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Government Expenditure, Economic Development and Economic Growth in Brazil

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Abstract: *The spending allocation pattern of national governments varies depending on public policy for desired effects but the outcome is rather controversial according to existing literature. This research aims to explore the relationship between government expenditure, economic development and economic growth in Brazil from 1994 to 2017. The Human Development Indicator (HDI) index is a representative measure of economic development and is comprised of three dimensions: Life expectancy at birth (LEAB), expected Years of schooling (ESOY) and the gross national income per capita on a purchase price parity basis (GNICP). Real Gross Domestic Product growth (RGDPG) serves as an indicator of the growth in real terms in overall economic activity. The aim of this research is to examine the relationship between the Government Expenditure, the HDI Index and Economic Growth in Brazil. To meet the proposed objective, this research adopts the ordinary least squares (OLS) method. The main findings of this work are in line with the human capital school of economics – spending in education contributes to economic development and then economic growth. The relationship between economic growth and economic development in Brazil, is strong, and supports the view that improvement in the HDI measure can lead to higher economic growth. The negative relationship between current expenditures and economic growth suggests that the Brazilian government is spending beyond its optimal level on current expenditures and the prevailing allocation decision does not contribute to growth within the market perspective. Such a study of government expenditure has not been done before and this research contributes to knowledge on the inter-relationships between economic development and economic growth. It also highlights the importance of the allocation decision on government expenditure and is thus useful for policymakers.*
JEL: F43, O11, O15, O40, O47
Keywords*: Government expenditure, HDI index, Brazil, GDP growth*

I. Introduction

1.1 Background

There has always been a big debate on whether national governments should intervene in the economy to promote general well-being. After the 2008 credit crisis, the different fiscal policies adopted by many governments around the world to lessen the adverse effects of the recession and these policies have intensified the discussion. In the literature, there is not a consensus among economic researchers in the field on whether the size of the state expenditure has a positive or negative impact on growth.

As the government regulates capital circulation and the great majority of economic activities, public intervention is a natural step when growth is pursued. On the one hand, excessive government intervention may lead to monopolization, distortion in the allocation of resources due to inefficiency, restrictions to free markets and "crowding out" effects (Barro, 1991; Afonso and Jalles, 2011). On the other hand, it might correct market failures, reduce conflicts between public and private areas of interest, as well as set the ideal social path to growth (Ram, 1986).

Government Expenditure (GE) can be analysed beyond the output growth perspective to a comprehensive measure of economic welfare. Gupta, Clements and Tiongson (1998) concluded in their work that GE improves human development in the health and education sectors (human capital), but various Human Development Reports (HDR) from the United Nations Development Programme (UNDP) show that economic

growth does not necessarily mean better human living conditions. Progress and development can be obtained through economic growth only if distributional policies allow the wealth to be properly distributed among the less privileged (Deb, 2015).

The rationale of this research takes GE beyond the scope of economic growth as the proxy for economic development. Following Ranis (2004) and Ranis and Stewart (2006) that in sum, human development is a path to reach economic development, this research intends to investigate the relationship between Brazilian government spending, Human Development Index (HDI) and real gross domestic product growth (RGDPG).

1.2 Brazil

Government Expenditure in a developed country, where the private sector is large, tries to achieve a stable and smooth rate of growth. Conversely, in underdeveloped countries, GE has a key role in promoting social and economic development, guiding the growth pace (Muritala and Taio, 2011). In this sense, it is interesting to study the relationship between GE and economic progress in a developing country like Brazil, where social indicators have shown improvement throughout history.

Even though Brazil is listed as the 9th largest economy in the world in terms of nominal GDP (measured in US$), the country is ranked 79th in the United Nations' (UN) Human Development Index (HDI) rank (Jahan, 2017). The real GDP growth in Brazil is summarised in Figure 1 below:

