BRAZILIAN's STRUCTURAL CHANGE AND ECONOMIC PERFORMANCE: STRUCTURALIST COMMENTS ON MACROECONOMIC POLICIES

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Abstract

This study assesses the impact of macroeconomic policies on the real side of the Brazilian economy. We present a Structuralist model in growth terms based on Rada (2007) to investigate the recent economic performance of Brazil. The Social Accounting Matrix for Brazil in 2006 serves as a benchmark for our model. We investigate the short/medium term effects of four simulation exercises: a rise in autonomous investment (animal spirits), an increase in wages, a exchange rate depreciation, and a rise in labour productivity growth. The results suggest that the Brazilian economy is weakly profit-led. A rise in formal wages and exchange depreciation do not foster economic growth. In this vein, only macroeconomic policies that increase autonomous investment and labour productivity can stimulate the economy.

Key-words: Structuralist models; Labour surplus economies; Wage/Profit-led regimes
JEL Classification: O1, C1, D57.

Resumo

Este estudo avalia o impacto das políticas macroeconômicas sobre o lado real da economia brasileira. Apresentamos um modelo estruturalista de crescimento com base em Rada (2007) para investigar o recente desempenho econômico do Brasil. A matriz de contabilidade social para o Brasil em 2006 serve de base para o modelo. Nós investigamos os efeitos de curto / médio prazo de quatro exercícios de simulação: um aumento no investimento autônomo (espíritos animais), um aumento nos salários formais, uma depreciação da taxa de câmbio, e um aumento do crescimento da produtividade do trabalho. Os resultados sugerem que a economia brasileira segue um regime de crescimento fracamente puxado pelos lucros. Um aumento dos salários formais e depreciação cambial não promovem o crescimento econômico. Nesse sentido, apenas políticas macroeconômicas que aumentam o investimento autônomo e a produtividade do trabalho podem estimular a economia.

Palavras-chave: Modelos estruturalistas; economias com excedente de trabalho; regimes alavancados por lucros/salários.
Classificação JEL: O1, C1, D57.

1. Introduction

Structural transformation and economic growth are strongly related with the process of economic development. Economic growth and high productivity may not be sufficient to create jobs and reduce poverty. To avoid jobless growth, labour transference from low to high productivity sectors must take place. Creating better paid jobs in high productivity sectors is crucial to reach a higher level of economic development. A strong demand for the modern sectors also remains important. In this manner, underdevelopment is associated with a lack of dynamic structural transformation in the economy.

Because of the role of the informal sector as a reservoir of labour, it is important to evaluate the impact of macroeconomic policies on both the informal and formal sectors to assess the complexities of the process of economic expansion in Brazil. In this context, policies should target to improve the interrelationships between sectors, generating well paid jobs and economic growth.

This paper aims to present a Structuralist model to investigate the effect of macro policies on the real side of the Brazilian economy after 2006. The Structuralist model presented here describes an open, developing economy with two sectors, two commodities, and three classes. We borrow model from Rada (2007, 2012) and notation from Morrone (2014). The two-sector Social Accounting Matrix (SAM) for Brazil in 2006 from Morrone (2015) serves as our benchmark. We employ the model in the short/medium term to compare the effects of four experiments: a rise in autonomous investment (animal spirits), an increase in wages, an exchange rate depreciation, and a surge in labour productivity growth. We attempt to shed light on the possible effects of these simulation experiments on key macroeconomic variables.

This paper is organized as follows. We assess the sectoral contribution to output growth in Section 2**.** In the following section, we present the the schematic Social Accounting Matrix (SAM), structuralist model, and the data. Three experiments are analysed in Section 4: a rise in autonomous investment (animal spirits), an increase in formal wages, and exchange rate depreciation. The remainder two sections exhibit results and conclusions.

2. Sectoral Contribution to Economic Growth and Structural change during the 2000s in Brazil

Economic development has a profound relationship with structural transformation towards activities that contain static and dynamic scale economies. Manufacturing and high tech services' performance are crucial to sustain growth. These sectors have the potencial to boost labour productivity through spillover effects and learning by doing. (The latter is present as a term of the

economic regularity known as the Kaldor-Verdoorn Law (KV)). In this context, agriculture has a major role as a provider of cheap food and inputs, acting to mantain external competitiveness and fight poverty (Von Arnim e Rada, 2011). Moreover, agriculture's exports plays an important role in countries like Brazil.

