The influence of poverty on Brazil’s economic growth, period 2000-2014

La influencia de la pobreza en el crecimiento económico de Brasil, período 2000-2014

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Abstract

Brazil is the seventh major economy of the world and it headed the list of the countries that reduced the poverty in 87 % in the periods 2006-2010, nevertheless the levels of internal brute product were not encouraging. Before these affectations, the present work has as principal aim determine the influence of the poverty in the economic growth and foreign debt of Brazil (period 2000-2014). The applied method is based on models Econometrics of Linear Regression Simple and Multichanged, using information of the Economic Commission for Latin America and The Carib and Department of Finance of Brazil. The results of the Linear Simple Model affirm a strong inverse correlation of poverty with unemployment and foreign debt measured by the coefficient of determination in 0.4533 and 0.7808 respectively that it represents to be acceptable for the model and a weak relation with internal brute product and inflation. The application of the Multivariate Model demonstrates an excellent adjustment of explanation of the independent variables and poverty with a statistical level F equally to 17.64. The results determine that the percentages of internal brute product and inflation do not affect in the levels of poverty, the economic growth is not affected mainly, whereas the changes in the external debt and rate of unemployment concern the poverty.

Resumen

Brasil es la séptima mayor economía del mundo y encabezó la lista de los países que redujeron la pobreza en un 87% en los periodos 2006-2010. Sin embargo los niveles de Producto Interno Bruto no fueron alentadores. Ante estas afectaciones, el presente trabajo tiene como objetivo principal determinar la influencia de la pobreza en el crecimiento económico y deuda externa de Brasil (periodo 2000-2014). El método aplicado se basa en la aplicación de modelos econométricos de Regresión Lineal Simple y Multivariable, utilizando datos de la Comisión Económica para América Latina y El Caribe y del Ministerio de Finanzas de Brasil. Los resultados del modelo lineal simple afirman una fuerte correlación inversa de pobreza con desempleo y deuda externa medidos por el coeficiente de determinación en 0.4533 y 0.7808 respectivamente, que representa ser aceptable para el modelo y una débil relación con Producto Interno Bruto e inflación. La aplicación del modelo multivariado evidencia un excelente ajuste de explicación de las variables independientes y pobreza con un nivel estadístico F igual a 17.64. Los resultados determinan que los porcentajes de Producto Interno Bruto e inflación no inciden en los niveles de pobreza, el crecimiento económico no es afectado mayormente, mientras que los cambios en el endeudamiento externo y tasa de desempleo afectan a la pobreza.

Keywords | Palabras clave

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Introduction

The experiences of the regional economies contrast the external debt in social development, the submission of the conditions of the creditors for the favoring of external credits have influenced in the internal conjuncture with political nuances, considering that the purpose of the resources serves to supply the lack of internal capital. These events became deep economic, fiscal, commercial crises and inability to maintain debt service (Rapoport, 2014); International credits granted with consequences for society, in unemployment, scarcity and poverty.

Poverty is considered a social evil and this leads to the need to change inequalities to social equality in the face of efforts to improve macroeconomic indicators with uncertain general data (Norberg, 2005 quoted in Anderson, 2015). While it is true that the foundations of public policies oriented to global problems, including poverty, contain serious economic arguments derived from the growth of developed nations; attempting to improve public skills with the objective of reducing social disparity, observed as a serious issue and dysfunctional population logic (Anderson, 2015), analyzes by quantile regressions show the human capital to be influential in wage inequality (Araújo, 2015).

The dynamics of economic systems have generated stagnation in economic growth with increasing social tensions, affecting in terms of inflation, labor supply and a changing financial globalization (Navarrete, 2016). The changes have drawn attention with the intervention of guidelines by international organizations in the construction of social policies, however along the way some programs have failed along with the central concern of the direct effects on economic development and inclusion (D’Amico, 2015).

The identification of the determinants of the problem of poverty and its effect on economic growth, according to (Navarrete, 2016), is intensified when poverty rates increase and economic growth decreases in triplicate, creating an obstacle to the global dynamism of national recovery and, as an alternative, the support of external credits. (D’Amico, 2015) agrees that the poverty category must have sustainability projects that articulate economic growth and restore citizens’ well-being with social advancement, work, employment and security.