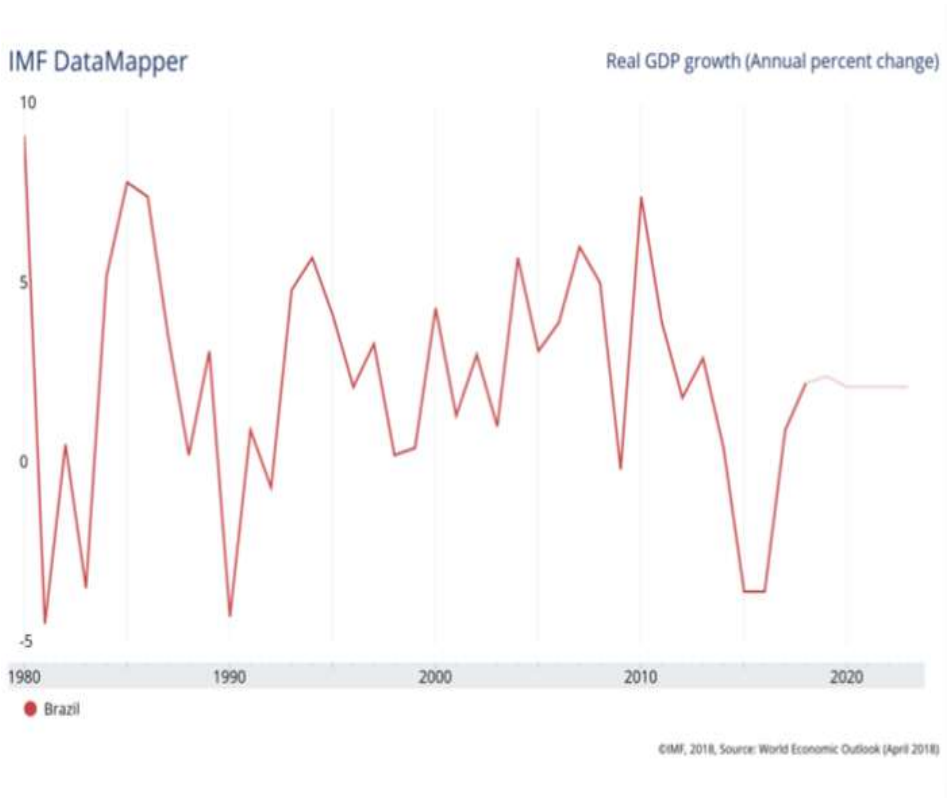

Figure 1: Brazilian real GDP growth (% change). Source: World Economic Outlook (2018)

Under the macroeconomic framework, the Real plan stabilized the Brazilian economy in 1994, leading to the termination of the hyperinflation process that occurred in the 1980s and early 1990s (Bogdanski, Tombini and Werlang, 2000). However, this model was not enough to keep the country protected from external crises, such as the Asian crisis (1997) and the Russian crisis (1998). The evolution of HDI in Brazil is presented in Figure 2 below.

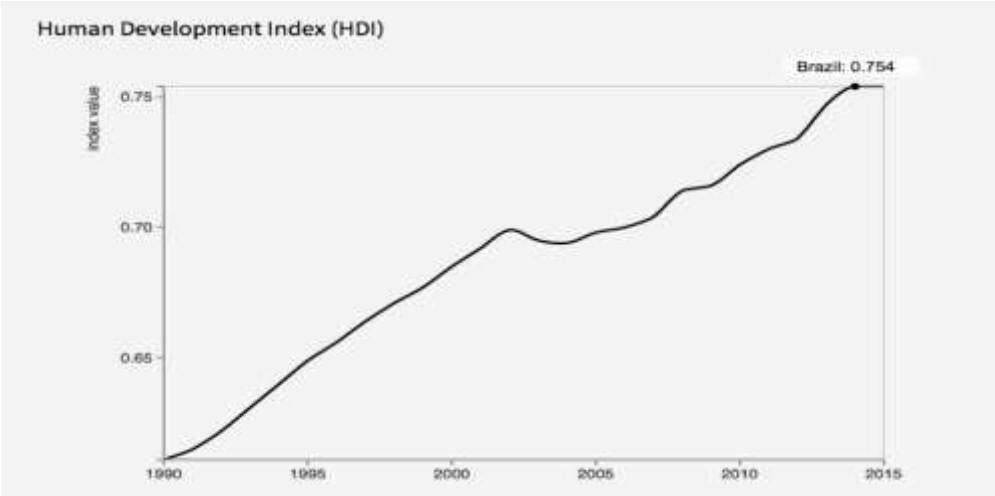

Figure 2: Brazilian HDI index. Source: Jahan (2017)

In recent years, economic growth in Brazil has been low and the budget deficit has been increasing. Therefore, motivated by the poor performance of the Brazilian economy in these areas, this research intends to explore the relationship between the components of governmental expenditure and economic development and economic growth. The current research will fill an existing gap in this area in Brazil.