Here we assess the sectoral contribution to economic growth of three major sectors: agriculture and live stock, industry, and services. The decomposition results for output growth are examined in Brazil in two periods: 2000-2005 and 2006-2011. Following the Structuralist literature, sustainable economic growth involves sectoral structural change that engenders a positive labour productiviy growth rate and a robust demand which in turn creates jobs in dynamic sectors.

Table 1 displays the sectoral value-added shares for the two periods. During 2000-2005, agriculture exhibited the lowest share of the value-added of the economy. Industry represented about 27.22 per cent. The services exhibited the larger share of aggregate output. Each sector weight in the total value-added highlights the sectoral contribution to the output generation.

Comparing the results of the first and second periods, Table 1 documents that the shares of services in total output were raised. In contrast, the participation in the economy of agriculture and industry diminished. This trend indicates a continuing process of deindustrialization in Brazil.

Table 1.

Average sectoral participation of total Brazilian value-added, (%).

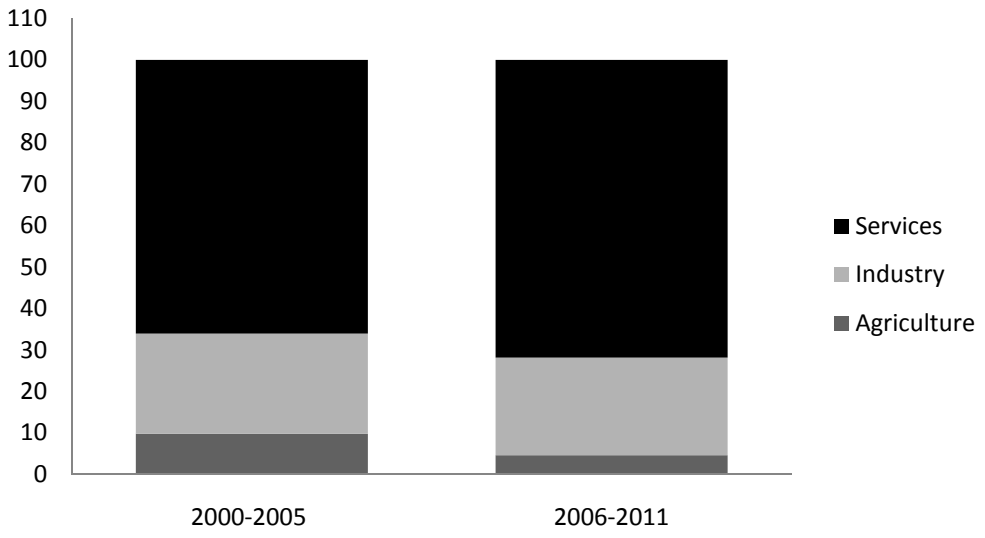
	Periods	
Sectors	2000-2005	2006-2011
Agriculture and live stock	6.16	5.16
Industry	27.22	27.09
Services	66.62	67.75

Source: author's estimations.

Now let us turn the focus toward the decomposition of the output growth. The aggregate output results from the sum of sectoral outputs, $X = \sum_{i=1}^{n} X_i$. Differentiating the output equation with respect to time shows that the output growth rate stems from the weighted average sum of the sectoral output growth rates, $\hat{X} = \sum_{i=1}^{n} \chi_i \hat{X}_i$. Figure 1 documents the results. The results reveal that service activities raised their contribution to aggregate output growth. Conversely, agriculture and industry's contribution to growth dropped substancially. Between 2000 and 2005, the industry's

growth rate represented aproximatelly 24.16 per cent of the whole output growth. In the second period, from 2006 to 2011, this share of growth diminished to 23.50 per cent; in other words, a drop of about 2.75 per cent. Comparing to the first period (2000-2005), the decrease in agriculture was substantial; it dropped by 52 per cent. Conversely, services increased its share, provoking a postive impact on the aggregate output growth. An in-depth sectoral analysis allows us to verify that the structural change towards services (likelly intensive labour services with small labour productivity) explained part of the economic growth in Brazil. Note that it was not high tech services that pulled economic expansion but labour intensive services, e.g., commerce and trade.

Figure 1. Sectoral contribution to output growth in Brazil (%).



Source: author's estimations.

A reversal structural change goes against the internacional evidence on countries that achieved sustainable growth. Such cases are related to the South Asian experiance after the 1950s, mainly that of South Korea. There, structural transformation occured in favor of manufacturing and high tech services (Rada e Taylor, 2006). In summary, the results for Brazil reveal a diminishing importance of industry in explaining economic growth.

