

## Bureaucracy, External Trade and Long-Term Growth in a Balance-of-Payments Constrained Growth Model

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**Resumo:** O debate em torno do crescimento econômico tem se estendido por um longo tempo. Este artigo segue a abordagem pós-keynesiana do crescimento, introduzida por Thirlwall (1979). O objetivo é contribuir com o debate acerca dos modelos de crescimento restringido pelo balanço de pagamentos, introduzindo a burocracia no modelo de Moreno-Brid (2003). O modelo e o estudo empírico desenvolvidos no trabalho, para uma amostra ampla de países no período entre 2008 e 2012, mostraram que a taxa de crescimento da burocracia afeta negativa e significativamente a taxa de crescimento do produto de um país. Como esperado, esse resultado sinaliza que, de fato, as variações positivas e o excesso da burocracia em um país em relação aos seus parceiros comerciais, afetam a competitividade de seus produtos e exigem maior esforço para atrair poupança externa para financiar o balanço de pagamentos, com todas as consequências do aumento da dependência externa de capital. Isso torna o país em questão relativamente mais vulnerável a problemas nos mercados financeiros nacionais e internacionais, que podem culminar em uma crise no balanço de pagamentos, com efeitos desastrosos para o crescimento econômico de longo prazo.

**Palavras-Chave:** Burocracia; Comércio Exterior; Crescimento Econômico.

**Abstract:** The debate surrounding the economic growth has been extended for a long time. This article follows the post-keynesian approach to the growth rate, introduced by Thirlwall (1979). The objective is to contribute to the debate surrounding the balance-of-payments constrained growth models, introducing the importance of bureaucracy in Moreno-Brid's (2003) model. The developed model and the empirical analysis of the model that incorporates bureaucracy for a broader sample of countries for the period between 2008 and 2012 showed that the rate of growth of bureaucracy negatively and significantly affects the rate of output growth in the country, as expected, signaling that indeed the excess and positive variations of bureaucracy in a country relative to its trading partners, affect the competitiveness of their products and require more effort to attract external savings to finance the balance of payments, with all the consequences of this increased dependence on foreign capital, making the country relatively more vulnerable to problems in the domestic and international financial markets, which may culminate in a crisis in the balance of payments, with disastrous effects for long term economic growth.

**Keywords:** Bureaucracy; External Trade; Economic Growth.

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## 1. Introduction

This paper has as its origin point the post-keynesian growth approach, meaning that it explains economical growth through demand components. This line of thought was initially developed considering the seminal works of Kaldor, which introduced the argument that the growth rate of exports detained the capability of restraining the output growth rate, as it is considered the main component of the aggregated autonomous demand in open economies. The growth rate of exports is a condition to achieve a virtuous growth cycle. The higher the exports growth to any given country is, *ceteris paribus*, the bigger the output growth rate will be.

This paper aims to contribute to the debate over the constrained growth models by adding the bureaucracy to the results presented by Moreno-Brid (2003).

The effort to analyze the role and significance of the bureaucracy in models export led growth, since, in excess, it is believed that may affect the competitiveness of the products of a country relative to its trading partners, reducing the net export and hence the rate of long-term growth.

The post-keynesian macroeconomic agenda rescues the central role of the state, in particular, in a way to create an economic environment favorable to the promotion of long-term growth. Institutions are fundamental to allow a "regular" working system, but the excess and the constant changes of these institutions should be avoided, as they compromise decision making by entrepreneurs and hence economic activity in the country. Therefore, even though bureaucracy is needed, it is tested the hypothesis that it's growth in relation to their trading partners can reduce the competitiveness of exports and jeopardize the growth of an economy.

In order to achieve the goal presented, besides this introduction, the paper is structured as follows: in the second section, a brief discussion of the origin and the recent ramifications of the BPC Growth Model is presented. In the third section, a new version of the Moreno-Brid (2003) model is demonstrated, one that includes the bureaucracy component. In the fourth section, the data base, the methodology and the obtained results are detailed. Finally, at the last section, concluding remarks are made.

## 2. Balance-of-Payments Constrained (BPC) Growth Model

In order to avoid an exhausting review of the many theoretical models available in literature, including those of distinct theoretical matrixes, a brief revision of the Kaldorian long-term growth literature is presented, in which the behavior of the long-term economic growth rate is explained by the demand components. In these models, it is the export growth rate that detains the capability of constraining the growth rate, since it is considered the main component of the aggregated autonomous demand in open economies.

In Kaldor's model, the items in the balance of payments, besides net exports, are not considered as a way of simplifying the analysis. In order to achieve the balance of payments equilibrium, the variable of adjustment is the output, meaning that a rise in the output level elevates imports up to the point in which the total value of exports equals to the total value of imports. Therefore, "the higher is, *ceteris paribus*, the growth of exports in a country, the higher its output growth rate would be" (Freitas, 2003).

Thirlwall's (1979) model advances when compared to this one as it shows that the economic growth rates differs between countries due to restrictions caused by the balance of payments, that are related to different income elasticities of exports and imports. Thus, it is encountered in the balance of payments the restriction to demand expansion. According to Thirlwall's Law, the growth rate of any given country will be constrained by its performance

in external exchanges, or even better, by the size of its income elasticity of imports related to its pace of exports expansion:

$$y_b = \frac{x}{\pi} \quad (2.1)$$

where  $y_b$  is the output growth rate,  $x$  is the exports growth rate and  $\pi$  is the income elasticity of imports.