1.3 Aim of the research

The aim of this research is to study the relationship between government expenditure, human development and economic growth in Brazil, and examine the implications for public policy. Taking into consideration the fact that the output growth has been the most applied proxy for economic progress in the literature despite its flaws, the first objective of this work is to clarify the interaction between the HDI index and economic growth in Brazil. The second objective is to analyse the effects of the components of GE on the HDI index. The last objective focuses on the government's allocative preferences, and evaluates the link between the dynamics of public policies and their effect on economic development.

1.4 Structure of this research

The first section introduced the topic of government expenditure, economic growth and human development, and the motivations for this research. The rest of this article is structured as follows: Section 2 presents an overview of the most important pieces of previous research related to the topic and the nature of government expenditure in Brazil. Section 3 focuses on the research design and the methodology applied in this research. A detailed explanation of the models chosen to conduct the analysis is outlined in this section. In Section 4 the data sample is described and the results of the estimations are presented step by step. Section 5 develops a discussion on the findings and section 6 reviews the extent to which the aim was achieved, limitations of the current study and recommendations for future research.

II. Literature Review

2.1 Introduction

In the preceding section, the subject was introduced, and the research aim was highlighted. In this section, relevant literature is critically appraised. The established connection between government spending and the HDI index relies on theories and models previously applied on traditional GE studies, where the output growth was adopted as the endogenous variable. As such, following this chronological evolution, classical studies approaching GE and GDP growth are first examined. Secondly, narrowing the perspective, public spending in Brazil is approached. The way Brazilian authors utilise national regulations and previous empirical studies to capture the impact of GE on growth are outlined. Thirdly, the concept of economic development is expanded to HDI. The HDI index is contrasted to GDP as a broader proxy of development. In this sense, papers that attempt to analyse expenditures applying the index as an endogenous variable are then explored. Finally, after structuring the theoretical bedrock that supports the development of this research, the last part of this section provides a critical assessment of contemporary literature.

2.2 Government expenditure and growth

The intensity of the 2008 credit crisis, in developed countries suggested financial markets' lack of ability to self-regulation (Queiroz and Poker, 2012). In this context, the ideas of Keynes (1937) gained strength among public policy makers. Keynesians agree on intervention to control macroeconomic aggregates, in an environment where the administration plays an important role in mitigating recessions. In contrast, Solow (1956) in his neo-classical growth model stated that an increase in the size of the state will reduce aggregate demand and therefore reduce GDP, advocating the "crowding out" effects (Mahmoudzadeh, Sadeghi and Sadeghi, 2017).

Some papers in the literature approach GE as a prejudicial factor to economic growth. Landau (1983) evaluated the share of public consumption to GDP utilising data from 104 countries from 1961 to 1976. His results were consonant with the neo-classical approach, where large government spending is negatively correlated to growth. Conversely, the high significance of the education investment coefficient in all regressions pointed out that expenditure on education had a positive impact on growth. Additionally, Landau (1986) disaggregated GE in investment, education, and consumption to obtain similar overall results. General spending had adverse effects on growth, but expenditure on education was positively correlated with total output growth. In this sense, both works seem to support the human capital school, which refers to the human stock of knowledge, abilities and social skills as producers of economic value (Lucas, 1988). This school of economics defends a positive association between spending on education and health, growth and economic development. As such, expenditures on education would be a key point in explaining endogenous economic growth through productivity increases (Queiroz and Poker, 2012).

According to Barro (1990;1991) and his endogenous growth model, different choices of expenditures will affect growth rates over the long horizon. The author labels certain parts of the public sector as providers of services in the productive process, which increases the productivity of the private sector. Endogenous growth theory suggests that the economy demonstrates the capacity to raise GDP to the exact extent that the capital increase for production increases, thus admitting the presence of marginal incomes of capital (Gomes, 1997). Based on this assumption, Barro (1990) admits the existence of productive and non-productive GE and analyses their implications for economic growth distinctively. In this context, Barro (1991) corroborated with the assumption that public expenditure has a negative effect on growth by analysing investment in 28 countries from 1960 to 1985. After separating defence and education expenses together in a productive variable, the author concluded that the other spending variables had a negative effect on per capita growth and on the private investment to GDP ratio. Thus some important papers in the literature have pointed out different outcomes.