The analysis of the decomposition results, therefore, reveal that the structural change toward services provoked the output to rise. Despite the smaller importance of the industry in explaining economic growth, this sector is still important to boost econonomic activity via dynamic scale economies. Moreover, after analysing the data it becomes clear that the growing contribution of the service sector to growth remains concentrated in low labour productivity activities. It is not high tech services that boost growth in Brazil. If this trend persists, an unsustainable economic performance may emerge.

3. The Structuralist Model and the Data

This section introduces the mathematical model and presents the data. First let us begin presenting the model in level and growth terms. The antecedents of the model are Rada (2007, 2012) and Morrone (2014). Next we exhibit the data. We attempt to overcome the lack of statistics about informal and formal sectors employing techniques developed by Rada (2010) and applied by Morrone (2015).

3.1 The Structuralist Model

The model presented here is standard. It represents a surplus labour economy with two sectors, two commodities, and three economic classes - a capitalist, a modern, and an informal household respectively. To build the model, we took into account the structural features of the economy. We borrowed model from Rada (2007) and notation from Morrone (2014).

The two activities of importance in the analysis are the informal sector (n) and the formal sector (t). The former produces a nontradable (N) good while the latter manufactures a tradable (T) good. They are not perfect substitutes. Private income is distributed among capitalists in the formal sector, workers in the formal sector, and workers in the informal sector. Capitalists consume the formal good and save. Workers consume a constant share of their income in the consumption of both goods. The formal sector makes a commodity that can be consumed, invested, or exported. By this token, the foreign sector supplies intermediate goods to the modern sector. Table 2 exhibits the schematic Social Accounting Matrix (SAM), and its data source for a two-sector economy.

Table 2. A social accounting matrix for a two-sector economy.

SAM for Brazil	Costs		Use of Income					
	Formal (A)	Informal (B)	Formal households (C)	Business (D)	Informal households (E)	Exports (F)	Accumulation (G)	Totals (H)
(1) Formal	Intermediate inputs (I-O Matrix/TRU)		Formal HH consumption of formal goods (TRU)	Formal goods consumption	Informal HH consumption of formal goods (TRU)	Foreign demand (TRU)	Capital Accumulation of formal goods (TRU)	Formal sector output
(2) Informal			Formal HH consumption of informal goods (TRU)		Informal HH consumption of informal goods (TRU)			Informal sector output
(3)Formal Labor	Wages (TRU)							Formal HH income
(4) Formal Business	Profits (TRU)							Business income
(5) Informal Labor		Wages and profits (TRU)						Informal HH income
(6) Imports	Imported inputs (TRU)							Payments to the rest of the world
(7) Savings			Formal HH saving (CEI)	Business saving (CEI)	Informal HH saving (CEI)	Foreign saving (CEI)	Total capital accumulation	
(8) Totals	Formal sector output	Informal sector output	Use of formal HH income	Use of Business income	Use of informal HH income	Receipts from ROW		

Note: TRU stands for the Table of Resources and Uses, that gives the statistics to estimate the input-output matrix, and CEI is the statistics of flow of funds.
Source: Reproduced from Rada (2012) and Morrone (2015).

3.1.1 Employment, Output, Investment and Net Exports determination for the Model in Level Terms

Let's start the analysis delving into the specifics concerning the functioning of labour markets. Here we assume full employment, that is, workers can always find a job in the informal sector. In other words, the informal sector works as a reservoir of labour, expanding during recessions and shrinking during economic recoveries. The equation formalizes the labour market behavior.

$$l_n = l - l_t \tag{1}$$

Where l_t and l_n stands for the number of employed workers in the formal and informal sectors respectively.

The labour compensation in the informal sector is $w_n = \varepsilon_n z_n$; hence, this implies an unclear distinction between capital and labour income. The transfer of workers from the informal sector (a

low labour productivity sector) to the formal sector (a high labour productivity sector) boosts labour productivity in the whole economy (Rada, 2007; Morrone, 2014). Having a higher capital-labour ratio, the formal sector can increase the productivity of each additional worker.

