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Philip Arestis

University of Cambridge, UK;

University of the Basque Country, Spain

pa267@cam.ac.uk

Carolina Troncoso Baltar

University of Campinas, Brazil

cbaltar@gmail.com

Daniela Magalhães Prates

University of Campinas;

National Council for Scientific and Technological Development (CNPq), Brazil

prates@unicamp.br

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Brazilian Economic Performance since the Emergence of the Great Recession: The Effects of Income Distribution on Consumption

Summary: After a long period of unstable and low economic activity, Brazil achieved a relatively high economic growth with low inflation from 2004 to 2008, when the world scenario was favourable for the Brazilian trade balance. An incomes policy, focused on real increases in the minimum wage along with a credit boom, led to a decade of high consumption growth rates. High levels of consumption and exports, in turn, induced investment and stimulated manufacturing production, despite the real appreciation of the national currency. However, the Great Recession that emerged after the global financial crisis of 2007/2008 brought challenges to the Brazilian economic performance, with unpleasant consequences for the country's GDP growth. Consumption, investment and exports have decelerated, despite anti-cyclical macroeconomic policies. In this setting, manufacturing production stagnated and GDP growth slowed down substantially, while imports continued rising considerably. The aim of this paper is to provide an explanation to the slowdown of Brazilian growth rates after the Great Recession. The main hypothesis is that consumption was the main source of effective demand in the country since 2003. However, Brazil has not yet been able to sustain manufacturing and economic growth without a more active government policy to stimulate productive investment.

Key words: Income distribution, Consumption, Imports, Investment.

JEL: E21, E25, F1.

After a long period of unstable and low economic activity, Brazil achieved a relatively high economic growth with low inflation from 2004 to 2008, when the world scenario was favourable for the country trade balance due to rising commodity prices and growing external demand. Successive years of current account surpluses of the balance of payments and substantially increasing capital flows coupled with a dirty floating exchange rate policy allowed the reduction of the public foreign debt and the rise in the country international reserves. This favourable scenario was a precondition for the feasibility of the new policy launch by the left-wing government of Luis Inácio Lula da Silva (Lula) that took office in 2003. The interventions in the foreign exchange market began in 2005 and aimed at buying foreign currency both to pay of external debt and increase external reserves (the so-called precautionay demand for reserves; see Joshua Aizenman, Yeonho Lee, and Yeongseop Rhee 2004). Conse-

quently, the Brazilian public sector has became creditor in foreign currency since 2006. Yet, despite these interventions in the spot market, the Brazilian currency continued to appreciate until the global financial crisis due to the key role of the foreign exchange derivatives market in the exchange rate path in the country (Daniela Prates, Carolina Baltar, and Marina Sequeto 2014).

The main pillars of this policy were an incomes policy, focused on real increases in the minimum wage, and a consumption credit boom that stimulated economic activity. High consumption and export levels, in turn, induced investment and manufacturing production, despite the real appreciation of the national currency. However, the Great Recession that emerged after the global financial crisis of 2007/2008 brought challenges to the Brazilian economic performance, with unpleasant consequences for the country's economic growth. Consumption, investment and exports have decelerated, despite anti-cyclical macroeconomic policies. In this setting, manufacturing production stagnated and GDP growth slowed down substantially, while imports continued rising considerably.

A recent debate on the difficulties to boost the Brazilian economy stresses the negative effects of the currency appreciation on industrial performance (Luiz Carlos Bresser-Pereira 2004; Bresser-Pereira and P.S.O.S. Gala 2010; Instituto de Estudos para o Desenvolvimento Industrial 2012). Moreover, the competition in the international markets for manufactured goods has increased after the global financial, intensifying the effects of the over-valued currency. Simultaneously, the growth rates of consumption, investment and exports decreased. In addition, government initiatives to increase autonomous investment, especially in infrastructure, had implementation difficulties and were delayed.

In this setting, the aim of this paper is to analyse the reasons of the slowdown of Brazilian growth rates after the Great Recession. The main hypothesis is that consumption was the main source of effective demand in the country from 2003 to the onset of the global financial crisis. However, Brazil was not able to sustain manufacturing and economic growth without a more active government policy to stimulate productive investment. Consumption increased due to the incomes policy that raised the minimum wage, together with a credit boom, thereby stimulating investment; but this increase in consumption was not enough to sustain investment growth. The main reason is the impact of the great recession on the Brazilian economy, with negative effects on investment decisions. Consequently, higher consumption, though in lower growth rates, took place with raising imports. In order to understand better all these relations, the paper estimates the equations for consumption, imports and investment and relates them to the GDP growth performance from to 2002 to 2013. The explanation given in this contribution is that the low dynamism of manufacturing production would explain the lower GDP growth after the emergence of the Great Recession.