The country of study - Brazil - is an economy with historical trajectory, with moments of positive and negative economic problems similar to the countries of the region, an effect of the seventies was the failure of
industrialization by imports with transcendence in the national economy by (Tavares, 1972). Hirschman has considered that the acceleration of industrial growth was largely due to the increase in income distribution inequality (Rivera, 2014), but economic declines had their moments of improvement after the exchange rate overvalued to one close to equilibrium, which served to foster exports as a national incentive and to remedy internal economic crises (Maddison, 2008 quoted in Rivera, 2014).

According to ECLAC studies (2014), between 1999 and 2008, Brazil’s indicators refuted poverty reduction initiatives around macroeconomic mechanisms such as trade liberalization, technological and financial advances, declining unemployment, inflation control, and the implementation of Social policies to the most vulnerable sectors. According to (Navarrete, 2016) these results were optimistic for the period 2006-2010, with a reduction of poverty by 87%. Transfers from external borrowing and attention to the labor market were part of the instruments applied to improve the proposals to reduce the non-measurable inflationary effects of unemployment as an advance to macroeconomic stability.

The study of the Brazilian economy is of collective interest, a broad analysis period corresponding to fourteen years 2000-2014 has been proposed, indicators indicate a reduction of poverty with good adjustments, although these numbers are still high, the adoption of productive governmental measures have been the consolidated axis for the results of the decrease of the inequality gap, with these antecedents it is proposed to know: What is the influence of poverty levels on the economic growth and external financing of the Brazilian economy? The study is disaggregated into variables: unemployment rate, external debt, gross domestic product and inflation, considering the use of two econometric models in order to obtain the relation of the variables measured in percentages, the results determined to the variable poverty as influent in its behavior by the unemployment rate and external credits, however, proved not to be highly affected by gross domestic product and price level variation; The changes in the economic activities evidence structural changes in its economic policy, for this it was necessary to use theoretical bases that support the research work.

**Theoretical basis**

The expansion of economies before the 1980s tended to grow together with minimum wages, the passage of decades led to phases of increased informal employment and migration had a greater participation, that
is, worsened working conditions. It is clear that depressed wages create greater labor poverty, migration, informality, low income distribution and inequality, which are part of the dynamics observed in Latin American countries. With the expectation of changes in internal policies as a contingent of encouragement to production and productivity (Escobar, 2014). Historically, the costs of inflation reduce the level of utility of economic agents as well as social welfare, defined by orthodox monetary theory (De Melo & De Araújo, 2013).

The assertions of Venengo (2007, 2008) and the book published by Epstein and Yeldan (2009) cited in (De Melo & De Araújo, 2013), establish that modern central banks must generate political spaces for the balance of objectives and proposed instruments, such as job creation, poverty reduction and growing economic growth coupled with expected stability of inflation as part of state policies.

According to Herzer & Nunnenkamp (2014), the effect of poverty also falls on life expectancy, with the application of separate estimates for developed and developing countries, determining that the effect is significantly negative for developing countries, in this context (Andrade & Cabral, 2015) employ another inverted U model application proposed by Kuznets in his 1955 studies, explains the relationship between income inequality and economic development for Brazil for the periods between 1995 and 2012, concluding that income inequality increases in the early years of national economic development and when there is an increase in economic growth, Inequality decreases.

Poverty among countries and their welfare depends on the distributional effects of transfer systems and the size of domestic economies that are sensitive to fluctuations in income and living standards in a society (Schröder & Bönke, 2012). External debt crises have resulted in weak economic growth, destabilization of the economy, inability of the state to boost economic development and transfer of the cost of structural adjustment to families, intensifying social inequalities expressed in greater poverty and marginalization (Torres & Rojas, 2015). Latin America has a poor employment situation in the face of strong levels of inequality with poverty, maintaining stationary cycles and scarce growth. When inequality decreases, poverty can continue to be reduced and thus improve the possibility of economic growth at acceptable rates accompanied by a democracy with citizen participation. Brazil, a worldwide representative economy, has 50% of blacks or mestizos, according to the 2010 census, with a high il-
literacy rate, about 8% in conditions of extreme poverty and their wage income is 2 times Less than those of white origin or the Far East (Global Voices, 2011); Despite the difficulties of poverty as a global problem, Brazil has created the world’s first poverty reduction center called World Without Poverty, with programs in favor of those who have the least and as a priority the family (World Bank - MB-, 2014).

