, we present the theoretical model that establishes the relation between distribution and aggregate demand. Section 4 presents the empirical analysis and definition of the nature of the demand regime in Brazil. In section 5, we interpret our results and Section 6 concludes the paper.

## 2. Functional income distribution and the behavior of investment in the 1951-89 period

A first empirical approach to the evolution of the functional income distribution and the investment rate is shown in Figure 1A. Although during 1951 to 1989 the wage share had been rather stable around 42%, it is clear that the movement of both curves was in opposite direction: when wage share increased investment rate decreased, and vice and

[3] We limit our period of analysis until 1989, as in March 1990, the new president elected after the military coup in 1964, Fernando Collor de Melo, gave a new orientation to economic policy, following neoliberal recommendations of the Washington Consensus. This implied deep changes in the institutional framework with impacts on income distribution and capital accumulation.

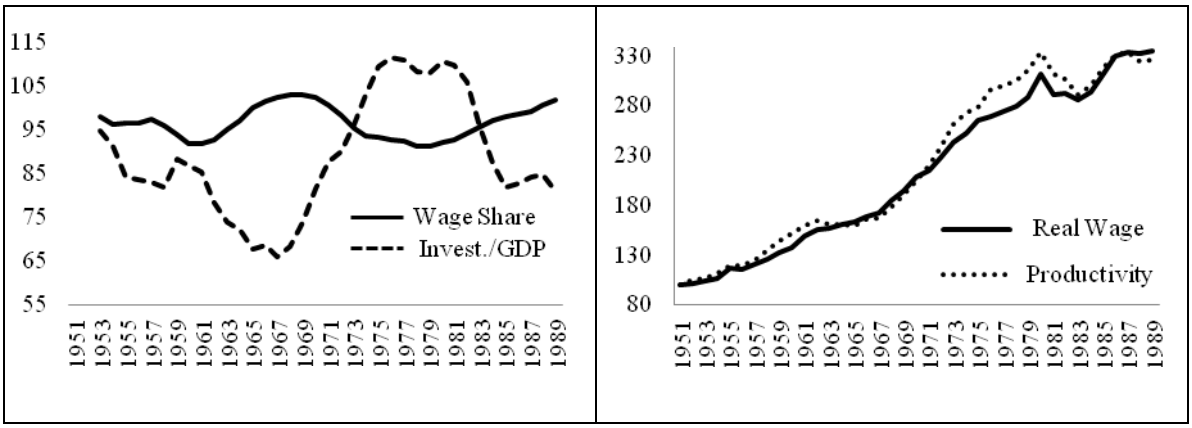
[4] Badhuri and Marglin (1990).

versa. As inflation had been persistent during the period, a wage control policy had been frequently used as an instrument of price stabilization (Bacha, 1980).

Figure 1B shows the periods when productivity gains grew faster than real wages: from 1957 to 1961 and from 1973 to 1983. During periods of lower rates of output growth (beginning of the 1960s and mid1980s) and therefore slowdown in productivity growth, we observe that there was redistribution in favor of wages. Conversely, periods of higher growth, as during the "economic miracle" (1968-74), productivity growth was higher than the growth of wages, and so wage share did not improve.

**Figure 1:** Evolution of functional income distribution – 1951-1989

**A** **B**




**Source:** Marquetti (2012) and Heston, Summers and Aten (2009); **A:** Index number **(**1951=100; moving average of 3 periods); **B**: Index number **(**1951 = 100).

Figures 1A and 1B allow us to suggest a causal relationship between distribution in favor of profits and acceleration in capital accumulation. In this sense, empirical evidences about the interaction between growth and income distribution in Brazil in 1951-89 suggest that the country followed a growth pattern similar to classic/Marxist interpretation, that is to say, the rise in the wage share resulted in profit squeeze and

reduced investment rate. [5] Based on Keyensian assumptions, we shall argue in the following sections that this pattern of growth might have occurred. Up to now, the first evidences seem to suggest that the growth of aggregate demand in Brazil between 1951 and 1989 was induced by the redistribution in favor of profits, thanks mainly to the high sensitivity of investment to that variable.

## 3. Aggregate demand and functional distribution of income

The investigation about the demand regime allows to establish the functional relationships between income distribution and growth components of aggregate demand. A regime is named profit-led when a distribution in favor of profits increases aggregate demand. If the opposite occurs, that is to say, an increase in the wage share increases aggregate demand, the regime is named wage-led.

The starting point for the construction of the theoretical model is to write the aggregate demand as follows:

$$Y = CP + I + G + NEX \quad (1)$$

where: $Y$ is aggregate demand; $CP$ is private consumption; $I$ is investmet; $G$ is governamental consumption; and $NEX$ are net exports, defined as $X - M$, where $X$ is demand for exports and $M$ is demand for imports.