The paper is organized as follows. After the introduction, Section 1 analyses the performance of the Brazilian economy in the period 2004-2008, highlighting the role of increased consumption on the economy's performance. Then, it analyses the performance of the Brazilian economy since the beginning of the Great Recession, showing the role of lower consumption growth to the poorer economic performance. A comparison of both periods brings to light the difficulties to sustain the growth of

consumption, investment and exports after the global financial crisis. Section 2 presents the theoretical background of the paper, in which the equations for consumption, imports and investment are put forward and discussed. The consumption equation incorporates the effect of income distribution and the role of credit. Increases in wage growth may also have an impact on productivity growth, enhancing investment. The equation for imports highlights the influence of the economic activity and of the evolution of the real exchange rate. The equation for investment incorporates the effect of economic activity and interest rate. Section 3 discusses the estimation results of the consumption, imports and investment functions, along with a discussion of the empirical results and the extent to which they validate the relevant theoretical propositions. Section 4 presents a further discussion of the empirical results and finally Section 5 summarizes and concludes this contribution.

1. Brazilian Economic Performance

Since the beginning of the liberalising reforms in the 1990s, Brazil's economic growth has been unstable and relatively lower, when compared to the period of industrialization (from 1930 to 1980). Yet, the country presented a period of relatively higher economic activity from 2004 to 2008, when the international setting was very favourable. Besides a new boom of capital flows for emerging economies, both external demand and price for commodity goods grew. Brazilian exports increased considerably as well as consumption and investment (Prates 2006; Baltar 2013).

The favourable international scenario contributed directly to the GDP growth through higher net exports. Alongside with net capital inflows, exports contributed to reducing foreign debt and to accumulating international reserves. In this setting, the country's external constraint decreased and its economic performance improved with higher GDP growth and lower inflation (Fabián Amico 2013; Baltar 2013).

Table 1 shows the growth rates of consumption, investment, exports, GDP, manufacturing product and imports and the real exchange rate since 2000, revealing that the economic performance improved from 2004 to 2008. Consumption had the biggest share of effective demand. In 2003, according to the Brazilian national accounts, consumption represented 73% of the sum of consumption, investment and exports. The share of investment was 14% in the same year and the share of exports was 13%.

In 2004, the national currency was devalued (the index was 135.5) and increases in exports were very high (15.3% increase compared to 2003), including manufactured goods (Baltar 2008). The increase in manufacturing exports from 2003 was associated with the devaluation of the currency and the low growth in the previous periods as well as to the growing external demand (Prates 2006). However, increases in domestic absorption, namely, consumption and investment (induced by consumption and exports) were more important than the net exports growth to the expansion of effective demand. In that year, manufactured output grew more than GDP and GDP growth, moved hand in hand with consumption, investment and net exports.

Table 1 Growth Rates of Consumption, Investment, Exports, GDP, Manufacturing GDP and Imports and the Real Exchange Rate Index

	Consumption growth	Investment growth	Exports growth	GDP growth	Manufacturing growth	Imports growth	Real exchange rate
2000	3.0	5.0	12.9	4.3	5.7	10.8	97.1
2001	1.2	0.4	10.0	1.3	0.7	1.5	120.6
2002	2.6	-5.2	7.4	3.1	2.4	-11.8	133.2
2003	-0.3	-4.6	10.4	1.2	1.9	-1.6	137.9
2004	3.9	9.1	15.3	5.7	8.5	13.3	135.5
2005	3.9	3.6	9.3	3.1	1.2	8.5	110.5
2006	4.5	9.8	5.0	4.0	1.0	18.4	98.7
2007	5.8	13.9	6.2	6.0	5.6	19.9	91.6
2008	5.0	13.6	0.5	5.0	3.0	15.4	89.1
2009	4.1	-6.7	-9.1	-0.2	-8.7	-7.6	88.5
2010	6.3	21.3	11.5	7.6	10.1	35.8	77.2
2011	3.5	4.7	4.5	3.9	0.1	9.7	75.2
2012	3.2	-4.0	0.5	1.8	-2.4	0.2	84.3
2013	2.4	5.2	2.5	2.7	2.7	8.3	90.1

Source: Own calculations based on the Central Bank of Brazil (2014) data[1]. The Index for Real Exchange Rate is based on June 1994 = 100.

The real exchange rate has decreased steadily from 2004 to 2011. Investment oscillated in 2005 due to the rise in the policy rate at the end of 2004. Yet, the restrictive monetary policy did not curb consumption, which accelerated due to increases in credit as well as to the incomes policy anchored on increases in the minimum wage (Nelson Barbosa and José Antonio Pereira de Souza 2010; Ricardo Carneiro and Kilko M. Matijascic 2011; André Calixte, Andre Biancarelli, and Marcos Cintra 2014). Booming consumption led to a peak of investment in 2007-2008, fostering further the country's economic growth. The economic growth of the period 2004-2008 highly stimulated imports. Exports more than covered these imports, generating trade surpluses. Yet, the trade surplus decreased during this period due to the currency appreciation, which led to an ascending deficit of manufactured goods. In 2008, trade surplus was not enough to cover the deficit in services, especially financial income, generating deficit in the current account. The global financial crisis that affected Brazil in the last quarter of 2008 interrupted this period of higher economic growth. Exports, investment, GDP and manufacturing production decelerated since the emergence of the Great Recession (Prates, Baltar, and Sequeto 2014).