These trends of economic growth in the case of Brazil have represented positive changes in the poverty indicator and in the macroeconomic variables, thus putting forward domestic economic policies with structural adjustments is part of the state decisions, based on the above, due to the scarce research of the proposed topic, it is essential to carry out the study to verify and measure the effect of the predicted variable (poverty) on the explanatory variables: gross domestic product, unemployment rate, inflation and external debt.

**Context of economic activity in Brazil, period 2000-2014**

According to what happened in the Brazilian economy during 1999, the objectives of the external debt were relatively comfortable with the evaluation of the last quarter, estimating a decreasing scope. By the year 2000, foreign debt reached US $ 236.2 million in December; the stock of credit lines for oil imports fell against the extinction of rural finance financing. Indicators such as the Consumer Price Index - Brazil (CPI-Br) ended the year with 7%, compared to 9.12% in the previous year (1999), generating a decrease in the prices of goods and services supplemented by the 4% of GDP and an unemployment rate of 8% (Central Bank of Brazil (BCB), 2000).

For the following year 2001, external debt was reduced to US $ 216.5 million, compared to December 2000, GDP decreased to 1.3%, proving to be crucial for the share of foreign debt as a percentage of GDP. Inflation remained stable for the second quarter by 6%. This behavior was associated with changes in the exchange rate and in the prices of processed food products, cleaning products and household utensils for the indicator unemployment. Maintained the same as the previous year (BCB, 2001a).

The Brazilian economy for 2002 experienced a decrease in the stock of external debt by US $ 212.9 million, however, indebtedness with international organizations increased by US $ 2 million. Price evolution was influenced by the pressures of depreciation and market prices, the restriction of the supply of agricultural products generated pressure on the basket
of food consumption with 8% inflation, GDP reached 3%, unemployment rose to 12% due to the low percentage of formal contracts, affecting trade and national industry (BCB, 2003c). In December 2003, the economic indicators had equal behaviors of 1.2% GDP, the unemployment rate remained in constant terms of 11.6% the generation of employment was insufficient with respect to the economically active population, inflation closed in 14.7%, compared to an external debt of US $ 215 million, the volume of the bonds had a tendency to increase and the little BCB country risk improvement (2002b).

The periods from 2004 to 2014 were presented by instabilities in the GDP variations from 5% until the end of the study period by 0.1%; Unemployment has made a significant difference because of its downward trend from 12% to 5%, home consumer products prices have maintained an inflationary effect of 6% and external debt has decreased from 30% to a Closing of 14% for 2014 (CEPALSTAT, 2014).

Economic activity for the year 2014 registered a decrease, the impact exerted by the modest recovery of the global activity and the slowdown of the internal activity of the confidence indicators for the entrepreneurs and consumers. The results of the macroeconomic indicators were not totally unfavorable, as they were largely offset by industrial activity; the deceleration of household consumption was consistent with the loss of dynamism in the labor market in the face of a low demand for capital goods and materials for construction (BCB, 2014d). These situations generated impacts on poverty levels, the statistics of the periods analyzed reflect the divergences between the decreases and growth of certain indicators due to the volatility of commodity prices, the labor supply and the recurrence of external credits to solve expenses in the urban and rural sectors.

The behavior of poverty in Brazil, reflects a decreasing slope for the period 2000-2014, several have been the strategies that have led to the reduction of the indicator such as social development programs, technology application, inflationary controls, financial aid to entrepreneurs, increased labor supply and targeting external capital to the social sectors with the greatest need and reducing economic instability.