National Income is defined as:

$$PY = W + R \quad (2)$$

where: $P \times Y$ is the National Income and $P$ is an index for the level of aggregate price; $W$ is the amount of wage paid and $R$ is the amount of profits. We assume that there are only two classes: workers that receive wages and capitalists that receive profits.

[5] We should note that in marxists models there is no role for aggregate demand in determining long-term growth, which is explained exclusively by supply forces.

Price formation is defined as:

$$P = (1 + z) \times CUT \tag{3}$$

where *z* is the mark-up and depends, among other things, on the degree of monopoly of the economy; *CUT* is the unit cost of work, that is to say, it measures the cost to produce a unit of physical product. It corresponds, in algebric terms, to the average nominal wage divided by labor productivity. The definition of this variable shows that *CUT* is related with the share of wages in national income as equation (4). Defining $W = wL$ in equation (2), we can write the wage share, *WS*, as:

$$WS = \frac{W}{PY} = 1 - \frac{R}{PY} = \frac{wl}{PY} = \frac{w/P}{Y/L} = CUT/P \tag{4}$$

where *w* is the average nominal wage; *w/P* is the average real wage and *L* is the amount of employment. We assume, without loss of generality, that the initial level of price is equal to one, and so: $WS = CUT$.

In the demand-led regime model, variations in the private consumption are related to functional income distribution. This is justified because it is assumed that average propensities to save are different between workers and capitalists (Kalecki, 1954; Kaldor, 1956), and workers have a propensity to save smaller than capitalists do. According to Naastepad (2006), this difference is due to the retention of a large proportion of profits by companies. Therefore, a given level of income distribution in favor of workers implies increased private consumption, that is to say, consumption function is positively affected by changes in the wage share.

The function to private consumption can be written as:

$$CP = f(WS, Y), \qquad \frac{\partial CP}{\partial WS} > 0 \quad e \quad \frac{\partial CP}{\partial Y} > 0 \tag{5}$$

It is also assumed that investment responds positively to redistribution in favor of profits. An increase in the share of profits means, *ceteris paribus*, an increase in the internal resources to firms, which may alleviate, given the state of expectations, any short-term constraint to new investment in fixed capital (Feijo, 1993). Moreover, since the investment decision entails a portfolio choice among liquid assets, the increase in expected profit rate on physical capital compared to the market interest rate can boost investment in fixed capital. Finally, for a certain constant level of capacity utilization, according to Uermura (2000) an increasing profit share may imply higher rate of profit (Uemura, 2000). This follows from Steindl (1952), that assumes that firms respond to the increase in effective demand increasing investment in capacity aiming at keeping the 'optimal' rate of capacity utilization as a strategy to deter entry and obtain 'super' normal profits in oligopolistic markets. Therefore, the investment is considered a positive function of GDP (proxy for aggregate demand) and the share of profits in income. The investment function is defined as:

$$I = f(RS,Y) \;\; \therefore \;\; I = f(WS,Y), \qquad \frac{\partial I}{\partial WS} = -\frac{\partial I}{RS} < 0 \;\; e \;\; \frac{\partial I}{\partial y} > 0 \tag{6}$$

where: *RS* is the profit share (the proportion of profits in national income (*R/Y*).

Government expenditures are assumed dependent on administrative and hierarchical processes in the government (Amitrano, 2011). In this sense:

$$G = f(\rho) \tag{7}$$

where $\rho$ is a variable that captures the effects of changes in the interaction among the different elements in process in government.

Finally, the demand for exports is assumed to be a positive function of income level weighted by the importance of the trading partners. The transmission mechanism of changes in distribution affecting exports is via prices. As it is assumed that prices are set up by a mark-up rule over unit labor cost, which is equivalent to the wage share, an

improvement in income distribution in favor of wages affects negatively price competitiveness of exported goods, [6] given the exchange rate. Imports, according to Naastepad (2006), are assumed a function of domestic income. [7] Both functions can be written as:

$$M = f(Y), \ \frac{\partial M}{\partial Y} > 0 \qquad X = f(WS, Yf), \ \frac{\partial X}{\partial WS} < 0 \quad e \quad \frac{\partial X}{\partial Yf} > 0 \tag{8}$$

where $Yf$ is the income of the trade partners.

Once the functions of the components of aggregate demand have been defined, equation (1) can be written as:

$$Y = CP(WS, Y) + I(WS, Y) + G(\rho) + [X(WS, Y) - M(Y)] \tag{9}$$

An exogenous variation in income distribution, given a certain level of capacity utilization (or a given level of income) will have a direct impact on consumption and investment and exports. The intensity with which these variables respond to changes in income will result in a net impact on the aggregate demand, which defines the nature of the demand regime: profit-led or wage-led.