During the period 2004-2008, the nominal exchange rate decreased (which means currency appreciation as the exchange rate of the Brazilian Real is the price of the US dollar), helping the inflation slowdown and the efficacy of the inflation target policy (Maryse Farhi 2006). As Baltar (2015) pointed out, the tradable goods inflation followed the nominal exchange rate path, but higher economic activity produced

[1] **Central Bank of Brazil.** 2014. Database, Time Series Information for Economy and Finance. http://www.bcb.gov.br/?TIMESERIESEN.

increases in non-tradable goods inflation, raising the relative price of non-tradable goods and keeping domestic inflation in higher levels compared to international inflation. Consequently, domestic currency real appreciation was very high in the period 2004-2008. Tradable goods in which Brazil did not have high comparative advantage were no longer exported and/or started to be imported. The tradable goods in which Brazil had high comparative advantage continued to be exported or produced in the domestic market, but with lower mark-ups.

The high domestic market growth rate (whereby investment was positively affected by increased consumption) was followed by a significant increase in manufacturing output until 2008, despite the disproportional increase in imports (especially manufactured goods) due to the real appreciation of the Brazilian currency. The growth of manufacturing production, however, was significant, although lower than GDP growth (Table 1). Due to the appreciated domestic currency, part of the effective demand was transferred to countries that exported manufacturing goods to Brazil.

However, since the Great Recession, the performance of the Brazilian manufacturing industry has been negatively affected (except in 2010) and the country has been under difficulties to sustain the previous growth rates (Table 1). As Baltar and Prates (2014) show, after the Great Recession, in a setting of the increased international competition, the net impact of Chinese economic activity on the Brazilian external trade became negative. On the one hand, Brazil has increased its exports of primary products to China, but, on the other hand, the country's manufacturing exports have been negatively affected as an important part of the Brazilian exports of manufactured goods to Latin American countries has been substituted by cheaper Chinese exports. The result has been a lower exports' growth, reinforcing the deficit of manufactured goods; at the same time imports (mainly from China) continued to grow, generating further decreases in the Brazilian trade balance.

The upturn in the world scenario and the negative effects on the Brazilian external trade have taken place with the cyclical slowdown of consumption growth. In addition, investment has decreased considerably and the smaller growth rate of all demand components has resulted in lower economic growth rates. As José Luís Oreiro, Flávio Basilio, and Gustavo Souza (2014) point out, it is crucial to consider the negative effects of the Brazilian currency over-valuation over the Brazilian manufacturing investment. Manufacturing growth has also shrunk considerably, suggesting that increases in consumption have probably been accompanied by higher imports.

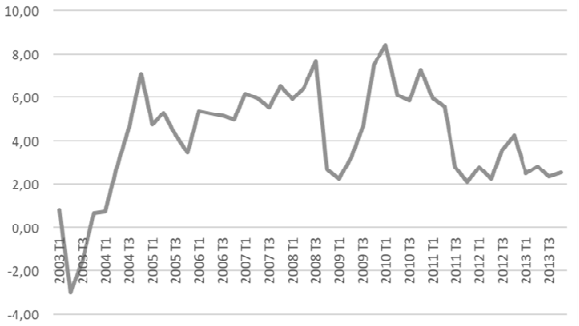
Comparing both periods, we note that from 2004 to 2008, Brazil was able to grow faster, despite the currency appreciation, because net exports and consumption were high, stimulating investment. In this sense, the currency appreciation did not prevent the country to have a higher economic activity. Besides that, consumption, investment and GDP growth rates presented a positive trend. However, after the global financial crisis and the Great Recession, consumption growth decelerated and investment decreased considerably, with negative consequences on the level of economic activity. Consumption, investment and GDP growth rates in this period present a declining trend. The negative effects of currency appreciation seem clearer in the period of the Great Recession.

Therefore, consumption seems crucial for the Brazilian economic growth. Under a favourable scenario, Brazil is able to grow faster, stimulating investment. However, the Great Recession had a great impact on the Brazilian economic performance, especially on investment decisions. The incomes policy and credit creation were able to sustain consumption, though in lower growth rates. Yet, due to very low investment, manufacturing production stagnated and imports kept increasing since the emergence of the crisis.

Then, it is important to investigate the behaviour of consumption, imports and investment in Brazil since 2002, evaluating the influence of increases in minimum wages on consumption and imports as well as on investment. The hypothesis of this paper is that the incomes policy was crucial to stimulate consumption, with positive consequences for the country's investment. However, the Great Recession negatively affected Brazilian investment decisions, explaining why consumption is not able to sustain the country's economic growth since then. Consequently, increases in imports compensate lower domestic consumption.