The study of the behavior of the variables raised during the period 2000-2014, is represented in Chart 1.
Chart 1. Brazil’s macroeconomic indicators, period 2000-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>% Poverty rate</th>
<th>% GDP</th>
<th>% Unemployment</th>
<th>% Inflation</th>
<th>% External Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>28,7</td>
<td>4,4</td>
<td>8</td>
<td>7</td>
<td>33,1</td>
</tr>
<tr>
<td>2001</td>
<td>27,5</td>
<td>1,3</td>
<td>6</td>
<td>6,8</td>
<td>37,5</td>
</tr>
<tr>
<td>2002</td>
<td>26,7</td>
<td>3,1</td>
<td>12,2</td>
<td>8,5</td>
<td>41,3</td>
</tr>
<tr>
<td>2003</td>
<td>28,1</td>
<td>1,2</td>
<td>11,6</td>
<td>14,7</td>
<td>38,5</td>
</tr>
<tr>
<td>2004</td>
<td>25,4</td>
<td>5,7</td>
<td>12,2</td>
<td>6,6</td>
<td>30,1</td>
</tr>
<tr>
<td>2005</td>
<td>22,8</td>
<td>3,1</td>
<td>10,5</td>
<td>6,9</td>
<td>19</td>
</tr>
<tr>
<td>2006</td>
<td>19,3</td>
<td>4</td>
<td>9,9</td>
<td>4,2</td>
<td>15,6</td>
</tr>
<tr>
<td>2007</td>
<td>18,3</td>
<td>6</td>
<td>9,8</td>
<td>3,6</td>
<td>13,8</td>
</tr>
<tr>
<td>2008</td>
<td>16,0</td>
<td>5</td>
<td>8,4</td>
<td>5,7</td>
<td>11,7</td>
</tr>
<tr>
<td>2009</td>
<td>15,3</td>
<td>-0,2</td>
<td>8,6</td>
<td>4,9</td>
<td>11,9</td>
</tr>
<tr>
<td>2010</td>
<td>13,7</td>
<td>7,6</td>
<td>7,4</td>
<td>5</td>
<td>11,6</td>
</tr>
<tr>
<td>2011</td>
<td>12,9</td>
<td>3,9</td>
<td>6,3</td>
<td>6,6</td>
<td>11,4</td>
</tr>
<tr>
<td>2012</td>
<td>10,9</td>
<td>1,8</td>
<td>5,8</td>
<td>5,4</td>
<td>12,7</td>
</tr>
<tr>
<td>2013</td>
<td>9,6</td>
<td>2,7</td>
<td>5,6</td>
<td>6,2</td>
<td>12,5</td>
</tr>
<tr>
<td>2014</td>
<td>8,6</td>
<td>0,1</td>
<td>5</td>
<td>6,3</td>
<td>14,4</td>
</tr>
</tbody>
</table>

Source: Own elaboration, based on data from the Central Bank of Brazil and CepalStat (2014)

Figure 1 reflects the illustration of the data in Chart 1, referring to the external debt decrease as well as in the poverty level. The unemployment rate has registered a constant movement, unlike the inflation in constant terms. Economic growth, measured by one of the relevant indicators such as GDP, highlights the booms and declines of the same, noting that the degrees of poverty have been greater than the gross domestic product.
Materials and Method

In order to materialize the objectives of the present investigation, the historical logical model for the study of the Brazilian economy was used. Statistical data for fourteen years (2000-2014) obtained from ECLAC were: External Debt, Gross Domestic Product, Unemployment and Inflation, while the economic reports of the Ministry of Finance of Brazil were used for poverty indicators. The approach of the model is based on the importance of relating variables using econometric models applied in the statistical software R-Project version 3.2.3 for the realization of the simple regression model with of Ordinary Least Squares (OLS) and obtain the individual relationship of each regressing variable with the poverty rate (variable regressed), as the first step.

The second phase was carried out with the multivariate regression analysis employed by the “univariate OLS model that can be easily expanded to become the multivariate OLS model” (Rengifo & Court, 2011, p. 306), defining the objective of the overall relationship of the proposed variables. The application of the multivariate regression from the theoretical bases becomes with the following generic equation:

\[ y_i = \alpha + \beta_1 X_1i + \beta_2 X_2i + \cdots + \beta_k - 1X_k - 1, i + \varepsilon_i \]

Finally, the results suggest acceptance of the model through corroboration with normality tests and model assumptions (Rengifo & Court, 2011).
Analysis and results

A state without poverty is the priority of the objectives of global economic policies and especially of Latin American countries. Brazil’s indicators demonstrate a case of particular analysis for the obtained results when it is confirmed that poverty is influenced in the variations of unemployment, as well as the external debt from the year 2000 to 2014. The application of the econometric models shows a strong correlation with weak findings in the model affected by the Gross Domestic Product and inflation.