## 4. Empirical analysis: data and estimates of the long-term elasticities

Data employed in the econometric exercise refer to GDP (*Y*), private consumption (*CP*), total investment *(I*), exports (*X*) and GDP of USA (*Yf*) from Heston, Summers e Aten (2009)[8], and the wage share (*WS*) from Marquetti (2012).

[6] Assuming that variations in the income distribution are not offseted by variations in the mark up.
[7] Increases in labor costs could affect the level of imports in open economies, as, when domestic prices increases, there would be a shift in demand for imported goods. However the Brazilian economy in 1951-89 was extremely closed and import control mechanism has been widely used given the import substitution strategy followed to accelerate the industrialization process. In this sense we follow Naastepad (2006) and consider that imports are not directly affected by changes in income distribution.
[8] We use data from Penn World Table 6.3 (PWT 6.3), because in more recent versions (PWT 7.0 or PWT 7.1), govenent expenditures with education and health are included in private consumption, and not as government expenditures. Concerning our objectives, we consider the old methodology more appropriated.

In our exercise we tested the variable investment for two different specifications. One as total investment and other as private investment. The reason for that is because during the period of our study state-owned enterprises played a relevant role in the industrialization process of the country.[9] Their importance can be understood not only as a driving force to private investment as they were crucial to the industrialization project of the country, but also, as Trebat (1983) had shown, because, by the 1970s, they were performing very close to private enterprises when investment decisons were made.[10] This means to say, according to the author, that state-owned enterprises in Brazil had a great autonomy to fix prices and allocate funds at that time. This scenario started to change in the 1980s, when macroeconomic conditions of the country deteriorated, and state-owned enterprises were used as part of the governamental strategy to attract capital and to control inflation. So, in order to test the relevance of public investment to explain the behavior of total investment, we also made estimates considering only private investment (and not total investment). To proceed such estimates we calculated public investment as the share of public capital formation in total capital formation (National Accounts[11]), and this proportion has been applied to the series of total investment from Heston, Summers e Aten (2009). [12] Results showed that the negative impact of wage share on investment was higher when public investment has been considered, and those are the results reported in Table 2.

[9] The main public enterprises created in the 1940s and 1950s were: Companhia Siderúrgica Nacional, in 1941, in the metalurgic branch; Companhina Vale do Rio Doce, in 1942, in the mining branch and Petrobras, in 1953, in the exploration and processing of oil.

[10] Trebat (1983) lists a number of factors such as operational autonomy, high dependence on financing from domestic resources (and relative independence from public funding), management reporting to "market disciplines", etc.. which leads us to assume the hypothesis that the demand for investment in Brazilian state-owned enterprises responded to a functional redistribution of income in a similar way to what happens with private companies. This implies, according to the assumptions of the theoretical model to be developed, that the share of aggregate demand that responds to the functional redistribution of income is greater than in cases where state-owned enterprises are mere subservient to the State.

[11] IBGE - Brazilian Statistical Office: *Estatísticas do Século XX*, <http://seculoxx.ibge.gov.br/economicas/contas-nacionais>

[12] Also we made estimates excluding public investment employing data from Morandi (2011), and reached at the same result.

All series were specified in log, as we assume a constant elasticity of each component of aggregate demand in relation to the distribution (and income).[13] To identify the demand regime we followed Hein and Vogel's (2008) methodology. Therefore, the partial impacts of changes in wage share in each component of aggregate demand (*CP*, *I* and *X*) were calculated according to the steps below:

i) Elasticities were estimated to each component of demand in relation to the wage share;

ii) In order to calculate the partial derivatives, that is to say - $\partial CP/\partial WS, \partial I/\partial WS, \partial X/\partial WS$ - elasticities estimated in (i) were multiplied by the ratio of the sample average of each component divide by the sample average of the wage share;

iii) Partial impacts were obtained by dividing the derivatives by the average sample of the income.

Adding up the partial impacts we obtain the total effect of a one percentage point increase in the wage share on the increase/decrease of real GDP (in %):

$$\frac{\frac{\partial Y}{Y}}{\partial WS} = \frac{\frac{\partial CP}{Y}}{\partial WS} + \frac{\frac{\partial I}{Y}}{\partial WS} + \frac{\frac{\partial X}{Y}}{\partial WS} \qquad (10)$$

If $\frac{\partial Y}{Y}/\partial WS > 0$, demand regime is wag-led; if $\frac{\partial Y}{Y}/\partial WS < 0$ demand regime is profit-led.

In order to define the econometric method to estimate the elasticities we first implemented the Augmented Dickey-Fuller (ADF) unit root test to identify the order of integration of the series. Then we tested for the existence of a stable long-term relation among the variables, that is to say, if the variables are co-integrated employing the

[13] Using the series in logarithmic form imply that we are assuming multiplier effects of the wage share on the components of aggregate demand. The estimation using variables in level, that assumes additive effects, are not suited to the characteristics of the series used in this analysis, since growth is exponential over time.