Consumption represents more than seventy percent of the sum of the country's consumption, investment and exports. Total consumption is the sum of household and government consumption. Household consumption represents three quarters of total consumption. The favourable international scenario over 2003-2007 reduced Brazil's external vulnerability and increased the country's policy space, creating conditions for adopting policies that boosted income and employment. At the same time, Brazilian inflation decreased and the balance of payments and public finances improved, creating expectations of sustained growth in income and employment. This led households to take on more debt to increase consumption, anticipating greater income; and the banking system satisfied this increased demand for credit (Baltar 2013) through the granting of personal and auto loans as well as payroll deduction credit with lower interest rate and larger terms. In the payroll deduction loan, established by the Brazilian government in January 2004, the instalments are automatically deducted from worker's wages, resulting in lower credit risk, and, consequently, lower interest rate and larger term in comparison to other consumer credit lines (which have very high interest rates and very short terms). Hence, this new class of credit had a key role in the consumer credit boom before the Great Recession. Yet, in comparison to other emerging economies, the conditions of payroll deduction loans are still adverse (namely, higher cost and shorter term). In addition, incomes policy focused on the minimum wage, benefitting lower income families, thereby reinforcing consumption growth. The consumption cycle, then, influenced the performance of the Brazilian economy in the 2000s. Figure 1 shows the behavior of household consumption from 2003 to 2013.

The graph shows that there was a phase of increasing consumption that was negatively affected by the contagion effect of the global crisis on the Brazilian economy in 2008 and beginning of 2009. But, the counter-cyclical policy was able to resume consumption growth, although it has been decelerating since 2010. The next step of this paper is then to investigate the behaviour of consumption, imports and investment to explain the upturn in the performance of the Brazilian economy since the emergence of the Great Recession.



Source: Own calculations based on the Central Bank of Brazil (2014) data.

Figure 1 Household Consumption Growth (in %)

2. Theoretical Background

The first step in our analysis of the consumer behaviour is to distinguish between different types of incomes in an attempt to explain the aggregate movements of consumers' expenditure. To do so, we follow Philip Arestis and Ciaran Driver (1980) and disaggregate income into wage income and non-wage income. A liquid asset variable is included in the analysis to incorporate a wealth effect. Arestis and Driver (op. cit.) divide consumption into durable and non-durable goods. The influence of the two kinds of income and the wealth effect are different in these two types of consumption. There is no available information in quarterly series separating consumption into durable and non-durables goods for Brazil. For this reason, the total household consumption is considered in this paper. Hence, consumption (C) is a function of income, the latter disaggregated into wage income (Y^w) and non-wage income (Y^{nw}), and a liquid asset (LA) variable. So, we have:

$$\Delta \ln(C)_t = \alpha_0 + \alpha_1 \Delta \ln(Y^w)_t + \alpha_2 \Delta \ln(Y^{nw})_t + \alpha_3 \Delta \ln(LA)_t + \Delta u_t \quad (1)$$

where u is the error term.

Following the suggestion by Arestis and Driver (op. cit.), the liquid asset is substituted by interest rate (R) and credit (CR). Changes in consumption of durable goods represent the main increase in household consumption. In the case of this class of consumption, it is more appropriate to include credit and interest rate in the equation rather than the quantity of liquid assets (Arestis and Driver, op. cit.). So, a new equation emerges as follows:

$$\Delta \ln(C)_t = \alpha_0 + \alpha_1 \Delta \ln(Y^w)_t + \alpha_2 \Delta \ln(Y^{nw})_t + \alpha_3 \Delta \ln(R)_t + \alpha_4 \Delta \ln(CR)_t + \Delta u_t. \quad (2)$$

This type of consumption function, then, relies on the disaggregation of income in explaining consumers' expenditure as well as on the role of credit and interest rate in explaining consumer behaviour. We could evaluate the importance of increases in total wages to household consumption as well as that of the behaviour of credit and interest rate. The redistribution of income towards a higher wage share generates an increase in consumption expenditures, since wage earners spend a greater portion of their income than profit recipients, with a consequent expansion in

output growth (Marc Lavoie and Engelbert Stockhammer 2013; Servaas Storm and C.W.M. Naastepad 2013).

Furthermore, high levels of economic activity have great repercussions on imports. Imports have become crucial to the understanding of the performance of the Brazilian economic activity, including the difficulties Brazil has faced in boosting its economic activity in the recent period, with consequences for the country's manufacturing product and GDP.

The behaviour of imports is analysed through the standard equation in which imports depend on the economic activity (Y) and the real exchange rate (RER). An increase in Y raises imports as well as a decrease in the real exchange rate (indirect measure in the case of Brazil). So, the equation for changes in imports Δ(Q) is the following:

$$\Delta(\ln Q)_t = \alpha_0 + \alpha_1 \Delta \ln Y_t + \alpha_2 \Delta \ln(RER)_t + \Delta u_t. \quad (3)$$

The analysis of imports requires including a dummy variable to separate the period before and since the Great Recession. The idea is to verify whether the Great Recession had an impact on the relationship between the growth rates of imports, economic activity and real exchange rate.