The informal sector is supply-constrained, meaning that prices will adjust to achieve equilibrium in the short/medium term. Labour productivity is equal to the informal sector value-added divided by the informal sector labour (l_n). We can rewrite the equation as:

$$y_n = \varepsilon_n l_n \tag{2}$$

Aggregate supply (x_n) is presented below:

$$c_{wn}^{\ n} l_n + c_{wt}^{\ n} l_t = x_n \tag{3}$$

where $c_{wn}^{\ n}$ and $c_{wt}^{\ n}$ stand respectively for the consumption of the informal good by workers in the informal and formal sectors.

Conversely, the formal sector operates with excess capacity. It functions as a quantity-clearing sector or demand-constrained. In this sector, output changes to accommodate disturbances in other variables. Capital stock is present in the modern sector only. In Keynesian fashion, the investment, i_t, responds to animal spirits (or autonomous investment, z_0), profits and accelerator. It is a function that includes the output of the formal sector (x_t), profit (Π), and the accelerator (z_2) as explicative variables.

$$i_t = z_0 + z_1 \Pi + z_2 x_t \tag{4}$$

Following analogous procedures for the formal sector, we can write the sectoral balance equation for this sector as:

$$c_\pi + c_{wt}^{\ t} l_t + c_{wn}^{\ t} l_n + k_t + i_t = x_t \tag{5}$$

where c_π is the capitalist (or business) consumption of formal goods and k_t is the tradable good exports.

We assume that both workers consume the nontradable good. We employ the Linear Expenditure System (LES) to add the consumer choice into the analysis. Note that workers consume a minimum amount, θ, defined as the floor-level consumption of the informal good. A

Positive θ [1] indicates an income-inelastic informal good demand and an income-elastic formal sector's good demand. The remaining income is separated between the two goods, in this case, $(1-\alpha)$ and $(1-\beta)$. For more details, see Morrone (2014).

Moreover, exports (k_t) and imports (m_t) are endogenous, responding to price and output changes only. The two equations are shown as:

$$k_t = \chi^0 (\rho)^{\chi} x_f \tag{8}$$

$$m_t = \phi^0 (\rho)^{-\phi} x_t \tag{9}$$

where ρ, $\rho = \frac{eP^*}{P_t}$, is the real exchange rate, x_f is the foreign demand for the modern sector goods, p_t is the price of the modern sector, $p*$ is the foreign price, and e is the nominal exchange rate. The parameters ϕ and χ stand for exports and imports' trade elasticities.

Lastly, the investment-saving balance $s = i_t$ (closure of the model) follows the Keynesian tradition; that is, demand triggers output. In other words, the output level rises in response to a change in aggregate demand for the formal sector. (For more details about the model and for information on price determination, see Morrone, 2014).

3.1.2 How the Model in Growth Terms Works for the Formal Sector

This section presents the model in growth terms. A set of equations can display the model's behavior in the short term. As mentioned earlier, the model works with full underemployment, since all workers can find jobs in the informal sector. The growth rate of employment is endogenous, being the outcome of the difference between the output growth rate and the labour productivity growth rate. The latter stems from the Kaldor-Verdoorn Law (KV).

Starting with $x \equiv l\varepsilon$, where x is output, l stands for labor, and ε is the average labour productivity, we can calculate labour growth rate as: $\hat{l} = \hat{x} - \hat{\varepsilon}$. Here, following the Kaldor-

[1] See Taylor (1979: 219-22) for more details.

Verdoorn relationship (Kaldor, 1965), the growth rate of the aggregate labour productivity growth ($\hat{\varepsilon}$) depends on the autonomous productivity ($\bar{\varepsilon}$) and on output growth ($\hat{x}$) as follows:

$$\hat{\varepsilon} = \bar{\varepsilon} + \gamma_0 \hat{x}. \tag{10}$$

Where the term on the right , γ_0, reacts to industrial policy, human capital, and trade openness (Rada, 2012). Replacing relation 10 (the KV Law) in the labour growth equation we have as a result:

$$\hat{l} = (1 - \gamma_0)\hat{x} - \bar{\varepsilon} \tag{11}$$

The equation 11 means that employment grows if demand grows faster than autonomous labour productivity and KV coefficient, γ_0 .

Turning now to output growth, we can examine which variables drive it. As before, demand triggers output growth in the short term. The model's closure follows Keynesian lines. Equation 12 exhibits the macroeconomic balance between saving and investment. The total saving is the sum of saving out of profits and foreign saving.

$$s\pi x + e(p^*/p_t)\, fx - k - i = 0 \tag{12}$$

where π, and f ($f = \frac{m}{x_t}$) stand, respectively, for the profit-share and the share of imports in supply.