Engle-Granger (1987) procedure. We concluded that all series are *I*(1) and co-integrated. Therefore, we applied a single-equation error correction model approach (SEECM), the Stock (1987) estimator and the Dynamic Generalized Least Squares (DGLS) estimator (Stock and Watson,1993) in order to estimate the co-integrating coefficient (the long-term elasticities).[14]

The number of lags on the differences of Stock (1987) error correction equation was determined according to the significance of the lagged difference added and the improvement in the test statistics. We gradually increased the lag order of the differences always keeping at sight the search for parsimony. The number of leads and lags included in the DGLS equations observed the same pattern. The inclusion of deterministic trend terms was motivated by graphical analysis of the dependent variables and these terms were included when their coefficients were significant and the inclusion did not deteriorate the individual and joint significance test statistics of estimated equations.

### 4.1 Estimating the partial effects of the income distribution

### Private Consumption

Private consumption (CP) was estimated as a function of the GDP (Y), employed as a proxy to national income, and a function of the wage share (WS). The results of the estimation are shown in Table 1.

[14] The method of Stock and Watson (1993) consists of adding leads and lags to a single equation of the error correction model to correct possible effects of endogeneity. The use of this method is appealing because the estimated equations relate the GDP, with the components of aggregate demand which can generate endogeneity by simultaneity. To correct autocorrelation a GLS estimator is used.

**Table 1:** Results for the estimation of the Private Consumption

| Stock (1987) estimator | | | |
|---|---|---|---|
| **Dependent variable: $\Delta \ln CP$** | | | |
| | **Coeficients** | ***t* Ratio** | **p-value** |
| Constant | -3,2364 | -4,4762 | 0,0001 |
| $\ln CP_{-1}$ | -0,9409 | -5,1045 | 0,0000 |
| $\ln Y_{-1}$ | 0,9901 | 5,1035 | 0,0000 |
| $\ln WS_{-1}$ | 0,4895 | 3,7327 | 0,0008 |
| D_80 | -0,0453 | -2,5782 | 0,0149 |
| $R^2$ | 0,8307 | | |
| DW | 1,8153 | | |
| **Long-run elasticities** | | | |
| Constant | -3,4397 | | |
| $e_{CP;Y}$ | **1,0523** | | |
| $e_{CP;WS}$ | **0,5202** | | |
| **Diagnosis tests** | | | |
| *Test* | *Test Statisitcs* | | *p-value* |
| Breusch-Godfrey(1) | 0,3271 | | 0,5674 |
| Breusch-Godfrey(2) | 0,4671 | | 0,7917 |
| Breusch-Godfrey(3) | 2,0172 | | 0,5689 |
| Breusch-Godfrey(4) | 2,9068 | | 0,5735 |
| ARCH (1) | 2,5226 | | 0,1122 |
| Bera-Jarque | 3,8407 | | 0,1466 |
| White | 3,0789 | | 0,1281 |
| Ljung Box | - | | |

| DGLS estimator | | | |
|---|---|---|---|
| **Dependent variable: *CP*** | | | |
| | **Coeficients** | ***t* Rtio** | **p-value** |
| $\ln Y_{-1}$ | **1,0536** | 124,7804 | 0,0000 |
| $\ln WS_{-1}$ | **0,4999** | 3,7884 | 0,0008 |
| Constant | -3,3784 | -6,1771 | 0,0000 |
| D_80 | -0,0652 | -3,3988 | 0,0022 |
| $R^2$ | 0,9993 | | |
| DW | 1,3493 | | |
| **Diagnosis tests** | | | |
| *Test* | *Test Statisitcs* | | *p-value* |
| Bera-Jarque | 2,427 | | 0,297 |
| Ljung Box | | | - |

**Notes**. (i) Both equations were estimated including a intercept dummy for the year 1980; ii) the error correction equation, computed with the Stock (1987) estimator has no lagged differences of the independent variables in the implicity co-integrated equation (error correction term); iii) one lead and one lag have been added to the estimated equation via DGLS (additional leads and lags did not show to be significant and did not improve test results); iv) we used the Newey-West estimator of the covariance matrix with Bartlett kernel; additional lags were not added in order to "whitening" the residues; v) in the Ljung Box test for autocorrelation, we report the order of serial correlation, when it exists, we proceed the test up to 16 lags at 10% significance.

Once we have estimated the long-term elasticities we can calculate the impact of one percentage point variation in wage share on private consumption (%). A one percent increase in the wage share leads to an increase of 0.75% in private consumption, according to the Stock estimator, or 0.78% according to the DGLS estimator. The results corroborate the hypothesis of differences in the propensity to save between capitalists and workers.

## Investment

Investment (*I*) has been estimated as a function of GDP (*Y*) and the wage share (*WS*). The results are in Table 2.