Finally, the behaviour of investment is analysed through the standard equation in which investment depends on economic activity and the interest rate. Investment depends on the degree of productive capacity utilization. Greater Y increases the use of this capacity, thereby inducing more investment (accelerator). Investment is also influenced by the market interest rate (MR). In this case, it is not only the cost of financing investment that is considered, but also the capitalist evaluation of investment decisions to increase the productive capacity that accounts for the existence of other possible capital application. The capitalist evaluation of investment in productive capacity accounts for its high risk and low liquidity, therefore making necessary for this investment to provide sufficiently high profitability to compensate its high risk and low liquidity. The equation for changes in investment is:

$$\Delta(\ln I)_t = \alpha_0 + \alpha_1 \Delta \ln Y_t + \alpha_2 \Delta \ln(MR)_t + \Delta u_t. \quad (4)$$

According to Amit Bhaduri and Stephen Marglin (1990), investment depends not only on capacity utilization, but also on profit share/margin. Accordingly, investors use as predictors of marginal profitability on new investment, and the future of demand, the current average profitability and average degree of capacity utilization. In this case, we include in Equation (4) the change in profit share (π), to verify whether increases in profit share stimulate investment decisions as suggested by Bhaduri and Marglin (op. cit.). The new equation for changes in investment is:

$$\Delta(\ln I)_t = \alpha_0 + \alpha_1 \Delta \ln Y_t + \alpha_2 \Delta \ln(MR)_t + \alpha_3 \Delta \ln(\pi)_t + \Delta u_t. \quad (5)$$

The analysis of investment also requires including a dummy variable to separate the period before and since the Great Recession. The idea is to verify whether the Great Recession had an impact on investment decisions, which is one of the main hypotheses of this paper. Public investment is not included in our investment relationship, which is private investment. It is worth noting, however, that especially

during the period 2007-2010, public investment increased more than private investment.

3. Estimation Results

Consistent data series for all the variables of Equations (2), (3) and (5) are available over the period 2002 to 2013. All data series employed are quarterly, so the number of observations for the estimations is fifty-two. The database is built with information collected from the Central bank of Brazil (2014).

The estimation of the coefficients of Equations (2), (3) and (5) should take into account the fact that the explanatory variables are not exogenously determined. The appropriate technique to obtain consistent estimates of the parameters that indicate correctly the influence of explanatory variables on dependent variables is the Generalized Method of Moments (GMM) technique. Another possibility could be the Vector Error Correction (VEC) model. However, the variables did not present the appropriate unit root form, and we have employed as a result the GMM technique as the most appropriate alternative as explained immediately below. The results for the unit root tests are not reported in this contribution but can be obtained from the authors upon request.

The GMM technique is based upon the assumption that the disturbances in the equations are uncorrelated with a set of instrumental variables. One possibility for these instruments is to use predetermined variables that are lagged endogenous variables (Jeffrey M. Wooldridge 2003).

Two procedures are undertaken in order to test the relevance of the instruments. First, a statistic proposed by John Shea (1997) is estimated. This statistic gives a "partial R^2" that takes the intercorrelations among the instruments into account. If an estimated equation yields a small value of the Shea (1997) measure, one may conclude that the instruments lack sufficient relevance to explain all the endogenous regressors, and the model may be essentially unidentified. Conversely, higher values of the Shea (1997) measure indicate that the instruments are relevant. Second, the *J*-statistic of Hansen (1982), the minimized value of the objective function, is used to carry out hypothesis tests from GMM estimation. The *J*-statistic tests for the validity of over-identifying restrictions when more instruments than parameters are present in the estimation procedure. Under the null hypothesis that the over-identifying restrictions are satisfied, the *J*-statistic times the number of regression observations is asymptotically χ^2 with degrees of freedom equal to the number of over identifying restrictions.

If the results of the previous two tests indicate the instruments are relevant, then it is assumed that the error is uncorrelated with current exogenous variables and with all past endogenous and exogenous variables. Therefore, each lagged endogenous variable is considered uncorrelated with the error term. Accordingly, for the estimation of the equations, lagged endogenous variables are used as instruments, if the result of the two tests suggests the proposed instruments are relevant.

The econometric analysis follows the David F. Hendry and Jean Francois Richard (1983) approach. Accordingly, the first step is to check whether the data is coherent. For that, the Augmented Dickey-Fuller (ADF) test is undertaken to check

the stationarity of the relevant variables. If the variable in question has a unit root, this variable is non-stationary and, if the variable does not present a unit root, this variable is assumed to be stationary. The Durbin Watson (DW) test is also employed, which can detect the presence of autocorrelation. If the value of DW is close to two, there is no autocorrelation. Conversely, if the value is very different from two, first-order autocorrelation is indicated and the variable in question may not be stationary either (Wooldridge 2003).