Starting with the saving-investment balance equation (12) and abstracting from intermediate goods we can solve this equation to x as follows.

$$x = \frac{k + i}{s\pi + e(p^*/p_t)\, f} \tag{13}$$

Now total differentiating the equation in (with) respect to exports (k_t), investment (i_t), saving rate (s) and real exchange rate, $e_r = e(p^*/p_t)$, produces the equation for output growth:

$$\hat{x} = \frac{i}{i+k}\hat{i} + \frac{k}{i+k}\hat{k} + \frac{s\pi}{s\pi + e_r f}\sigma(\hat{w} - \hat{\varepsilon}) - \frac{e_r f}{s\pi + e_r f}\hat{e}_r \tag{14}$$

, or

$$\hat{x} = \mu_1 \hat{i} + (1-\mu_1)\hat{k} + \mu_2\sigma(\hat{w}-\hat{\varepsilon}) - (1-\mu_2)\hat{e}_r \quad (15)$$

Where:

$\frac{i}{i+k} = \mu_1$, and $\mu_2 = \frac{s\pi}{s\pi + e_r f}$;

$\hat{w}$ = growth rate of the wages in the formal sector;

$\hat{\varepsilon}$ = growth rate of the labor productivity in the formal sector.

The saving's growth rate, $\hat{s}$, responds negatively to a higher wage share, $\hat{s} = -\sigma\hat{\psi}$, where $\hat{\psi} = \hat{w} - \hat{\varepsilon}$ stands for the wage share's growth rate in the formal sector and σ is the elasticity of saving with respect to the wage share. Investment and exports react to demand and wages (or profits) as follows:

$$\hat{i} = \hat{i}_0 + \phi_x \hat{x} - \phi_\psi \hat{\psi} \quad (16)$$

$$\hat{k} = \hat{k}_0 + \theta_X \hat{x} - \phi_\psi \hat{\psi} + \theta_e \hat{e}_r \quad (17)$$

Where $\hat{i}_0$ is the autonomous investment and $\hat{k}_0$ is the autonomous growth rate of exports, also called the incoming (or trend) growth rate of investment and the incoming growth rate of exports, respectively. Additionally, employing the relations 16 and 17, and adding further algebraic manipulation, we can rewrite the equation for output growth as:

$$\hat{x} = \chi_1 \hat{i}_0 + \chi_2(\hat{w}-\hat{\varepsilon}) + \chi_3 \hat{e}_r + \chi_4 \hat{k}_0 \quad (18)$$

Where:

$\chi_1 = \frac{\mu_1}{1-\mu_1\phi_X + (1-\mu_1)\theta_X}$;

$\chi_2 = \frac{(1-\mu_1)\theta_\psi + \mu_1\phi_\psi - \mu_2\sigma}{1-\mu_1\phi_X + (1-\mu_1)\theta_X}$;

$\chi_3 = \frac{(1-\mu_1)\theta_e - (1-\mu_2)}{1-\mu_1\phi_X + (1-\mu_1)\theta_X}$;

$$\chi_4 = \frac{1-\mu_1}{1-\mu_1\phi_X + (1-\mu_1)\theta_X}.$$

A precondition for model economic meaning is that χ_1 and χ_4 must be positive. This requirement is met when the accelerator (ϕ_x) is closer to one (For details, see Rada, 2007). The remaining two coefficients χ_2 and χ_3 measure the impact of changes in income distribution and capture the effect of exchange rate depreciation on exports. A χ_2 lower than one makes the economy wage-led, a situation where higher wages provoke a surge in domestic demand that compensates the very small negative impact on exports and on investment. Conversely, a χ_2>1 indicates a growth regime led by profits. In this case, higher profits stem investment, functioning as the major component in triggering economic activity. Employing equations (10), (11), and (18) we can rearrange them to show the key macroeconomic variables:

$$\hat{x} = \frac{1}{1-\gamma_0\chi_2}\left[\chi_2(\bar{\varepsilon} - \hat{w}) + \chi_1\hat{i}_0 + \chi_3\hat{e}_r + \chi_4\hat{k}_0\right] \tag{19}$$

$$\hat{\varepsilon} = \frac{1}{1-\gamma_0\chi_2}\left[\bar{\varepsilon} + \gamma_0(\chi_1\hat{i}_0 + \chi_3\hat{e}_r - \chi_2\hat{w} + \chi_4\hat{k}_0\right] \tag{20}$$

$$\hat{l} = \frac{1}{1-\gamma_0\chi_2}\left[(1-\gamma_0)(\chi_1\hat{i}_0 + \chi_3\hat{e}_r - \chi_2\hat{w} + \chi_4\hat{k}_0) - (1-\chi_2)\bar{\varepsilon}\right] \tag{21}$$