Thirlwall (1979) has advanced in comparison to Kaldor's model by showing that the economic growth rates differ between countries due to constraints to the expansion of the demand provoked by the balance of payments, that are related to the different income elasticities of exports and imports. This model has considered the external constraints created by the need of economies to import to the long-term growth, which became known as the Balance-of-Payments Constrained Growth Model (BPC Growth Model).

It was then established Thirlwall's Law, according to which the long-term growth rate of a country is constrained by the size of its income elasticity of imports related to the pace of exports expansion. Thirlwall and Hussain's (1982) model added, after this, a constraints given by the evolution of foreign capital inflow, besides the presented by net exports and terms of trade.

Following this, Moreno-Brid (1998-1999) aimed to adapt the BPC growth model to developing and emerging economies. The author claims that the accounting constraints imposed by Thirlwall and Hussain (1982) would not be enough to guarantee that the evolution of foreign capital inflows would not generate an unsustainable pattern of foreign indebtedness. Indeed, he presented a growth model that considers a simple constraints to the evolution of foreign capital inflows, which would restrain the expansion of external debt, in other words, the relation between the current account deficit (F) and income (Y) must be maintained balanced.

Moreno-Brid (2003) presented a new version of his own model, which considered also the net interest payments abroad, in order to better adapt his model to the emerging countries, particularly to the Latin-American ones, maintaining the constraint for a sustainable growth of external debt.

The new equation to calculate the output growth rate for Moreno-Brid's (2003) model may be expressed by:

$$y_b = \frac{\theta_1 \xi z - \theta_2 r + (\theta_1 \eta + \psi + 1)(p_d - p_f)}{\pi - (1 - \theta_1 + \theta_2)}; \quad (2.2)$$

This equation shows that the income growth rate depends on the world's real income, on the amount of net interest payments abroad, as well as on domestic prices and foreign prices. Note that the variables  $r$  and  $p_f$  are negatively related to  $y_b$ .

Assuming that the terms of trade variation ( $p_d - p_f$ ) are not significant:

$$y_b = \frac{\theta_1 \xi z - \theta_2 r}{\pi - (1 - \theta_1 + \theta_2)}; \quad (2.3)$$

If the current account deficit is zero ( $1 - \theta_1 + \theta_2 = 0$ ) and, hence, ( $1 - \theta_1 = -\theta_2$ ), it is obtained a new version of Thirlwall's Law, which provides the income growth rate that is compatible with equilibrium in the balance-of-payments:

$$y_b = \frac{\theta_1 \xi z - (1 - \theta_1)r}{\pi}, \text{ where: } x = \xi z. \quad (2.4)$$

If net interest payments abroad are assumed as constant ( $r = 0$ ) or not significant ( $1 = \theta_1$ ), then equation (2.1) becomes the original Thirlwall's Law:

$$y_b = \frac{x}{\pi} \quad (2.5)$$

Having this version of Moreno-Brid's (2003) model as a starting point, the aim is to include the bureaucracy incident in exports and imports to the model, as a manner to evaluate their impacts over long-term growth in a balance-of-payments constrained growth model.

### 3. A BPC Growth Model with Current Transfers and Bureaucracy

#### 3.1 Theoretical Considerations

Several empirical *studies* undertaken in many countries have demonstrated the veracity of "Thirlwall's Law", but some developing countries had significantly different rates of growth than the established by Thirlwall. Aware of this, Thirlwall and Hussain (1982), Moreno-Brid (1998-99), Moreno-Brid (2003), among others, presented contributions, with the inclusion of variables in the original model in order to try explaining why developing countries grew faster than the balance-of-payments constraint should allow.

Hussain (2006) points out that:

The time for class discussion came and all the debate seemed to linger around one basic query: if growth could be explained by a rule which contained two variables only, what was the relevance of many other socio-economic variables that could also influence the growth process? What about the role of policies and economic management? What about the role of capital, labour and technical progress? The answers of the Professor were convincing to some students, but confusing to many others. In an attempt to relieve our baffled faces he concluded the discussion by saying in a pleasant fusion of smile and speech '*Simple laws make good economics*'. And as he was leaving the classroom, his smile turned gradually into a laugh that engulfed his remark: '*if this rule comes to be known as Thirlwall's Law, I will retire*'. Less than one year after the publication of the manuscript in 1979 the rule was crowned as '*Thirlwall's Law*'.

Although, according to Thirlwall (2011), the contributions can not significantly affect the model's predictions, it is believed that the observation of the empirical evidence is important, particularly for in development, as if determined variable has statistical significance, its omission may cause bias in the estimations.

The basic form can be synthesized by Harrod's dynamic multiplier for foreign trade, which, under the assumption of constant relative prices and lack of capital flow, postulates that the growth rate of a country is determined by its volume of exports divided by its income elasticity of demand for imports. The extended form of the model, introduced by Thirlwall and Hussain (1982) had incorporated the effects of changes in terms of trade and capital flows, which can cause a deviation of the growth rate predicted by the basic model.

It is proposed to introduce bureaucracy in the model, which, in excess, can become a hindrance to net exports and hence to the rate of long-term growth. Keynes argues that the efficiency with which governments administer the economic environment and the provision of public goods is crucial to output growth of a country.