After checking for the data coherence, the next step is to evaluate the quality of the estimation (Hendry and Richard 1983). The Wald test is used to verify the true value of the parameters based on the sample estimates. This test indicates whether the fitted model describes well the relevant data. The inclusion of lagged dependent and independent variables is also considered in the estimation; this is to verify whether the past values of these variables have an influence on current values. The Root Mean Square Error and the *R*-squared statistics are also considered to measure the goodness of fit of the statistical model.

All equations presented in the theoretical background are changes in the logarithm value of the variable. In this case, the most appropriate way to estimate the equations and capture the relationship between the variables is to consider the variables in growth rates. So, all estimations undertaken in this section consider the variables in growth rates.

The first estimated equation is consumption that relates to income (wage and non-wage income), interest rate and credit, all in growth rates; Table 2 provides the relevant empirical results.

The variable c is the growth rate of consumption, y^w is the growth rate of wages, y^{nw} is the growth rate of non-wage income, r is the growth rate of the bank rate and cr is the growth rate of credit. The coefficients of each variable are significant at the 1% level, except the constant that is significant at the 5% level. The inclusion of lagged dependent and independent variables follows the Hendry and Richard (1983) approach and four lags for these variables were included and eliminated the non-significant ones. The *R*-squared statistic shows that the estimated line approximates the real data points in 32% and the Root Mean Square Error (Root MSE) statistic, which indicates the measure of accuracy, is 1.4. The instruments used for the GMM estimations were lagged endogenous variables up to two lags, as indicated in the Table. The Shea's partial *R*-squared test shows that the instruments are relevant to explain all endogenous variables. This result is reinforced by the *J*-statistic test, which shows that the over identifying restrictions are satisfied; so the instruments as a group can be used as exogenous variables. The Wald test indicates that the value of the parameters based on the sample estimate is true and the Durbin Watson test is close to two.

The estimation of the consumption equation shows the importance of increases in total wages to boost consumption in the Brazilian economy as well as the role of credit. In this sense, we can confirm that increases in employment and credit were the main variables that explained the increase in consumption over the period 2004-2008. They were reinforced by the minimum wage policy and the formalization of labour contracts. The counter-cyclical policy of the government to face the conta-

Table 2 Estimation of Consumption (GMM)

Equation for: c_t

	GMM	
Variable	Coef.	Std. error
Constant	-0.18**	0.0823
c_{t-1}	-0.14*	0.0077
y^w_t	0.59*	0.0401
y^{nw}_t	0.01*	0.0017
r_t	-0.03*	0.0039
cr_t	0.16*	0.0059

Notes: * significant at 1%, ** significant at 5%

Instruments: c_{t-1}, y^w_{t-1}, y^w_{t-2}, y^w_{t-3}, y^{nw}_{t-1}, y^{nw}_{t-2}, r_{t-1}, r_{t-2}, cr_{t-1}, cr_{t-2}

Observations: 52

Period: 12 years between 2002 and 2013, with quarterly data

R-squared: 0.39

Root MSE: 1.4

Wald stat: 6722.97 (prob.=0)

Durbin Watson *d*-stat: 2.08

J-test: 2.3468 (p=0.8852)

Shea's (1997) partial R-sq: 11% for w_t, 10% for nw_t, 70 % for br_t and 57 % for cr_t

Source: The authors.

gion effect of the global financial crisis sustained the growth of consumption, but it was not able to prevent its deceleration. The coefficients of non-wage income growth and interest rate growth have the expected sign, but the coefficients are lower when compared to total wages and credit.

The next step is the estimation of the equation for imports. In this case we include a dummy variable (DGR) to verify whether the change in the scenario due to the Great Recession has had an impact on imports. The main hypothesis is that probably the negative effect of currency appreciation is more pronounced since the Great Recession due to the greater competition in international markets. Table 3 shows the results for both equations, without and with the inclusion of the dummy variable.

The variable q is the growth rate of imports, y is the growth rate of GDP and rer is the growth rate of the real exchange rate. The coefficients of each variable are significant at the 1% level and all the tests performed indicated the estimation is robust.

The estimation of the imports equation without including the dummy variable shows that increases in effective demand that raise GDP also lead to increases in imports. The latter is stimulated especially when it takes place together with a lower

Table 3 Estimation of Imports (GMM)

Equation for: q_t				
Variable	Coef.	Std. error	Coef.	Std. error
Constant	-2.32*	0.4613	-5.30*	1.3084
q_{t-1}	0.90*	0.0210	0.92*	0.0191
q_{t-2}	-0.24*	0.0393	-0.24*	0.0356
y_t	0.18*	0.0378	0.21*	0.0543
rer_t	-2.86*	0.1081	-3.02*	0.2132
DGR			6.03*	3.1467
Notes: * significant at 1%, ** significant at 5%				
Instruments: q_{t-1}, q_{t-2}, y_{t-1}, rer_{t-1}, rer_{t-2}				
Observations: 52				
Period: 12 years between 2002 and 2013, with quarterly data				
R-squared:	0.42		0.43	
Root MSE:	19.03		20.6	
Wald stat:	2310.5 (prob.=0)		7054 (prob.=0)	
Durbin Watson:	2.4		2.2	
J-test: (p=0.6703)	1.9671 (p=0.7418)		1.9544 (p=0.7441)	
Shea's (1997) Partial R-sq:	15% for y 16% for rer		10% for y 11% for rer	

Source: The authors.

real exchange rate. On the other hand, decreases in effective demand, followed by increases in the real exchange rate, reduce imports. The inclusion of the dummy variable in the imports equation shows that the effects of changes in the real exchange rate on imports have increased since the emergence of the great Recession.