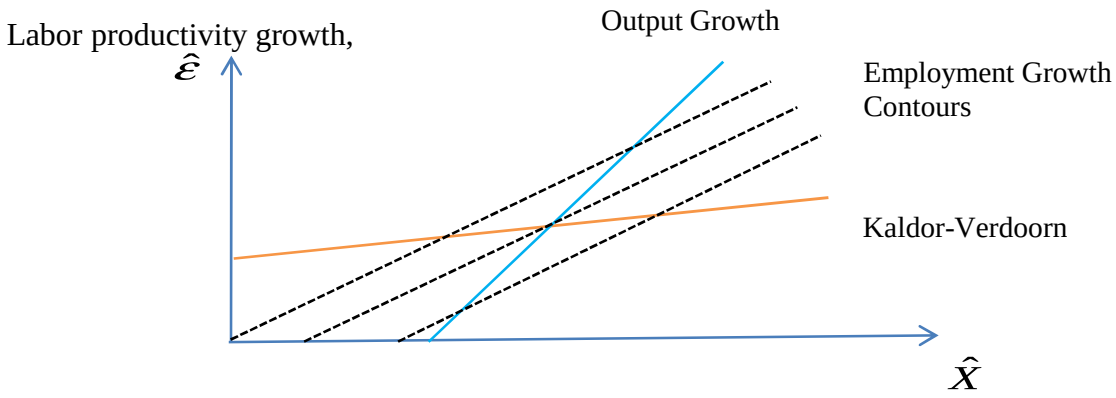
Having set these equations, we are able to analyse how the key variables (output, labour productivity, and formal employment) react to exogenous shocks. A higher autonomous productivity $\bar{\varepsilon}$, ceteris paribus, raises average labour productivity setting a chain impact on output and employment. The results can stem output and employment growth or not. Once χ_2 is negative (the wage-led regime case), output and employment drop. On the other hand, output and employment grow if χ_2 >1 (the profit-led case). Finally, an intermediary case occurs when the economy is weakly profit-led (0<χ_2<1). In this situation only employment growth plumbs. Visually, these regimes can be presented in Figure 1 (a), and (b), borrowed from Rada (2012).

Rada (2007, 2012) sets up an interesting model that explores the determination of output, employment and labour productivity in the formal sector in two scenarios: a strongly profit-led economy and a weakly profit-led regime. In Figure 2 (a), the intersection between the Kaldor-Verdoorn relation and output curves indicates labour growth. In this figure, effective demand is weakly profit-led. Labour growth is zero on the employment growth contours (lines containing a 45 degree slope) for instance. When equilibrium moves to the northwest region, employment creation

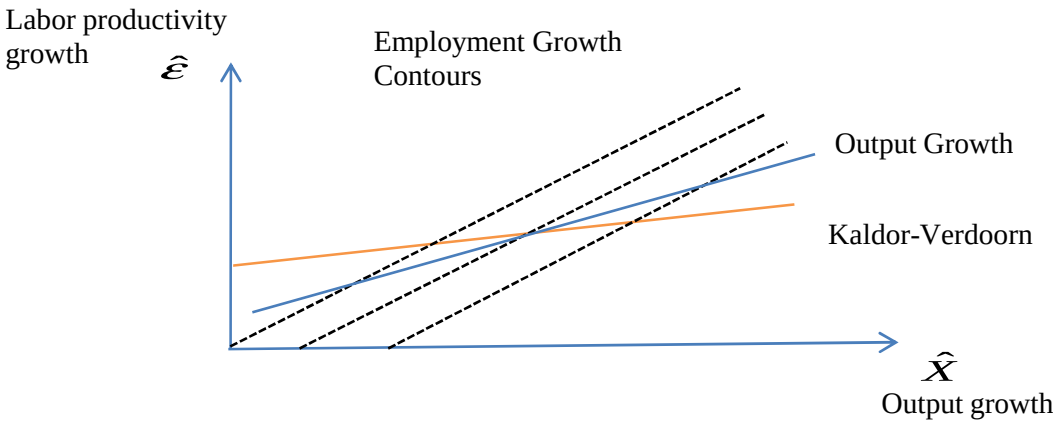
diminishes, leading to a fenomenum usually known as jobless growth. From the analysis of the figure, an increase in the labour productivity growth rate does not boost output growth substancially.