The post-Keynesian macroeconomic agenda rescues the central role of the State, in particular, in order to create an economic environment favorable to the promotion of long-term growth. According to Ferrari Filho and Conceição (2001), one can take in Minsky one of the most significant contributions in order to link the importance of institutions and of the "institutional environment" to the theoretical principles of the General Theory Keynes.

Bureaucracy observed in most economies is a set of "institutions" or "rules" necessary to maintain a favorable institutional environment in which the business man is supported and take his investment and production decisions, including for exports. For Keynes (1964), coordination of the economy is one of the main roles of the State. For Keynes, the coordination must be about an action of economic policy fine-tuned with what is required to cooperate with the private sector. In this logic, the state is a being able to gather the most information available, in addition to being the most influential social actor. It shall, therefore, coordinate economic activity<sup>4</sup>. Also according to Keynes (1964, p 378.):

State will have to exercise a guiding influence on the propensity to consume... [on the] optimum rate of investment... [Moreover] a somewhat comprehensive socialization of investment will prove the only means of securing an approximation to full employment.

That passage can be interpreted in two ways: on the one hand, there are those, both favorable and critical to the system of a regulated and administered by the State economy, that understand that Keynes solution to boost effective demand is merely the state intervention and, on the other hand, the idea of "socialization of investment" may be related to endogenous institutional mechanisms created by society so that decision making of individuals can be performed as less adversely as possible. Considering that the second interpretation seems to be reasonable in the sense of Keynes, post-Keynesians consider that institutions are important in determining economic outcomes and events. Thus, institutions matter (Ferrari Filho and Conceição, 2001).

According to Gallardo and Carvalho (2008), institutions are fundamental in order to allow a "regular" operating system, but it is believed that excessive and constant changes in the institutions should be avoided, as these may compromise the decision making by entrepreneurs and hence economic activity in the country. The authors claim that it is the role of the State to support the entrepreneurs' decision to produce and invest, ensuring the appropriate level of aggregate demand, which will ensure sufficient profits to offset production and investment.

From the foregoing, it is believed that the post-Keynesian literature on balance-of-payments constrained growth may be ignoring a key aspect, which is the regulatory quality of the State, which maintains an adequate and stable level of the bureaucracy involved in the production process. Regulatory quality refers to the ability of government to formulate and implement policies and regulations that promote the development of industrial activity in the country. When efficiency or regulatory quality is low, it means that the bureaucracy in the country is increasingly high, compared to the one practiced by its trading partners, which increases production time and costs of companies in the country, reducing profits, competitiveness and long-term economic growth of the countries.

Therefore, even if the bureaucracy is necessary to maintain order in the economic system, its excess and increase relative to its trading partners reduces export competitiveness and undermines the growth of an economy. The problems related to excessive bureaucracy in emerging economies have been widely discussed in recent years, as the same is seen as an impediment to business expansion and long-term growth of some economies. FIESP (2010) highlights that the economic literature on the role of bureaucracy in economic growth gained momentum in the late 80s, with the development of the endogenous growth theory, from which the institutions are to play an important role in the growth rates of the economy.

According to FIESP (2010), bureaucracy may be defined as a formal organizational structure with defined goals and hierarchic, standard process and managing procedures, and a

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<sup>4</sup> Ferrari Filho and Terra (2011).

series of regulations to manage the social and economic activities. Contemporary analysis use the term bureaucracy in a more pejorative sense, as a massive administrative structure which functions are to conduct procedures and rules that are complicated and unnecessary.

Bureaucracy is considered one of the greatest obstacles to income growth and to competitiveness to the country's products in international market. This factor compromises both the private sector efficiency and the quality of public institutions, implying in losses to the citizens and to entrepreneurs, as it reduces the benefits of the goods and services provided.

The World Bank publishes annually indexes related to the size of countries bureaucracy. The Regulatory Quality Index<sup>5</sup>, one of the indicators of governance, varies between -2.5 and 2.5, but in this work it was normalized to vary between zero and one, where a higher value of this indicator means that the bureaucracy in this country is smaller. In this paper, the parameter that measures the bureaucracy is expressed by<sup>6</sup>:

- $\beta_{m_i} = \frac{1}{\delta_{m_i}}$ , where  $\beta_{m_i}$  is the bureaucracy over imports for the analyzed country and  $\delta_{m_i}$  is the Regulatory Quality Index from the World Bank;
- $\beta_{x_i} = \frac{1}{\delta_{x_i}}$ , where  $\beta_{x_i}$  is the bureaucracy over exports for the analyzed country and  $\delta_{x_i}$  is the Regulatory Quality Index from the World Bank;
- $\beta_{x_j} = \frac{1}{\delta_{x_j}}$ , where  $\beta_{x_j}$  is the bureaucracy over exports for the rest of the world and  $\delta_{x_j}$  is the Regulatory Quality Index from the World Bank.

where  $i$  stands for each country and  $j$  stands for the rest of the world, or the commercial partners of the analyzed country.

The parameters were defined as such as it is believed that they have a linear relation with the rate of growth of the country, and the higher the index, the more the parameter approaches its minimum value of one and the lower the damage caused by the bureaucracy in the countries rate of growth is.

Data of the evolution of bureaucracy in the recent period (2008-2010) has indicated an average rise of bureaucracy during the aforementioned period. It is noted that emerging countries, especially Brazil, Venezuela, Argentina, India and Russia, have presented an elevated bureaucracy index and, furthermore, have registered a rise in the same period.