**Table 2:** Results of the estimates to Investment (*I*)

| Stock (1987) estimator | | | |
|---|---|---|---|
| **Dependent variable: $\Delta \ln I$** | | | |
| | **Coefficients** | ***t ratio*** | **p-value** |
| Constant | 6,2795 | 2,7542 | 0,0098 |
| $\ln I_{-1}$ | -0,7239 | -4,5595 | 0,0001 |
| $\ln Y_{-1}$ | 0,6292 | 4,2896 | 0,0002 |
| $\ln WS_{-1}$ | -1,5912 | -2,8636 | 0,0074 |
| D_69 | 0,2600 | 3,1046 | 0,0040 |
| $R^2$ | 0,6249 | | |
| DW | 2,1982 | | |
| **Long run elasticities** | | | |
| Constant | **8,6746** | | |
| $e_{I;Y}$ | **0,8692** | | |
| $e_{I;WS}$ | **-2,1981** | | |
| **Diagnosis tests** | | | |
| *Test* | *Test Statisitcs* | | *p-value* |
| Breusch-Godfrey(1) | 2,2189 | | 0,1363 |
| Breusch-Godfrey(2) | 2,4032 | | 0,3007 |
| Breusch-Godfrey(3) | 2,6024 | | 0,4571 |
| Breusch-Godfrey(4) | 6,7957 | | 0,1471 |
| ARCH (1) | 0,6299 | | 0,4274 |
| Bera-Jarque | 2,0679 | | 0,3556 |
| White | 33,4498 | | 0,1494 |
| Ljung Box | 8 a 16 | | |

| DGLS estimator | | | |
|---|---|---|---|
| **Dependent variable: *I*** | | | |
| | **Coefficients** | ***t ratio*** | **p-value** |
| $\ln Y$ | **0,9243** | 1,7547 | 0,0000 |
| $\ln WS$ | **-2,4479** | -6,7921 | 0,0000 |
| Constant | 8,6043 | 5,3205 | 0,0000 |
| D_69 | 0,2740 | 3,7479 | 0,0009 |
| $R^2$ | 0,9947 | | |
| DW | 1,8848 | | |
| **Diagnosis tests** | | | |
| *Test* | *Test Statisitcs* | | *p-value* |
| Bera-Jarque | 0,3852 | | 0,8248 |
| Ljung Box | - | | |

**Notes:** i) Both equations were estimated including a intercept dummy for 1969; ii) the number of lags in the error correction equation and leads and lags in the estimated equation via DGLS are the same as in Table 1, as well as the covariance matrix estimator.

In both estimated equations the signals correspond to the expected and both estimation methods were statistically adequate. [15] The calculated partial impacts indicate that an increase of one percentage point in the share of wages in income would produce a reduction in investment of approximately 0.77%, according to the Stock estimator, and 0.86% according to the DGLS estimator.

## Exports

In the estimates reported below the series of U.S. GDP are used as a proxy to estimate the impact of increased income in trading partners on the demand for Brazilian exports [16]. To calculate the impact of price competitiveness on exports we use the wage share as a proxy for unit labor costs. Table 3 presents the results of estimations

**Table 3:** Results of the estimation for exports

| Stock (1987) estimator | | | |
|---|---|---|---|
| **Dependent variable: $\Delta \ln X$** | | | |
| | **Coeficients** | ***t* Ratio** | **p-value** |
| Constant | -6,8357 | -3,0269 | 0,0049 |
| $\ln X_{-1}$ | -0,4779 | -4,5311 | 0,0001 |
| $\ln Yf_{-1}$ | 0,8273 | 4,9119 | 0,0000 |
| $\ln WS_{-1}$ | -0,9223 | -2,1485 | 0,0396 |
| D_80 | 0,2521 | 3,1715 | 0,0034 |
| $R^2$ | 0,4686 | | |
| DW | 2,1869 | | |
| **Long run elasticities** | | | |
| Constant | **-14,3026** | | |
| $e_{X;Y}$ | **1,7310** | | |
| $e_{X;WS}$ | **-1,9297** | | |
| **Diagnostic Tests** | | | |

| DGLS estimator | | | |
|---|---|---|---|
| **Depend variable: $\ln X$** | | | |
| | **Coeficients** | ***t* Ratio** | **p-value** |
| $\ln Y_{f-1}$ | **1,5758** | 14,5354 | 0,0000 |
| $\ln WS_{-1}$ | **-2,6239** | -2,4828 | 0,0220 |
| Constant | -8,4479 | -1,6420 | 0,1162 |
| D_80 | 0,6087 | 5,3192 | 0,0000 |
| $R^2$ | 0,9846 | | |
| DW | 1,7578 | | |
| **Diagnostic Tests** | | | |
| *Test* | *Test Statisitcs* | *p-value* | |
| Bera-Jarque | 0,8107 | 0,6667 | |
| Ljung Box | - | | |

[15] The method of Stock (1987) rejects the hypothesis of non-autocorrelation of the Ljung-Box test of the 8th to the 16th lag order at a significance level of 10%. However, at the significance level of 5% we only reject the $H_0$ for the 8th and 9th orders. For this reason, we consider valid the estimation results.