In contrast, we have the case for a strong profit-led regime in Figure 2 (b). Here the output growth schedule's slope is shallow. In this scenario, a rise in the labour productivity growth rate (a upward shiftt of the KV schedule) stimulates employment growth considerably. Last but not least, a wage-led regime will present a negative sloped output growth schedule. (For more details, see Rada (2007) or Ocampo, Rada, and Taylor (2009)).

Figure 2. Output, labour productivity, and employment for the formal sector.



(a): Output, productivity, and employment equilibrium determination when output schedule has a slope higher than 45 degree.



(b): Output, productivity, and employment equilibrium when output schedule presents a slope lower than 45 degree).

Note: Reproduced from Rada (2012).

3.2 Data and Calibration

The data to build the SAM comes heavily from the System of National Accounts (SNA-IBGE, 2011) and Morrone (2015). In this study, the informal sector is defined as a subdivision of the household sector in the System of National Accounts - SNA, characterized by a particular way of organizing the production and an unclear division between labor and capital. This sector includes businesses not officially registered. Informal labour has two main component parts: autonomous labour and employees without legal contracts. For simplicity, we assume that the informal sector uses informal labor only.

The SAM includes two sectors and two households. The formal sector incorporates high productivity agriculture, industry and services. The Brazilian SAM for 2006 attempts to measure informality and its relation to the formal sector. The analyses of the SAM and its components reveal the importance of the informal sector and the relative degree of structural interdependence within the Brazilian economy. Table 3 illustrates important statistics for the two sectors.

Table 3. Summary indicators for Brazil for year 2006.

Economic indicators	
Relative labor productivity (formal/informal)	8.39
Relative wage (formal/informal)	4.38
Informal employment (% of total)	57.59
Capitalist's savings rate	38.12
Saving rate formal HH (%)	9.45
Saving rate informal HH (%)	3.82
Current account balance/GDP (%)	-0.97

Source: author’s estimations.

From the table's analysis, we detect that there is a substantial difference in labour productivity between the two sectors. Formal sector workers are on average 8.39 times more

productive than workers in the informal sector. In this vein, the creation of jobs in the formal sector and further increases in productivity are important requirements for sustainable economic growth.

However, to achieve sustainable growth, improvements in the labour productivity of informal sector workers are required. The increase in productivity in the informal sector releases labour that can migrate towards the formal sector. The transfer of workers from the informal sector, a low labour productivity sector, to the formal sector, a high labour productivity sector, leads to a rise in average labour productivity in the whole economy. This is a precondition for many developing economies that pursue a robust and sustainable growth.

Table 3 reveals that there is a significant inequality between the two sectors. Labour remuneration in the formal sector on average is about four times higher than labour remuneration in the informal sector. When we consider that labour remuneration in the informal sector includes both capital and labour remunerations, this difference should be even greater.

In addition, there are also significant differences in terms of employment indicators. The informal sector employs 53.70 million people, while the formal sector absorbs only 39.54 million. This illustrates the informal sector's role as a creator of jobs and its capability to absorb surplus labour.

Turning now to the main parameters and exogenous variables of the model, it is important to underscore their importance. They serve as key variables to feed our model. Table 5, in the appendix, displays the incoming (trend) growth rates of macroeconomic variables and parameters of the model. Most of the parameters come from national accounting, literature, or chosen ad hoc. The share of investment $\mu_1 = \frac{i}{i+k}$ is 0.54 in Brazil, and the share of savings to total savings is 24 per cent in the country for 2006. The profit-share comes from the national accounting data, being equal to 39 per cent. The domestic savings- total savings share (μ_2) is 38%. Savings from capitalists, formal and informal workers are 38, 9.4, and 3.8 per cent respectively.

We chose ad hoc plausible values for the remaining exogenous variables and parameters. The accelerator, ϕ_x, is equal to one in agreement with the international empirical evidence (See Naastepad, 2006). A higher wage share has a negative effect on investment and exports (both elasticities are equal to -0.20). The external demand reacts to an exchange rate depreciation with an elasticity of one. Lastly, according to Thirlwall (1983), the Kaldor-Verdoorn coefficient (γ_0) is 0.3.