On the other hand, United Kingdom, Hong Kong and South Korea have maintained a reduced level of bureaucracy and have even reduced their indexes in the recent period. Developed countries such as Canada, Germany, USA and Japan have low bureaucracy indexes, but have had a rise in their levels recently. China, Indonesia and Poland are examples of countries with bureaucracy higher than the average, but that has declined recently.

FIESP (2010) developed a study that concluded that countries with higher bureaucracy tend to present a lower level of product per capita, a lower level of competitiveness, a higher informal economy (impacting tax revenue and output growth), as well as a lower level of schooling, as bureaucracy generates inefficiency in public management as it becomes slower and more expensive, elevating the losses of tax revenues and reducing the effectiveness of public expenses. Furthermore, reducing bureaucracy could reduce company costs, make the price of their products cheaper, and elevate consumption, besides generating productive investments in research, technology and improving infrastructure for companies and the welfare of the population.

<sup>5</sup> For more information regarding this index and to access the data available: <http://info.worldbank.org/governance/wgi/>.

<sup>6</sup> In the mathematical model to be developed, bureaucracy on imports is different of bureaucracy on exports.

The stiffness and regulatory complexity discourage businesses formalization and, consequently, the output growth of the economy due to the fear of inspection, making access to the credit market and corporate financing harder, encouraging corruption and decreasing their investments (including in technological innovation), which limits the productive capacity of the country. As a result, a generalized reduction in productivity of the economy occurs, undermining jobs and the potential long-term growth of the country. Indeed, bureaucracy tends to generate higher levels of tax burden in order to afford the bigger and more costly civil service, as well as finance the public management and projects, facing the loss of revenue generated by greater informality.

Summarizing, bureaucracy is harmful to the competitiveness of the products of an economy as it elevates the product price and reduces companies invoicing, in consequence to the costs of procedures and delay in process. In regard to harbor operations, bureaucracy for cargo liberation is considered the main obstacle. The main effects of bureaucracy are the reduction of the public expenses efficiency and the decrease of encouragement for private investment, which harms the competitiveness of the economy and compromise the potential of growth for the economy.

### 3.2. The Equations and the BPC Growth Model with Bureaucracy

The model that will be developed has as its starting point the following equations for exports and imports<sup>7</sup>:

$$X = \left( \frac{P_d}{P_f E} \right)^\eta \left( \frac{Z}{\beta_{x_j}} \right)^{\xi_{\beta_x}} \quad (3.1)$$

$$M = \left( \frac{P_f E}{P_d} \right)^\psi \left( \frac{Y}{\beta_{m_i}} \right)^{\pi_{\beta_m}} \quad (3.2)$$

Note that, if the country has no bureaucracy, the index becomes equal to one and stops compromising the economy output. In this case, the exports and imports equations presented above go back to its standard form, as is presented in the original growth models. However, if there is bureaucracy in the country, the equations can be represented as described above, since they are harmful to exports and imports through the economy output.

By applying logarithm to both sides of the equations and deriving the result in relation to time, it is obtained (with  $e = 0$ ):

$$x = \eta(p_d - p_f) + \xi_{\beta_x} (z - \hat{\beta}_{x_j}), \text{ with } \eta < 0 \text{ e } \xi_{\beta_x} > 0 \quad (3.1')$$

$$m = \psi(p_f - p_d) + \pi_{\beta_m} (y - \hat{\beta}_{m_i}), \text{ with } \psi < 0 \text{ e } \pi_{\beta_m} > 0 \quad (3.2')$$

Knowing that:

$$\theta_1 = \frac{\frac{P_d X}{\beta_{x_j}}}{\frac{P_f M}{\beta_{m_i}}}, \text{ with } 1 \leq \beta_{m_i} \leq \beta_{x_j} \leq N \quad N = 1, 2, 3, \dots \quad (3.3)$$

<sup>7</sup> For simplicity, the internal and external products listed in the equations of imports and exports are presented as a decreasing function of bureaucracy on imports and exports, respectively.

$$\theta_2 = \frac{P_d R}{\frac{P_f M}{\beta_{m_i}}} \quad (3.4)$$

$$BP = (X - M) + TU - R + F \quad (3.5)$$

$$\frac{P_f M}{\beta_{m_i}} = \frac{P_d X}{\beta_{x_i}} + P_d TU - P_d R + P_d F \quad (3.6)$$

Applying the logarithm to both sides of equation (3.6) and deriving its result in relation to time, it is achieved:

$$p_f - \hat{\beta}_{m_i} + m = \theta_1(p_d - \hat{\beta}_{x_i} + x) - \theta_2(p_d + r) + (1 - \theta_1 + \theta_2)(f + p_d) \quad (3.7)$$

Replacing (3.1') and (3.2') and then isolating the output, the following is encountered:

$$\pi_{\beta_m} y = [\hat{\beta}_{m_i} - (\theta_1 \hat{\beta}_{x_i})] + \theta_1 p_d - p_f + \theta_1 \eta (p_d - p_f) - \psi (p_f - p_d) + [\pi_{\beta_m} \hat{\beta}_{m_i} + \theta_1 \xi_{\beta_x} (z - \hat{\beta}_{x_j}) - \theta_2 (p_d + r) + (1 - \theta_1 + \theta_2)(f + p_d)] \quad (3.8)$$