The results were contrasted in Chart 2, obtained through the Simple Linear Model, based on the independent external debt and unemployment variables, with a better adjustment with the poverty rate. The values of the coefficient of determination are acceptable, so the variables analyzed are suitable for the model. Another factor applied was the probability of being acceptable.

The variables Gross Domestic Product and inflation proved to be unfavorable for the applied model, with a very low coefficient of determination and the probabilities above the admitted error.

**Chart 2. General Matrix of Simple Linear Regression Model: Brazil 2000-2014**

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>ANOVA Analysis</th>
<th>External Debt</th>
<th>GDP</th>
<th>Unemployment</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty rate</td>
<td>Determination Coefficient</td>
<td>0.78084307</td>
<td>0.00678135</td>
<td>0.45338312</td>
<td>0.25839719</td>
</tr>
<tr>
<td></td>
<td>Probability</td>
<td>0.0000125</td>
<td>0.77046821</td>
<td>0.0059309</td>
<td>0.05301479</td>
</tr>
<tr>
<td></td>
<td>Coefficient</td>
<td>0.55072682</td>
<td>0.26293809</td>
<td>1.95031941</td>
<td>1.41505054</td>
</tr>
</tbody>
</table>

Source: Own elaboration.

For its part, Chart 3 presents the results obtained from the «Multivariate Model», starting with the data equation of the estimation of the coefficients of the model:

Equation (2):

\[
\text{Poverty rate} = 2.47317049 + 0.52854311 \times \text{External Debt} + 0.29032488 \times \text{GDP} + 0.79667099 \times \text{Unemployment} + (- 0.3626713) \times \text{Inflation}.
\]
The analysis in Chart 3 shows that the independent variables as a whole have an excellent explanatory adjustment with respect to the poverty rate. The adjusted $R^2$ is equal to 0.82619096, the statistic of significance is equal to 17.6370424 and a probability below the level of error allowed in these types of models.

The statistical normality test was calculated to strengthen the relation of the variables, being even more consistent the results. The test corresponds to the Shapiro-Wilk test of 0.96192 and a probability = 0.7258, which is higher than the standard 5.00%, indicating that the residual data follows a normal distribution and is acceptable for the model results.

The confirmation of the model was made with the application of two additional assumptions: Durbin and Watson and heteroscedasticity, whose values are presented in Chart 4. The Durbin and Watson autocorrelation test emerges with a result of 1.8168, a value that is in the range of $L_i$ (Lower Limit) = 0.685 and $L_s$ (Upper Limit) = 1,977, stipulated for this test. Therefore there is negative autocorrelation, i.e., the chosen variables do not present a perfect relationship between them, which is good for the validity of the proposed model.

### Chart 3. General Matrix of Multivariate Regression Model: Brazil 2000-2014

<table>
<thead>
<tr>
<th>Poverty rate</th>
<th>$R$</th>
<th>$R^2$</th>
<th>$R^2$ adjusted</th>
<th>Statistic $F$</th>
<th>Probability</th>
<th>Normality test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9358</td>
<td>0.8759</td>
<td>0.8262</td>
<td>17.64</td>
<td>0.000158</td>
<td>$W = 0.96192$</td>
</tr>
</tbody>
</table>

Source: Own elaboration.

### Chart 4. Assumptions Matrix of the Multivariate Regression Model: Brazil 2000-2014

<table>
<thead>
<tr>
<th>Model assumptions</th>
<th>Autocorrelation</th>
<th>Heteroscedasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durbin y Watson (DW)</td>
<td>1.8168</td>
<td>$R = 0.4954$</td>
</tr>
</tbody>
</table>

Source: Own elaboration.
Finally, in the second assumption (heteroskedasticity), the product was calculated from data \(0.4954 \times 15\) (number of observations 2000-2014), obtaining 7.431, a value that is below the critical value of the \(\chi^2\) table, confirming once again that the residual data have a normal distribution like the Shapiro-Wilk test. Figure 2 shows the normal probability of the variables.

\[\text{Figure 2. Normal Probability. Multiple Linear Regression}\]

![Figure 2](image)

Source: Own elaboration.