[16] As in Marglin (1990), after the War until the end of the 1980s, U.S leadership in the world economy was indisputable. This means to say that US could 'manage' international economic activity. Thus, we believe that it is a reasonable assumption to consider that increases in US GDP would increase demand for Brazilian exports.

| *Test* | *Test Statisitcs* | *p-value* |
|---|---|---|
| Breusch-Godfrey(1) | 0,7926 | 0,3733 |
| Breusch-Godfrey(2) | 1,0214 | 0,6001 |
| Breusch-Godfrey(3) | 1,3064 | 0,7276 |
| Breusch-Godfrey(4) | 1,3085 | 0,8599 |
| ARCH (1) | 0,0872 | 0,7677 |
| Bera-Jarque | 0,6586 | 0,7194 |
| White | 23,6914 | 0,9257 |
| Ljung Box | - | |

**Notes**: i) An intercept dummy for the year 1980 has been included in both estimated equations; ii) the number of lags in the error correction equation is the same as reported in Table 1; iii) in the DGLS equation we included 2 leads and 2 lags; the estimator of the covariance matrix is the same reported in Table 1.

The sign of the long-run elasticity of exports with respect to wage share is significant in both estimated equations and the effects of income distribution towards wages (one percentage point) on the aggregate demand for exports is -0.22% for the Stock (1987) method and -0.30% for the DGLS method.

## Identifying the demand regime

Grouping the partial effects of redistribution on the components of aggregate demand we can define the nature of the demand regime of the Brazilian economy (1951-89). Table 4 presents the results

**Table 4:** The demand regime for the Brazilian economy in the 1951-1989 period

| **Estimator** | **Elasticities** | | **Sample average 1951-89 (*I$*)** | | | | **Partial effects (%)** |
|---|---|---|---|---|---|---|---|
| | | | *CP/WS* | *I/WS* | *X/WS* | *1/Y* | |
| Stock (1987) | $e_{CP;WS}$ | 0,520 | 8.770.631 | | | | 0,7757 |
| | $e_{I;WS}$ | -2,198 | | 2.067.807 | | | -0,7727 |
| | $e_{X;WS}$ | -1,930 | | | 678.059 | 1,7E-09 | -0,2224 |
| DGLS | $e_{CP;WS}$ | 0,500 | 8.770.631 | | | | 0,7454 |
| | $e_{I;WS}$ | -2,448 | | 2.067.807 | | | -0,8605 |
| | $e_{X;WS}$ | -2,624 | | | 678.059 | 1,7E-09 | -0,3025 |
| Stock (1987) | Domestic effect | | | | | | 0,0030 |
| | **Total effect** | | | | | | **-0,2195** |
| DGLS | Domestic Effect | | | | | | -0,1151 |
| | **Total effect** | | | | | | **-0,4176** |

**Note:** 'Domestic efffect' is the net change (%) on aggregate demand due to one percentage point increase in the wage share, excluding the impact on exports. In the 'total effect' we do not exclude exports.

The findings in this session are in line with preliminary analysis presented in Section 2, that is to say that the demand regime in Brazil had been profit led in the 1951-89 period. The results obtained show that an increase in one percentage point in the wage share results in a reduction of 0.22% and 0.42% in aggregate demand according to Stock (1987) and DGLS estimators respectively.

**Table 5**: Income-elasticity/wage-share elasticities

| **Estimator** | **Module of the ration between the elasticities** | | |
|---|---|---|---|
| | $E_{CP;WS}/E_{CP;\,Y}$ | $E_{I;WS}/E_{I;\,Y}$ | $E_{X;WS}/E_{X;\,Yf}$ |
| Stock (1987) | 0,4943 | 2,5289 | 1,1148 |
| DGLS | 0,4745 | 2,6484 | 1,6651 |

Table 5 shows the relative elasticities of the components of aggregate demand (elasticities in relation to the wage share to income elasticity) which supports the hypothesis that the behavior of investment is the main responsible for the determination of the profit-led regime in the period. Private consumption is much more sensible to variations in the level of the income to changes in the income level rather than the distribution among classes.

The high relative elasticity of investment ($E_{I;WS}/E_{I;\,Y}$) shows that capital accumulation in Brazil has not followed a kaleckian/steidlian pattern, i.e., the capacity utilization or the income effect had a smaller relevance in the determination of the demand for investment than the profit share.

The estimated coefficients to the elasticity of exports also shows that this component is quite sensible to changes in the functional income distribution. However, the Brazilian economy was rather closed in the period, so the partial impact of income distribution on this component of aggregate demand is the lowest among all. Once more we observe that this result is in line with the importance of investment to explain changes in aggregate demand caused by the redistribution effect.