Also applying GDP variation as the proxy for economic growth, Ram (1986), in his classical work relied on a two-sector (private and public) production function to explain the relationship between growth and the size of the government. In his research, he utilised both time series and cross-sectional data for more than 115 countries, and this was considered one of the largest cross-country samples ever used by then. The author concluded that public expenditures have a positive impact on economic performance and this evidence was even stronger in lower income nations.

Furthermore, Lin (1994) used a sample of 62 different countries for a 25-year period and stated that different ways of GE can lead to growth. In the short run, the impact of spending was positive while in the intermediate term it was not. Following the methodology and expenditure classification in Barro (1990), the author found that non-productive GE had a negative influence on growth for developed countries while having a positive influence for underdeveloped countries.

A relevant paper that focused on the composition of spending as a leading factor to a steady-state growth rate in developing countries was the one from Devarajan, Swaroop and Zou (1996). They avoided classifying the data as productive or non-productive prior the examination itself. Employing data from 43 developing nations over 20 years, they found that although the government capital expenses were negatively related to growth, current expenditure had a positive effect. Their model implies that productive expenses can turn into unproductive if made in excess. In addition, the authors concluded that developing countries had favored capital expenses over current expenses, and therefore the effect on growth turned out to be negative.

The research from Sáez, Álvarez-García and Rodríguez (2017) suggests that the GE effect on GDP for the European Union (EU) nations from 1994 to 2012 is not clear; while the relationship was significant and positive for countries like Portugal and the United Kingdom, it was negative for others like Finland and Italy.

2.3 Government expenditure in Brazil

Brazilian law 4.320/64 encompasses general rules for budget preparation and control of all governmental spheres (federal, states and municipalities). In its article 12, section 3, governmental spending is classified in economic categories: current expenditure (current transfers and costs) and capital expenditure (financial investments, investments, and capital transfers), thus total government expenditure is the sum of

current expenditure (CURR) and capital expenditure (CAP). Brazilian government's ordinance no. 42/1999 divides Brazil's public budget into 28 functions and 109 sub-functions, which allows consolidating the spending per fiscal year of all federate units (Sousa and Paulo, 2016).

According to Rezende (1997), the expenditure and investment plan of a government reflect the pattern of its allocative preferences, which translates the way a government is trying to implement public policies and encouraging economic development. Based on the functional approach, Rezende (1997) proposed a classification that was later widely applied by scholars for allowing a dynamic and comprehensive understanding of the budgetary functions by public policies. Total expenditures were then divided into three distinct components: minimum expenditure (MINEXP), social expenditure (SOCEXP), and economic expenditure (ECOEXP).

Minimum expenditures stand for the part of government spending on public policies considered to be of the government's exclusive domain, which cannot be provisioned by market instruments. The share of spending on public policies destined to the delivery partially public goods and services, where the government does not assume a monopolistic role, corresponds to social expenditures. Finally, economic expenditures match the portion of spending that the government would not technically need to absorb. However, in practice, the government performs such activities given the need for market regulation among other things (Rezende, 1997).

Minimum Expenditure	**Social Expenditure**	**Economic Expenditure**
Pure Public Goods	Semi-public Goods	Private Goods
Legislative; Judiciary; Planning and Management; Defence and Security.	Education and Culture; Health Care and Sanitation; Social Security and Assistance; Housing and Urban Development.	Agriculture; Communication; Regional Development; Energy and Mineral Resources; Industry, Commerce and Services; Foreign Relations; Labour; Transport.

Table 1: Rezende (1997) functional approach. Source: Rezende (1997)

The identification of the above mentioned allocative preferences might lead to regional trend inferences: the state minimization situation where there is an expansion of the minimum expenditure, simultaneous to the maintenance or reduction of the other two expenditures for a given period; the state socialization where social expenditure increases over time; the situation where economic expenditure surges over time, known as economic interventionism. Therefore, the application of these definitions in a time-series analysis can enable verifying to what extent a government's decision to allocate resources is being transformed through time (Rezende, 1997).

In summary, annual Government Expenditure (GE) is by
Economic classification: GE = CURR + CAP
Functional classification: GE = SOCEXP + MINEXP + ECOEXP

In this context, it is important to examine studies regarding the Brazilian fiscal policy and its impact on the national GDP. Most of them, like the ones from Ferreira (1996) and Ferreira and Malliagros (1998), focused on either the impact of infrastructure spending or total aggregate spending on GDP. Their work pointed out that government spending on infrastructure is positively correlated to long-run growth. Likewise, Candido (2001) estimated the productivity differential between the public and the private sectors of the economy with aggregated data from 1947 to 1995. The author found a positive influence of spending on growth in the short-run, in contrast to a negative relation on a long horizon.