Figure 3, with the application of the Simple Linear Regression between the variable Poverty and Gross Domestic Product, shows the poor relation for the found dispersion, resulting that GDP does not generate significant interrelation in the levels of poverty.

\[\text{Figure 3. Simple Linear Regression: Poverty and Gross Domestic Product}\]

![Figure 3](image)

Source: Own elaboration.
Statistical analysis of multiple regression show that the variables are fit for the model. However, when performing the bivariate relationships with simple linear regression between poverty and Gross Domestic Product, an atypical behavior is defined between them, with the objective of identifying the behavior of the variations by the factors raised in Brazil based on the levels of poverty.

Discussion and conclusions

Several authors expose to poverty as a priority in the decisions of State policy by the influence in the economic indicators and in the low standards of quality of life. The exposed aggravating factors are findings of the intellectual debate: whether to allocate resources to social actions or debt services. The theoretical foundations show that the economies face periods of growth accompanied by cyclical booms, generating an effect on the population as it is poverty.

The Kuznets studies explain that during the first years of economic development inequality grows and decreases in boom times or economic growth. However, ECLAC notes that economic growth is important but not determinant in poverty indicators. Other studies establish the relationship of poverty with foreign indebtedness. Most of the Latin American countries have contracted historical debts that have affected the levels of investment of the internal public expenditure, reason why among the more resources have been destined to the payment of external debt and less resources have been given to the basic areas of the families, the trend of poverty will increase with prices of goods and services above the market price, a decrease in labor supply in the face of a significant demand of workers that fall in considerable proportions of inequality. The arguments of the Central Bank are due to a decrease in the payment of the external debt and an improvement of the Gross Domestic Product.

The structural changes in Latin America for thirty years have led to the consolidation of equality as an important factor for social balance and to strengthen strategic commercial alliances. The relevant theoretical foundations emphasize inequality as a bridge to generate an increase in poverty indicators and to break the harmony with employment, cost of living, opening of new mechanisms of external overindebtedness as an injection to public investment.

The application of the multivariate model with information on poverty levels (dependent variable) was related to unemployment, inflation,
Gross Domestic Product and external debt (independent variables). The existence of compatibility between them is verified, which makes it possible to confirm that the variants are globally acceptable. In order to corroborate the model’s feasibility, the Shapiro-Wilk normality test and the Durbin and Watson and Heteroscedasticity assumptions were added, contrasting the acceptance of the pattern by the allowed percentages.

In the second practice, from the studies generated in simple linear regression models, the poverty and external debt variables define a high incidence ratio, as well as unemployment. The opposite happens in the interrelation of poverty with Gross Domestic Product and inflation, producing a very low correlation.

The interpretation of the previous yields in the simple model allows explaining that the existing levels of poverty are not influenced by the variations of the Gross Domestic Product. As well as the inflation rate in Brazil, international indebtedness (debt service) and unemployment levels directly influence the variations in inequality, generating concern about the scarce workplaces, low levels of productivity in response to the poor quality of life and life expectancy.

The results of the model discard the theoretical argument by indicating that the levels of economic growth are significantly affected by the poverty rate, a criterion coincident with Novales (2011, p.9) who mentions that “countries experience high growth spells with hardly any reduction of poverty ... “, that is to say that economic growth strengthens social disparities but does not totally reduce poor population indicators. However, the model clearly contributes to clarifying the variables related to Brazilian poverty.

It is recommended in future research to use information on the growth rate of the total annual Gross Domestic Product (GDP) by economic activity at constant prices and the relationship with unemployment, since it is the main variable affecting the poverty rate, with the objective of obtaining results that allow to identify the low relation between GDP and the indicators of poverty and thus to obtain a better analysis of correlation of the proposed variables.

References