Simplifying the terms, it is obtained a version of the model that considers bureaucracy:

$$y = \frac{[(1 + \pi_{\beta_m}) \hat{\beta}_{m_i} + \theta_1 (\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i})] + \theta_1 \xi_{\beta_x} z - \theta_2 r + (\theta_1 \eta + \psi + 1)(p_d - p_f)}{\pi_{\beta_m} - (1 - \theta_1 + \theta_2)} \quad (3.9)$$

Assuming that the terms of change  $(p_d - p_f)$  are not significant:

$$y = \frac{[(1 + \pi_{\beta_m}) \hat{\beta}_{m_i} + \theta_1 (\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i})] + \theta_1 \xi_{\beta_x} z - \theta_2 r}{\pi_{\beta_m} - (1 - \theta_1 + \theta_2)} \quad (3.10)$$

If the deficit in the current account is zero  $(1 - \theta_1 - \theta_2 + \theta_3 = 0)$  and, therefore,  $(1 - \theta_1 - \theta_2 = -\theta_3)$ , it is found a new version of Thirlwall's Law that provides the income growth rate compatible with the equilibrium of the balance-of-payments:

$$y = \frac{[(1 + \pi_{\beta_m}) \hat{\beta}_{m_i} + \theta_1 (\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i})] + \theta_1 \xi_{\beta_x} z + (1 - \theta_1) r}{\pi_{\beta_m}} \quad (3.11)$$

In the next section, the goal is to analyze this model through seven different sceneries, with opposing assumptions in regard to the parameters that measure the bureaucracy in each country in order to evaluate its effects on the economy's growth strategy.

### 3.3 Analysis of the BPC Growth Model with Bureaucracy

The first scenery exposed represent exactly the model developed by Moreno-Brid (2003), without bureaucracy variation  $(\hat{\beta}_{x_j} = \hat{\beta}_{x_i} = \hat{\beta}_{m_i} = 0)$ .

The equation for the outputs growth rate for this scenery would be:

$$y = \frac{\theta_1 \xi_{\beta_x} z - \theta_2 r}{\pi} \quad (3.12)$$

The other sceneries will be compared to this one in criteria of imports, exports, foreign capital flow and their respective parameters, with equation (3.12) being the starting point. In order to do so, three sceneries where the variation rate of bureaucracy over domestic exports is superior than the one practiced by commercial partners (or in the rest of the world) are considered, and, three more where the opposite occurs, meaning that the variation rate of



bureaucracy over domestic exports is inferior to the one practiced by commercial partners. The following frame presents some possible sceneries:

**Frame 1 – Possible Sceneries with Different Levels of Bureaucracy and its Impacts**

Scenery	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i}$	$\hat{\beta}_{m_i}$	M	$\theta_1$	X	$(1 - \theta_1 + \theta_2) = \theta_3$	F
1	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} = 0$	$\hat{\beta}_{m_i} = 0$	$M = M^m$	$\theta_1 = \theta_1^{mb}$	$X = X^{mb}$	$\theta_3 = \theta_3^{mb}$	$F = F^{mb}$
2	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} > 0$	$\hat{\beta}_{m_i} = 0$	$M = M^m$	$\theta_1 > \theta_1^{mb}$	$X > X^{mb}$	$\theta_3 < \theta_3^{mb}$	$F < F^{mb}$
3	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} < 0$	$\hat{\beta}_{m_i} = 0$	$M = M^m$	$\theta_1 < \theta_1^{mb}$	$X < X^{mb}$	$\theta_3 > \theta_3^{mb}$	$F > F^{mb}$
4	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} > 0$	$\hat{\beta}_{m_i} > 0$	$M < M^m$	$\theta_1 > \theta_1^{mb}$	$X > X^{mb}$	$\theta_3 < \theta_3^{mb}$	$F < F^{mb}$
5	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} < 0$	$\hat{\beta}_{m_i} > 0$	$M < M^m$	$\theta_1 < \theta_1^{mb}$	$X < X^{mb}$	$\theta_3 > \theta_3^{mb}$	$F > F^{mb}$
6	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} > 0$	$\hat{\beta}_{m_i} < 0$	$M > M^m$	$\theta_1 > \theta_1^{mb}$	$X > X^{mb}$	$\theta_3 < \theta_3^{mb}$	$F < F^{mb}$
7	$\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i} < 0$	$\hat{\beta}_{m_i} < 0$	$M > M^m$	$\theta_1 < \theta_1^{mb}$	$X < X^{mb}$	$\theta_3 > \theta_3^{mb}$	$F > F^{mb}$

**Source:** Own Elaboration.

In the second scenery, that considers the variation rate of bureaucracy over imports for the analyzed country null, the income elasticity of exports versus the variation rate of bureaucracy over exports practiced in the rest of the world is bigger than the variation rate of bureaucracy over the exports for the analyzed country. In this case, the total amount of imports is the same encountered in the basic model of Moreno-Brid (2003).

When the rate of variation of the bureaucracy of a trading partner increases, the available market for the country in question gets larger, allowing an increase in exports of the country. Therefore, the participation of exports in financing the balance of payments ( $\theta_1$ ) is superior than the one found in the basic model ( $mb$ ). This scenery reduces the need of financing the balance of payments through foreign capital ( $\theta_3$ ) when compared to the basic model, reducing external savings, since F is lower.