## 5. Explaining the profit-led demand regime: specificities of the Brazilian economy in the 1950-1989 period

Until the end of the 1980s, the Brazilian economy had experienced an 'inward' growth model, in the sense that foreign trade was only 4.7% of GDP, in average. As seen in the previous sections, demand regime had been induced by profits, what turns the Brazilian development model in the 1950-1989 period *sui generis*, in the light of the demand-led growth literature.

As mentioned in the introduction, Bhaduri and Marglin (1990) suggest that a rather closed economy and with a large share of consumption in GDP, as the Brazilian economy during the period of this study, would be expected to present a wage-led demand regime.[17] However, our findings show that as investment had been more sensible to the distribution than private consumption, we identified a profit-led regime. Our interpretation for this result relies on two main arguments. On one hand we call attention to the financial structure of investment, heavily dependent on internal funds; on the other on the consumption pattern of the emerging middle class in the urban sector, based on increasing demand on durable goods. The post-War period in Brazil is characterized by accelerated industrialization process via import substitution with a heavy inducement by the State, [18] and so by a rapid transformation of an agrarian economy into a rather well succeeded industrial economy, at least until the end of the 1970s.

[17] Investment, […], is likely to respond more cautiously to a change in profit margin/share compared to consumption. Thus, the depressing effect of a lower real wage rate on consumption may be felt within the short period without its stimulating effect on investment materializing within the same period, […]. To the extent that exports and imports have faster speeds of adjustment (to price changes) compared to investment (*ibid*, p. 385).

[18] Since the War, three development plans had been launched: the Targets Plan (Plano de Metas) in the 1950s and t wo National Development Plans (PND I and II), in the 1970s. For a review of the Brazilian development, see Baer, 2008.

## Financial structure of investment

High and persistent rates of inflation since post-War inhibited the development of a long term credit market for firms in Brasil.[19] Still nowadays, long term credit is mostly provided by public development banks, mainly the Brazilian National Development Bank (BNDES). In this context, retained profits mainly, but also foreign resources (to large firms, in this later case) had been the main sources of funds to finance investment (Cruz, 1994).

The absence of a developed credit and capital markets to finance long term investment, however, would not be enough to explain a profit-led regime. Two other factors should be added. The first is to call attention to the fact that the strategy of rapid industrialization based on import substitution lead to an oligopolistic productive structure in the industrial sector, that favoured firms to keep mark ups relatively high, as domestic markets were protected with tariffs and non-tariffs barriers. Second, a policy of wage squeeze dominated most of the period of rapid industrialization, contributing to keeping profit share high.

So, in our interpretation, the lack of domestic long term supply of credit by the private financial system explains in a great deal the high sensibility of investment to profits. Also, and not less important, as in an inflationary environment alternative allocation of resources were limited, favouring capital accumulation out of retained profits.[20] Therefore, it can be concluded that the dynamic interaction between the evolution of the financial system, governmental policies, market structures and persistent inflation

[19] For a discussion about the development of the financial system in Brazil from the post-War until the 1980s, see, for instance, Tavares and Serra (1971), Bresser-Pereira (1987), among others.
[20] It should be mentioned that in the 1960s important reforms were introduced in the financial market aiming at developing a long term credit market. See, for instance, Cruz (1994), among others.

resulted a pattern of funding that made investment decisions very sensitive to the availability of internal funds.[21]

Although the credit market did not develop a long-term segment of credit, a solid consumer credit market was consolidated in the 1970s. The development of this segment helps to explain the lower sensitivity of private consumption in relation to changes in the share of wages in income. The access to "easy credit" to consumers is one of the arguments in favor of the consumption pattern that was being developed along ther Brazilian industrialization process.

## Consumer´s credit and the ´conspicuous consumption pattern of the mass´

Consumption pattern in Brazil changed significantly since post-War until the beginning of the 1980s following rapid industrialization and urbanization of the country. One of the main contributions for changing consumption pattern came from the expansion of the consumer's credit, in the 1970s, which allowed workers, in face of a reduction in their share in total income, to sustain both their subsistence consumption and their conspicuous consumption. It is in this sense that Medeiros (1992) concluded that in Brazil the consumption of the working class followed the combination of conspicuous consumption and mass consumption.

This pattern of consumption allowed the internal absorption of the industrial production in a 'low-wage industrialization strategy'. In Tavares and Serra (1971) interpretation, the success of Brazilian industrialization was largely conditioned by the redistribution of income in favor of capital, and so the evolution of the consumption pattern, based on

[21] After the foreign debt crisis of the 1980s there was a collapse of all forms of financing investment, as the inflow of external resources toward investment was very affected, and in these conditions the dependence on internal financing funds was not reversed.

income concentration and credit expansion, contributed to the reduction of the relative elasticity of private consumption to income distribution.