Finally, Table 4 presents the results for the estimation of investment equation. The dummy variable for the Great Recession is also included, to verify whether there is an effect of the crisis on investment decisions. For the investment function, we have two different estimations: the first one does not consider the increase in the rate of growth of profit share and the second one does.

The variable i is the growth rate of investment, mr is the growth rate of the market interest rate and π is the growth rate in profit share. The variable used for the market interest rate is the referential rate swaps pre-fixed DI and profit share is total profit divided by total income. The coefficients of each variable are significant at the 1% level, except the constant that is significant at 10%, and all the tests performed indicated the estimation is robust.

Income growth and market interest rate have the expected sign. An increase in income stimulates investment and increases in interest rate affects investment negatively. However, both coefficients are very low when the profit share is not considered in the equation. Probably the favourable scenario of the period 2004-2008, together with increasing consumption were the main variables responsible for the in-

Table 4 Estimation of Investment (GMM)

Equation for: i_t								
Variable	Coef.	Str. error	Coef.	Str. error	Coef.	Str. error	Coef.	Str. error
Constant	1.13***	0.1741	0.61***	0.6472	1.00*	0.1696	1.41***	0.7903
i_{t-1}	0.28*	0.0285	0.27*	0.0484	0.28*	0.0369	0.27*	0.0584
i_{t-4}	0.50*	0.0482	0.50*	0.0601				
y_t	0.05*	0.0166	0.05*	0.0211	0.04**	0.0228	0.04**	0.0236
mr_t	-0.07*	0.0258	-0.06*	0.0351	-0.19*	0.0282	0.18*	0.0430
π_t					-0.02*	0.0056	-0.02*	0.0063
DGR			-0.95*	1.132			-0.82*	12.438
Notes: *significant at 1%, **significant at 5%, *** significant at 10%								
Observations: 52								
Period: 12 years between 2002 and 2013, with quarterly data								
R-squared:	0.14		0.13		0.12		0.14	
Root MSE:	5.47		5.51		6.41		6.38	
Wald stat:	538.5 (prob.=0)		545.0 (prob.=0)		124.6 (prob.=0)		168.6 (prob.=0)	
Durbin Watson:	1.91		1.93		1.98		1.98	
J-test:	1.8571 (p=0.9673)		1.8234 (p=0.9352)		1.5034 (p=0.9127)		1.4959 (p=0.8274)	
Shea's (1997) Partial *R*-sq:	12% for y, 47% for mr		12% for y, 42% for mr		10% for y, 33% for mr, 50% for π		10% for y, 24% for mr, 48% for π	

Source: The authors.

crease in investment verified in 2007 and 2008. Another important result is the inclusion of the dummy variable for the crisis, which shows that the Great Recession had a negative effect on investment decision, probably affecting more this variable than income growth and the market interest rate. When we consider the growth rate in profit share in the estimation, we note that the negative effect of the market interest rate increases. However, the effect of increases in profit share does not present the expected sign. The negative coefficient indicates that increases in profit share reduces investment. Yet, it is worth noting that this coefficient is very low. Probably, this negative coefficient, especially after the Great Recession, implies that the growth rate of profit share might have a negative impact on investment than previously in view of the great recession and the political instability in Brazil.

Considering the estimations for consumption, imports and investment together, we note that the consumption boom took place at the same time as the national currency appreciated, and was followed by high increases in both imports and GDP. When the world scenario was favourable to the Brazilian economy, investment reacted, helping to boost the country's GDP. However, consumption has decelerated since the Great Recession, despite government stimulus. This slowdown was due to the very consumer cycle dynamic. On one hand, the consumer boom was focused on durable goods, which are not replaced frequently. On the other hand, this boom was

anchored not only on rising incomes (due to employment growth and real increases in the minimum wage), but also on household indebtedness, which could not increase indefinitely. Indeed, in face of the higher cost and shorter term of this class of credit, in Brazil the commitment of the monthly income to pay amortizations and interest reaches a high level in shorter periods of time comparing to other countries. For data on household indebtedness, see Brazilian Central Bank website: www.bcb.gov.br. Besides that, investment is negatively affected due to the Great Recession. The consequence has been low GDP growth and increases in consumption, yet in lower growth rates, taking place with increasing imports. Clearly, our empirical results validate our theoretical propositions as put forward in Section 2.