In the third scenery, that also considers the variation rate of bureaucracy of imports null, and the income elasticity of exports versus the variation rate of bureaucracy over exports for the rest of the world is smaller as the variation rate of bureaucracy of exports for the analyzed country. When the bureaucracy of the country in question is greater than the bureaucracy of a business partner, a comparative advantage is gained by the trading partner. This leads to a reduction in exports of the country in question. Thus, although the total amount of imports continues the same as found in the basic model of Moreno-Brid (2003), the ratio of exports financing the balance of payments ( $\theta_1$ ) is relatively smaller. In this case, it is noted that the bureaucracy in the analyzed country grows relatively more than in its trade partners, and deepens the dependency of this country to foreign capital (external savings) in order to finance the balance of payments.

In the next scenery, that assumes a variation rate of bureaucracy over imports greater than zero, the income elasticity of exports versus the variation rate of bureaucracy over exports from the rest of the world is greater than the variation rate of bureaucracy over exports for the analyzed country. In this case, the total amount of imports is smaller than what was encountered in the basic model of Moreno-Brid (2003) as bureaucracy prevents imports of reaching its maximum possible value<sup>8</sup>. Furthermore, note that the ratio of exports financing the balance of payments ( $\theta_1$ ) is bigger than the one from the original model. Additionally, in this scenery, the need for financing of the balance of payments through foreign capital ( $\theta_3$ ) is reduced when compared to the basic model, causing a fall of external savings, since F was reduced.

In the fifth scenery, it is also considered that the variation rate of bureaucracy over imports is greater than zero, but the income elasticity of exports versus the variation rate of bureaucracy over exports for the rest of the world is smaller than the variation rate of bureaucracy over exports in the analyzed country. It is important to observe that the total amount of imports is smaller than what was found in the original model of Moreno-Brid (2003), the explanation being the same as the previous scenery, meaning the obstacles generated by the unexpected changes in the bureaucracy over imports. The value found for  $\theta_1$  is relatively smaller. In this case, it is noted that the bureaucracy in this country grows relatively more than in its trade partners, deepening the dependency of the country to foreign capital in order to fund the balance of payments ( $\theta_3$  increases).

For the sixth scenario, it is assumed that the rate of change of the bureaucracy on imports is less than zero and the difference between the product of the income elasticity of exports with the rate of change of the bureaucracy on exports practiced in the rest of the world is bigger than the rate of change of the bureaucracy on exports of the country in question. In this case, the total amount of imports is higher to that found in the original model of Moreno-Brid (2003), since the obstacles generated by unexpected changes in the bureaucracy are relatively smaller. The share of exports in financing the balance of payments ( $\theta_1$ ) is larger than in the original model, which reduced the need to finance the balance of payments through foreign capital ( $\theta_3$ ), hence the need for foreign savings is also reduced, as F has decreased.

Finally, on the seventh scenario, it is considered that the rate of change of the bureaucracy on imports is also less than zero and the difference between the product of the income elasticity of exports with the rate of change of the bureaucracy over exports practiced in the rest of the world smaller than the rate of change of the bureaucracy on exports of the country in question. The total amount of imports is greater than that found in the original model of Moreno-Brid (2003), for the same reason as in the previous scenario, i.e., due to the smaller obstacles generated by the bureaucracy in imports. The value found for the parameter  $\theta_1$  is relatively smaller. In this case, we realize that if the bureaucracy in the country in question grows relatively more than in trading partners, it increases the country's dependence on foreign capital (external savings) in order to finance the balance of payments ( $\theta_3$  increases).

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<sup>8</sup> Unexpected changes in bureaucracy on imports lead to losses in operating profit margin and increases the delivery time of, for example, a machine to an industry, compromising production and contracts signed. Looking at the definition of the World Bank for its governance indicator it is observed that it aims to reflect the government's ability to formulate and implement policies that promote private sector development, so that a certain level of bureaucracy is necessary to ensure the proper functioning of the country, avoiding malpractice, but its excess causes negative effects like the ones mentioned above.

As was presented by sceneries three, five and seven, the excess of bureaucracy practiced by some emerging economies when compared to its trade partners, generates a dependency of these countries to the foreign capital in order to finance the balance of payments, making it relatively more vulnerable to problems in both the domestic and the international financial market, which could lead to a crisis of the balance of payments with disastrous effects for the long-term economic growth.

Usually, when domestic financial markets are well developed and regulated, and the operations of the international financial system are peaceful and stable, countries that finance their balance of payments with the capital account have an upward trajectory for long-term growth. Otherwise, when domestic financial markets are small and underdeveloped, these countries will be subject to crises and the ratio between capital and output growth becomes negative.

From what was exposed, it is believed that as bureaucracy impairs the economy's and the public sector's efficiency it also affects the stability in business environment, productivity and economic growth. It is suggested the reduction and maintenance of bureaucracy in civilized levels, as it not only improves the competitiveness of the productive sector but also beneficiates the State, which becomes more efficient and effective in its politics, loosening economic development in the country.

Concluding, the model showed that the excess and the positive variations of bureaucracy in any given country, when compared to its trading partners, affects the competitiveness of the products and demand a higher effort to attract external savings to finance the balance of payments, with all the consequences of this increased dependence on foreign capital. Indeed, there has been an increase in the output gap when compared with trading partners, since this causes the analyzed economy to exhibit relatively lower growth rates.

Note that, in the absence of bureaucracy and assuming that current transfers and net interest payments abroad are not significant, the equation returns to the one showed in (2.1), which represents the original equation of Thirlwall's (1979) model.