Moreover, Silva and Triches (2014) examined Brazilian central government spending data in regard to its economic (current or capital) and functional categories (transportation, education, and health among others) from 1980 to 2005. They classified spending on communication, transportation, and health as productive expenditures for stimulating income growth because they showed positive and statistically significant impacts on GDP. Conversely, spending on defence, national security and education were found to be non-significant, notwithstanding their relevance in the literature.

Rocha and Giuberti (2007) analysed GE components using the economic and functional categories, with data from Brazilian States for the period 1986 to 2002. The authors utilised the Devarajan, Swaroop and Zou (1996) methodology to find classical exogenous variables examined in the literature such as the capital, education, and communication expenditures, being statistically significant and having a positive influence on growth. Nonetheless, the health and current expenditures had a negative impact.

Also applying the Devarajan, Swaroop and Zou (1996) model in research on the Brazilian states, Sousa and Paulo (2016) utilised data from 1995 to 2010 and reached a different conclusion from Rocha and Giuberti (2007) regarding capital expenditures. They found government capital expenditures to be non-productive during the period of analysis, i.e. statistically significant and negatively correlated to growth. The authors also based their conclusion on the endogenous growth theory to characterise current expenditures as non-productive due to their negative influence on growth. In addition, their relevant study applied the functional approach of Rezende (1997) to explore the impact of the components of GE on growth. Although not statistically significant, the minimum expenditure component had a negative effect on growth, which is opposite to the expected result from endogenous growth theory.

2.4 Endogeneity issue: GDP and HDI

All previous papers explored in this review analysed GE assuming GDP as the proxy for economic growth. Nevertheless, the limitation of GDP as a measure of a country's economic progress has been widely debated. According to Scarpin and Slomski (2007), relying on the GDP per capita of a country or region is not enough to evaluate the living conditions of its population, because it disregards the quality of the medical services and the level of education of the population. As such, the multi-dimensional perspective of human progress cannot be captured by GDP alone (Constanza et al., 2009; Coyle, 2014; Karabell, 2014).

The Human Development Index (HDI) was created in 1990 by the UNDP and has become the most famous aggregate measure for well-being and an important parameter for progress (Malik, 2014). It is composed of 3 different dimensions: health, income and, education. Since 2010, it is calculated as the geometric mean of the 3 dimensions (Prasetyo and Zuhdi, 2013; Jahan, 2017).

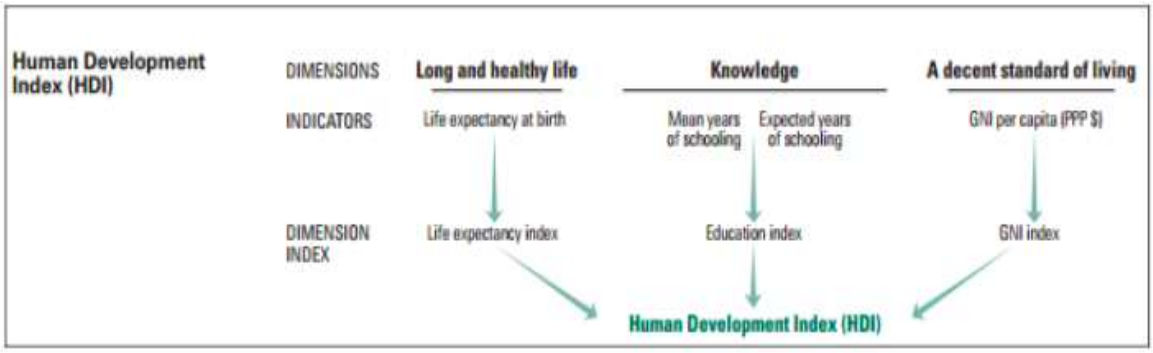

Figure 3: The HDI Index composition. Source: Malik (2014)

In this sense, Blanchflower and Oswald (2005) defined the HDI as one of the best efforts to move away from the dependence on GDP as the proxy for economic development. Taking advantage of the success of the HDI, the United Nations (UN) has been able to alert governments around the world that the economic development pursuit is not an exclusive synonym of GDP growth. However, the Index is not perfect in the context of not capturing the psychological state of individuals. In addition, the HDI might be correlated with GDP due to the utilisation of the income dimension in the measurement process (Perovic and Golem, 2010). Despite its drawbacks, the HDI has been able to change policymakers view and has influenced the focus of developing economies towards people-centered programmes (Haq, 1995; Scarpin and Slomski, 2007; Jahan, 2017). HDI scores and rankings of some developed countries and countries in Latin America in 2017 are as in Table 2.