4. Further Discussion of the Empirical Results

The Brazilian economic growth has been unstable and relatively low since the liberalising reforms. A better performance of the economy took place when the world scenario was favourable to the Brazilian exports. Under those circumstances, the balance of payments constraint decreased and increases in household consumption became the main source of effective demand growth. These reforms, mainly the privatization of public enterprises and external openness, decreased the government possibilities to intervene in the economy, creating difficulties to articulate autonomous investment. The latter was crucial to boost the Brazilian economic growth during the industrialization period. Since the reforms, economic growth has been led by consumption with investment being driven by consumption and exports.

The long international commodity price boom before the global financial crisis (2003 to mid-2008) created a favourable scenario for the Brazilian exports growth, both for primary and manufactured goods. The economic activity had been low prior to that period, and the national currency was devalued, reinforcing increases in exports of manufactured goods. Increases in exports and in the domestic market raised employment and income. The latter took place together with lower inflation and significant improvements in the balance of payments and public finances, creating expectations of sustainable improved performance. Consequently, demand and supply of credit were stimulated. Consumption, then, increased significantly, especially on durable goods. The latter was reinforced by an incomes policy that focused on increases in the minimum wage, thereby enabling households with low incomes, which were excluded from this market, to increase their consumption.

A phase of increased consumption highly stimulated both imports of manufactured goods and investment. The latter became the main component of effective demand in 2007-2008. Consequently, domestic production increased considerably, less than GDP nonetheless, decreasing the share of manufacturing in the national output.

An important observation is that the appreciated currency did not prevent the growth of industrial production from 2004 to 2008. In that period, manufacturing growth was crucial in boosting GDP, despite the decrease in the share of manufacturing in the national output. The resumption of economic growth in the period 2004 to 2008 started with increases in exports, but the expansion of consumption became essential.

However, the Great Recession changed the world scenario and increased the negative effects of the currency appreciation on the Brazilian economy. The complexity of the effects of an appreciated national currency on the economic activity is seen when comparing the performance of the Brazilian economy during both periods 2004-2008 and 2009-2013. In the period 2004-2008, the national currency appreciation due to a favourable international scenario was an important aspect to the process in which the GDP growth was based on consumption and investment. In the period 2009-2013, an appreciated domestic currency took place under an unfavourable international scenario, contributing to exacerbate the effects of the slowdown in consumption and investment on GDP growth; thereby influencing positively manufacturing production.

Continued high GDP growth rates required increases in autonomous investment, especially in infrastructure, complementing the rising investment induced by consumption. The Program to Accelerate Growth (PAC) launched in 2007 was the beginning of autonomous investment; however, it was negatively affected by the contagion effect of the global financial crisis in the last quarter of 2008.

Brazil responded efficiently to the Great Recession and the counter-cyclical policy prevented decreases in household consumption. However, the uncertainty due to the crisis created difficulties to enhance the necessary autonomous investment, and household consumption increased at lower rates after 2010. Besides that, competition in the international market for manufactured goods intensified after the crisis, with negative consequences for the domestic production of these goods. This higher competitive international scenario, together with an overvalued national currency, negatively affected exports of manufactured goods and increased the impact of effective demand on imports. Increases in effective demand slowed down, therefore weakening its impact on manufacturing production and GDP growth.

The estimated consumption function illustrates the high sensitivity of this important component of effective demand in relation to the behaviour of total labour income (employment and wages) and the evolution of demand and supply of credit to consumption. It then helps to understand the reasons of the consumption boom that has occurred since 2004. On the other hand, the estimation of imports shows the structural break in the relation between the growth of imports, on the one hand, and GDP growth and the evolution of the real exchange rate, on the other hand. This breakdown is probably a result of the increased competition in the international market for manufacturing goods. Besides that, the lack of investment did not improve the country's production, stimulating imports to satisfy higher consumption. The estimation of the investment function shows the negative impact of the Great Recession on investment decisions, reveling that increases in consumption are not enough to sustain investment growth.

5. Summary, Conclusions and Implications

GDP growth has been lower after the global financial crisis and decreased continuously from 2010 to 2013. Its resumption requires undertaking autonomous investment in infrastructure and industry and reinforcing the domestic manufacturing production, which will foster employment and workers' income, allowing the mainte-

nance of household consumption. The success of these initiatives requires a controlled devaluation of the national currency, which would both stimulate exports and curb imports. This devaluation should take place at the same time that domestic inflation is under control; therefore, it would not worsen the necessary sustained household consumption. Yet, the increase in net exports due to a devalued currency is probably not able to compensate decreases in this consumption, considering its low share in total effective demand.

Hence, the resumption of GDP growth in Brazil is a complex task that requires active action from the government to enhance autonomous investment. At the same time preventing decreases in household consumption and keeping inflation under control with a devalued national currency and a lower policy rate, the government capacity to act in the economy demands a rebuilt of the institutional instruments that were abandoned by the liberalising reforms.

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