## **4. Methodology, Data Base and Results**

### **4.1 Methodology**

This paper uses the methodology of static panel data, as it will treat many countries between the years 2008-2012, in the model with bureaucracy. The use of panel data is necessary, since it allows control of certain unobservable characteristics of the chosen variable, solves the problem of omitted variables and also allows to "somehow fix the inconsistency of the estimated parameters of the models" (Silva and Martins, 2012, p.17). In the absence of effects not observed, the estimation could be normally performed by the method of OLS Pooled.

The data models in static panel, when there are effects not-observable, can be estimated by fixed effects and random effects. In fixed effects models, the differences between the cross-section units are captured in the intercept term and these are constant over time (Silva and Cruz, 2004). It is assumed that the term of error ( $e_{it}$ ) is independent and randomly distributed with zero mean and variance constant and equal to  $\sigma^2$ .

According to Wooldridge (2006, p. 433), the fixed effects estimator uses "a transformation to remove the effect not observed before the estimation" in which the explanatory variables constant over time are removed. If exists the suspicion that the effects not observed are not correlated with all the explanatory variables, one must estimate the

model with random effects. The random effects model is an intermediate model between the OLS and fixed effects models.

To choose between the models, the Hausman and Breusch-Pagan tests will be realized. The Hausman Specification Test evaluates the fixed effects and random effects models. The null hypothesis is that the residuals are uncorrelated with the explanatory variable and the alternative hypothesis is that the residuals are correlated with the explanatory variable. In the first case one should opt for the random effects model, whereas in the second case, the most recommended is the fixed effects. When the results obtained for the models are not the same, this is because the random effects are biased in this case, and one must use the fixed effects. If the results are the same, the more efficient model is used, which is the random effects model.

The Breusch Pagan LM test seeks to compare the static models with random effects and the Pooled models. The null hypothesis states that the variance of residuals that reflect individual differences is zero and the alternative hypothesis states that it is different than zero (Silva and Cruz, 2004). If the null hypothesis is rejected, the random effects model is chosen and the Pooled model rejected.

#### 4.2 A Model with Bureaucracy

In this analysis, we consider 65 countries from different continents, in the period of 2008-2012. The model considers both the rate of growth of bureaucracy. For this model, the following equation is used to find the estimations:

$$y = \frac{[(1 + \pi_{\beta_m}) \hat{\beta}_{m_i} + \theta_1 (\xi_{\beta_x} \hat{\beta}_{x_j} - \hat{\beta}_{x_i})] + \theta_1 \xi_{\beta_x} z - \theta_2 r}{\pi_{\beta_m}} \quad (4.1)$$

From where it can be obtained:

$$y = \beta_0 - \beta_1 buroc + \beta_2 x - \beta_3 r \quad (4.2)$$

In which is contained in the parameter  $\beta_0$  the rate of change of the parameter of bureaucracy on imports from the country in analysis as well as the relation of the income elasticity of imports and the rate of change of the parameter of bureaucracy on exports from the rest of the world ( $\xi_{\beta_x} \hat{\beta}_{x_j}$ ).

The annual data used in this econometric exercise were extracted from the International Monetary Fund (IMF) and from the World Bank, for the period of 2008 to 2012, due to the lack of information in some countries, particularly of the Gross Domestic Product (GDP). The sample corresponds to 325 observations, and the panel data are balanced, i.e., the information is available for all periods. Table 1 presents the descriptive statistics of the variables used in the model, which shows the mean, standard deviation, minimum and maximum values achieved by these variables, plus the total number of observations (N), the total number of countries (n) and the total number of periods (T):

**Table 1 – Descriptive Statistics of Variables Used in the Econometric Models, 2008-2012**

Variable		Mean	Standard Deviation	Min.	Max.	Observations
id	overall	33	18.79059	1	65	N = 325
	between		18.90767	1	65	n = 65
	within		0	33	33	T = 5
year	overall	2010	1.416394	2008	2012	N = 325
	between		0	2010	2010	n = 65
	within		1.416394	2008	2012	T = 5
y	overall	0.078576	0.093941	-0.1874	0.437703	N = 325
	between		0.066704	-0.02707	0.278974	n = 65
	within		0.066561	-0.22809	0.34218	T = 5
r	overall	0.170792	2.937356	-16.203	31.85481	N = 325
	between		1.174246	-3.70138	6.669989	n = 65
	within		2.695594	-18.2198	25.35562	T = 5
tu	overall	0.068194	0.701805	-8.72635	5.225188	N = 325
	between		0.34512	-1.97009	1.240688	n = 65
	within		0.612285	-6.68807	4.052693	T = 5
buroc	overall	-0.00021	0.030907	-0.09277	0.157432	N = 325
	between		0.013661	-0.03926	0.035328	n = 65
	within		0.027765	-0.09339	0.121891	T = 5
x	overall	0.096087	0.175806	-0.38803	1.269854	N = 325
	between		0.075469	-0.03537	0.34702	n = 65
	within		0.159004	-0.62795	1.029933	T = 5

Source: Elaboration using Stata with data from IMF and World Bank.

In this case, data from 65 countries (n) from different continents were used over a period of 5 years (T), totaling 325 observations (N). The rate of change in net interest payments abroad (*r*) continues to have the highest standard deviation and the difference between its maximum and minimum values remain the most significant.