Another important characteristic of this period concerns the functioning of the labor market. The process of accelerated industrialization implied a process of increasing incorporation of workers formerly unemployed or under-employed (Medeiros, 1992).[22] This resulted in a striking expansion of the formal market, and that was a major factor to explain the increase of wage bill, with redistribution in favor of profits.[23] The positive correlation between the growth of the mass of salaries and GDP growth, contributed to a relative low elasticity of private consumption. Therefore, a characteristic of the period was that if, on one hand, the increase in income followed by redistribution in favor of profits negatively affected consumption by increasing the average propensity to save, on the other hand, the simultaneous increase of the wage bill positively affected consumption. This result was possible because the expansion of the wage bill was highly sensitive to variations in growth.

Rapid urbanization also implied increase in the share of mixed income. According to Tavares and Serra (1971) and Medeiros (1992), this increase may also have had its impact on the elasticity of consumption with respect to the wage share. In practice, mixed income functions as profit sharing, that is to say, redistribution in favor of profits between capitalists and workers. The result is a reduction in the elasticity of consumption with respect to the wage share in income.

[22] The under-employment and informal work is a common feature of the Latin American economies, with high structural heterogeneity (Cimoli, Primi and Pugno, 2006).

[23] It is worth mentioning that Bhaduri and Marglin (1990) point out that the expansion of the wage bill and increasing employment are important factors to socially sustain a profit-led regime, as well as they reduce the possibility of a crisis of over-accumulation in the long run.

## 6. Final remarks

Growth and income distribution has always been an issue in economic debate in Brazil as the period of rapid economic growth was not followed by an improvement in income and wealth distribution. In recent years, in mid-2000s, growth rates resumed in an environment of improvement in income distribution, but the international financial crisis interrupted this movement, and since 2011 the Brazilian economic performance has been poor.

In this paper, based on the demand-led growth literature, we investigated the demand regime for the Brazilian economy for the 1951-1989 period. We implemented an econometric exercise based on Hein and Vogel's (2008) methodology to estimate partial elasticities of the aggregate demand components to changes in income distribution. An important contribution of this paper was to show that in a relatively closed economy with a high share of consumption in GDP a profit-led demand regime was identified.

In our interpretation two characteristics of the Brazilian industrialization process can explain this result. On one hand, persistent and relatively high inflation inhibited the development of a long-term credit market, as well as a meaningful capital market, making firms heavily dependent on internal funds to expand their capacity. To this specificity, it should be added another peculiarity of the Brazilian industrialization process that was the expressive presence of state-owned enterprises, that according to Trebat (1983), reached a highly degree of autonomy in their decision making process by the 1970s. In this sense, the author compares their behavior concerning investment decisions with those of private firms, what reinforces the evidence that firms, in general, were dependent on internal funds to invest. So, in this respect, we concluded that political, institutional and structural features contributed to the development and

maintenance over time of a pattern of self-financing investment in Brazil after the War to the end of the 1980s.

On the other hand, we also identified that the industrialization process in Brazil favored the emergence of a domestic market for durable consumer goods taking advantage of rapid urbanization, increase in formalization in the labor market and the expansion of consumer's credit. In this sense, concentration of income allowed for a 'low-wage industrialization strategy', as discussed in Tavares and Serra (1971).

Furthermore, it should be added that, given the importance of retained profits in financing capital expansion, policies that limited the rights of the working class and wage compression were functional. The implementation of ambitious development plans that resulted in deep structural change, by increasing the productivity of labor in the context of wage restraint, also contributed to the growth momentum via redistribution. Devaluations, when adopted in the Brazilian case, were also a wise economic choice to boost exports. As shown in the literature, in conditions of wage restraint, the rise of the share of profits in income tends to increase the price competitiveness of exports. [24]

In sum, with the exercise presented, we were able to show, based on recent literature on demand-led growth, that rapid structural change due to a State-led industrialization strategy resulted in fast growth, without generating an expressive income distribution in Brazil since post-War until the end of the 1980s. Liberal reforms introduced in the 1990s changed the macroeconomic environment dramatically, but as growth rates have

[24] In fact, the estimations using the Stock(1987) estimator found that when considering the effects of redistribution only on domestic aggregate demand components - private consumption and investment - the 'domestic regime' was wage-led (in fact, almost insensitive to redistribution). Thus, it is understood that the reductions in the wage share in order to increase price competitiveness of exports (and aggregate demand) in this case were offset by similar policies by the trading partners. If this had been the case, the effect would have been a reduction in aggregate demand in the local economy, turning weak the sacrifice of the working class (Stockhammer and Onaram , 2012).

not resumed yet a new institutional model of political economy, conciliating growth and income distribution, is under pungent debate nowadays in Brazil.

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