Latin America & BRICS	HDI Score	Rank	Developed countries	HDI Score	Rank
Brazil	0.759	79	USA	0.924	13
Chile	0.843	44	United Kingdom	0.922	14
Peru	0.750	89	Germany	0.936	5

Argentina	0.825	47	Spain	0.891	26
India	0.640	130	Australia	0.939	3
China	0.752	86	Norway	0.953	1
Russia	0.816	49	France	0.901	24
South Africa	0.699	113	Japan	0.909	19

Table 2: HDI scores and rankings in 2017. Source: Jahan (2017)

Deb (2015) focused on whether the HDI ranking of countries is different from the GDP ranking in a way to find a gap between the measures. The author found that the influence of GDP on the HDI index varies according to the level of income of each country. His research pointed out a distinct positive impact for low-income countries, but a weak one for high-income countries. As such, the effect of GDP on HDI tends to deteriorate as the level of income increases.

Moreover, Ranis (2004) and Ranis and Stewart (2006; 2012) explored the HDI/GDP relationship to a great extent and affirmed that there are different paths to obtain an improvement on the HDI index; the majority of which are either correlated to growth or to an increase in a government's social expenditure. Theoretically, the level of spending in education is likely to affect the index and might be appropriate to defining success and failure in the evolution of HDI over time. Likewise, the size of health and social assistance expenditure ratios have a chance to impact on the standard of living of the population and therefore on human development (HD). Although political rights, social instability, and gender empowerment are weakly correlated to the HDI index, Ranis and Stewart (2012) defined success in HD according to improvements in the HDI performance. As such, nations with positive economic growth and a high HDI rank can achieve their goals through maintaining the national education indicator, at least at a moderate level; medium and low HDI countries can advance even during slow growth periods, but only via better education and income distribution indicators (Ranis and Stewart, 2012).

Just a few studies come out of the impasse related to the currents of economic thought, and even less are committed to analysing GE effectiveness (Poker, Nunes and Nunes, 2013). In this sense, some studies have considered the HDI index as the proxy for development. Prasetyo and Zuhdi (2013) used data for 81 countries, from 2006 to 2010, to track the efficiency of the GE per capita in the education and health sectors towards HDI. In their comparative study, they found that countries, where the spending was maximised in order to improve HDI, were not necessarily considered by the literature as economic developed.

Poker, Nunes and Nunes (2013), following Yavas (1998) and Davies and Quinlivan (2006), included HDI as the endogenous variable in their assessment of the impact of spending on education due to its broader inference, i.e. sense of economic progress. In their research, they decomposed the HDI index, applying only the education component as a reference for efficiency in spending for the Brazilian municipalities. The paper concluded that spending on education explained the variation in the education dimension of the HDI during the period from 2000 to 2010.

Furthermore, motivated by the human capital school ideas, Razmi, Abbasian and Mohammadi (2012) investigated the impact of the Iranian government health expenditure on the country's HDI index from 1990 to 2009. Using the method of ordinary least squares (OLS) as the econometric technique, they found the health component to be significant with a positive effect on the overall index. Based on this result, the authors concluded that an increase in health expenditure would enhance labor productivity and therefore promote economic growth. However, their model used GDP per capita growth, mortality rates, and elementary school completion rates as exogenous control variables. Once these variables are also computed as inputs to the HDI index composition, the result might not be as reliable as it seems.

In similar research, approaching the Brazilian municipalities and states from 2000 to 2009, Poker and Crozatti (2013) studied the effects of health expenditures on the health component of the HDI alone. An important aspect outlined in their work was the selection of a linear model to express the relation between the expenditure and HDI index variables. The authors found the quadratic model not suitable after testing the collinearity of the variables. Therefore, using a robust multiple regression, they found the health component of spending significant only at the 10% level.