Considering that the estimation by the OLS Pooled method generates inconsistent estimators, arises the need for other models to obtain consistent and efficient estimators. Table 2 shows the results for the Pooled, Fixed Effects and Random Effects models.

**TABLE 2 – Results of the Estimatives of the Pooled and Static Models of Regression with Panel Data using Fixed Effects and Random Effects. Dependent Variable: Output Growth Rate, 2008-2012**

Variable	Pooled	FE	RE
buroc	-0.258**	-0.274***	-0.267**
	-0.121	-0.105	-0.107
x	0.372***	0.297***	0.328***
	-0.0212	-0.0183	-0.0187
tu	-0.00941*	0.00339	-0.0023
	-0.0053	-0.0048	-0.0048
r	-0.0009	0.00034	-0.0002
	-0.0013	-0.0011	-0.0011
cons	0.0436***	0.0497***	0.0472***
	-0.0043	-0.0034	-0.0054
Observations	325	325	325
Id. Number	65	65	65
R <sup>2</sup>	0.499	0.515	-
R <sup>2</sup> Overall	-	0.487	0.496
R <sup>2</sup> Between	-	0.607	0.641
F-Test all u <sub>i</sub> =0		4.23	
P-Value – F-Test		0	
Hausman Test – chi <sup>2</sup>			47.79
Hausman Test – P-Value(chi <sup>2</sup> )			0
Breusch-Pagan LM Test – chibar <sup>2</sup>	73.71		73.71
Breusch-Pagan LM Test – P-Value (chibar <sup>2</sup> )	0		0

Source: Own elaboration using data from IMF and World Bank.

\*Significant at 10%; \*\*Significant at 5%; \*\*\*Significant at 1%.

In the Pooled model, the variable *x* and the constant are statistically significant at 1%, while the variable *buroc* has statistical significance at 5% and *tu* at 10%, which are the most important variables in this case. Note that the variable *buroc*, which accurately measures the impact of the growth rate of bureaucracy on the growth rate of the country output has a negative sign, as expected, showing that increased bureaucracy leads to a reduction in the long-term growth rate of the economies.

The growth rate of current transfers showed a negative sign, indicating that most economies of the world does not depend on current transfers. The variables *x* e *r* show the expected signs, affecting positively and negatively, respectively, the rate of output growth, although the variable *r* was not statistically significant.

In the Fixed Effects Model, the variables significant at 1% are the growth rate of exports, *x*, and the growth rate of bureaucracy, *buroc*, besides the constant. In this model, the variable *buroc* continues to show the expected sign. The F-test indicated that the non-observed effects are significant, rejecting the Pooled model in favor of the Fixed Effects Model.

Analyzing the Random Effects Model, it is noted that  $x$  and the constant showed the expected signs and statistical significance at the level of 1%, as well as the variable  $buroc$  has statistical significance at 5%. Although it have not shown statistical significance, the estimated sensitivity of net interest payments abroad ( $r$ ) continues with a negative sign, as expected, indicating that it impacts negatively on the long-term growth rate of the country ( $y$ ).

At the end of Table 2 it is presented the tests of Breusch-Pagan and Hausman, in order to determine the most appropriate model for this analysis. The Breusch-Pagan LM test compares the Random Effects model with the Pooled model. The null hypothesis states that the variance of residuals that reflect individual differences is zero, in which case, the Pooled model should be chosen. However, the model results show that the value of  $\chi^2$  is high (73.71) and its p-value is low (zero), rejecting the null hypothesis, indicating the random effects model as the best choice. The Hausman specification test is used to assist in the choice between fixed effects and random effects. The null hypothesis states that the residuals are uncorrelated with the explanatory variable. The p-value found for the chi-square test was zero, meaning that one should reject the null hypothesis and choose the fixed effects model. Thus, the fixed effects model appears to be more appropriate.

## 5. Concluding Remarks

The goal of this article is to contribute with the debate of the balance of payments constrained growth model, by developing a mathematical model that introduces to the model of Moreno-Brid (2003) the bureaucracy, which, in excess, may directly affect the countries' competitiveness compared to their trading partners.

The analysis of the model and the scenarios generated initially indicated that, theoretically, the excess and positive variations of bureaucracy in a country relative to its trading partners, affect the competitiveness of their products and require more effort to attract external savings to finance the balance of payments, with all the consequences of this increased dependence on foreign capital, making the country relatively more vulnerable to problems in the domestic and international financial markets, which may culminate in a crisis in the balance of payments, with disastrous effects for long term economic growth.

Although the regulation of economic activity (bureaucracy) by the state is important to ensure order and stability of the economic system, it is believed that excess should be avoided.

From the foregoing, it is believed that the bureaucracy, by impairing the efficiency of the public sector and of the economy, also affects the stability of the business environment, the economy's productivity and long-term growth of the country. FIESP (2010) suggests the maintenance of bureaucracy in civilized levels, as it will improve the competitiveness of the productive sector and also tends to benefit the State, which becomes more efficient and effective in their policies, unlocking the economic development of the country.

The analysis of the model with bureaucracy for a sample of countries from various continents during the period between 2008 and 2012 indicated that the growth of long-term output is mainly explained by the dynamics of exports, but the impact of the rate of bureaucracy growth on the rate of the country's output growth had a negative sign, as expected, and statistical significance, indicating that increased bureaucracy leads to a reduction and impaired long-term growth rate for the economies.

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