These parameter values help to solve for the remaining variables. Other parameters and exogenous variables such as χ_1, χ_2, χ_3, and χ_4 come from macroeconomic data. In this way, χ_2 = 0.02 indicates that the economy is weakly profit-led. As before, a χ_2 positive and lower than one indicates a weakly profit-led economy. In other words, changes in the wage-share has an impact on output through χ_2. The remaining parameters and growth rates of exogenous variables are in the appendix (Table 5).

4.Comparative Statics' Results for the Formal Sector

This section reports on the simulation results of four experiments: a surge of autonomous investment growth rate from 1.5 to 2%, a rise of wages growth rate trend from 1.5 to 3%, a exchange rate depreciation changing from -0.8 to 1%, and an increase in the productivity growth rate (autonomous productivity) from 0.15 to 1%. Table 4 reveals the main economic results.

The first row in the table describes the base run results of the model that reproduces the average annual growth rates of formal output, productivity, and employment in Brazil from 2000-2008. The remaining rows display simulation results. Let us begin with the first scenario in row two when a rise in autonomous investment emerges. The results show that the statistics improve all over the border. The key macroeconomic variables (output, productivity, and employment) rise substantially after the investment shock. The growth of the three macro variables implies that structural change obviously takes place in favour of formal activities.

What does the model predict for the economy when formal wages growth rate increases? In this scenario, both output, labour productivity and employment growth rates present a moderate decrease. It occurs because the economy is weakly profit-led. This outcome might seem inaccurate since the Brazilian economy growth recently was attached to income redistribution. We argue that income transfers answer at least part of the growth in Brazil. In this vein, a positive international scenario and income transfers triggered growth, overcoming the mild negative impacts of wage growth on output.

Next, what is the effect of an exchange rate depreciation? The model's outcome suggests that output, productivity, and employment growth rate diminish considerably. The positive impact on exports are insufficient to dominate the negative effect on higher costs of imported inputs. For instance, price inelastic capital goods imports can create a contractionary outcome as a response for an exchange rate depreciation (Krugman and Taylor, 1978). Because χ_3 is negative, exchange rate depreciation hurts economic performance. Rada (2012) found similar results for India.

The last row of the table shows that a boost in autonomous labour productivity ($\bar{\varepsilon}$) leads to economic expansion (as a result of a successful industrial policy or a higher human capital growth rate). In the weakly profit-led economy of Brazil, a higher autonomous productivity stimulates output and productivity through the KV Law. Figure 2 (a) illustrates this result. A rise in productivity causes a shift upward on the KV schedule, leading to higher output and productivity growth rates. In contrast, the new equilibrium occurs in a higher employment growth contour, diminishing employment growth substantially.

Table 4. Comparative static's results for the formal sector in Brazil, (%).

		Growth (%)		
		Output	Productivity*	Employment
Base run		3.34	1.15	2.19
Investment growth	1.5 - 2%	3.83	1.30	2.53
Wage growth	1.5- 3%	3.31	1.14	2.17
Exchange depreciation	1%**	2.83	1.00	1.83
Productivity growth	0.15-1%	3.36	2.01	1.35

* Productivity stands for average labour productivity for the formal sector only.
** A rise in exchange depreciation from -0.8 to 1%.
Source: author's calculations.

5. Conclusion

This paper has introduced a model to evaluate the effects of macroeconomic policies on the economy. Specifically, we investigate the short/medium term results of four exercises: a rise in autonomous investment, a surge in formal wages growth rate, an exchange depreciation, and an increase in the growth of autonomous labour productivity.

The results show that the Brazilian economy is weakly profit-led. In this context, a redistributive policy towards labour and exchange depreciation does not foster economic growth. The latter is explained by the economic structure and its reliance on imported inputs. On the other hand, policies that provoke a surge in autonomous investment (e.g., via industrial policy), and in labour productivity positively affect the economy, boosting output and employment. Our findings

underscore the importance of these macroeconomic policies to engender economic expansion.

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Appendix

Table 5**.** Economic parameters and exogenous growth rates.

Economic parameters and exogenous growth rates	
(a) Major parameters	
π	0.39
μ_1	0.54
μ_2	0.38
γ_0	0.30
χ_1	0.97

χ_2	0.02
χ_3	-0.28
χ_4	0.83

(b) Growth rate of exogenous variables (%)

$\hat{w}$	1,58
$\hat{e}_r$	-0,80
$\bar{\varepsilon}$	0.15
$\hat{i}_0$	1.50
$\hat{k}_0$	2.00

Source: author's estimations.