2.5 Critical appraisal

Although this review verified the GDP as the most applied measure on research on economic progress, recent papers disclose a new view among scholars towards supporting the human capital school, and this current of thought sets barriers to the GDP as a proxy for economic development. Under the prevailing understanding that welfare is a multidimensional concept, human capital is an important factor driving HD and the output growth alone fails to capture this feature. The advent of the HDI ranking led policy-makers to inspect how each

country was performing in this regard and to ask why some countries and regions managed to succeed by reaching much higher HDI levels in comparison to countries with similar income levels (Ranis, 2004). Empirical studies show that the answer may be registered on the way governments allocate their resources in a specific time frame, i.e. how their spending synthesise public policies.

According to Deb (2015), the HDI index alone represents a measure of social progress. The existing literature on the topic shows there is a clear relationship between GDP and the HDI index once the latter is based on the GNI per capita, but this interaction is neither standard nor constant through time. Thus, the HDI/GDP relationship varies depending on the country and time frame.

The analysis of the effect of spending components on growth is widely applied by researchers irrespective of their nationality (Queiroz and Poker, 2012). This review found different debt/growth relationships across countries, which means appropriate policies and levels of spending might fit one country but not another. As such, depending on the country, period of estimation and on the variables representing the size of the government, the influence on growth can be either positive or negative (Sáez, Álvarez-García and Rodríguez, 2017).

In general, in this literature review, the relationship between economic allocation on the components of GE and their effect on economic development were investigated adopting the GDP measure as an endogenous variable. This type of arrangement was used to directly explain a ratio such as the HDI, in which different dimensions of human development are synthesised. Regarding Brazilian studies on the topic, the majority of the papers have considered the expenditures according to the governmental spheres, which means exploring the spending of the states and municipalities. Only a few works try to focus on the central government budget allocation and its effect on economic development. Within this framework, there is still a great controversy among Brazilian studies whether spending has a positive or negative impact on growth.

Depending on the classification of the type of GE, a different type of endogenous variable is utilised in the literature. Although it is important to find the relationship between GE and GDP growth, it is crucial to widen the perspective of analysis to a multi-dimension measurement of economic development, i.e. also investigate the relationship between GE and the HDI index. There is a growing interest in exploring the relationship between the allocation of social GE variables and the HDI index in the literature. Some Brazilian studies on the subject have focused on the impact of a particular component of the budget, such as health or education spending, on their correspondent dimension of the HDI. The results have shown quite interesting relations, where GE is not necessarily significant. In addition, the foregoing academic studies about the Brazilian GE do not link the nationwide concept of expenditure to the HDI index as a measure of economic welfare. Thus, a study in which the whole central government budget is taken into account, and that concentrates on exploring its effects on the integral national HDI measure, instead of just on a particular dimension of the index, becomes necessary.

III. Methodology

3.1 Introduction

The previous section approached empirical research related to public spending and its influence on growth, and the utilisation of the HDI index as a comprehensive measure of economic development. This section has as its initial purpose outlining the methods of research. Then, the research questions and the procedures applied in this examination are explained in detail. At last, the variables and the econometric models utilised for the investigations are delineated and justified according to the existing literature.

3.2.1 Research style

Research is an action oriented toward figuring out things previously not known in a systematic and organized way. The tools and techniques involved in this action define a research's philosophy and method. In this context, different styles are utilised to study research problems. A deductive approach tests the hypotheses of a study while an inductive approach usually creates a new theory relying on the data observed. The application of the suitable style is the support for the validation of the study and therefore the foundation of the new knowledge (Walliman, 2011). This study is based on the deductive style, which intends to apply a quantitative methodology. The positivist feature of this method incorporates the examination between variables in a way to explore the relationship between government expenditure and economic development. As such, this research is based on statistical inference on numerical parameters to obtain value free results. Similar to experimental design, this method of analysis makes use of controls to ensure the legitimacy of data (Saunders, Lewis and Thornhill, 2016).

3.2.2 Research questions

For many years, the overall economic development of countries used to be assessed only by their level of economic activity. Under this perspective, a nation would be as economically developed, as it would be capable of producing income, which was measured in the level of GDP. However, scholars started to notice that GDP growth alone had not led to an overall upgrade in the general well-being of people, in the sense of improving the standard of living.

Contrasting GDP growth to the HDI index, the latter is seen as a much more comprehensive and human economic measure (Scarpin and Slomski, 2007). It is also argued that the GDP does not capture the distribution of income and fails to identify inequalities. Since GNI per capita is used as an input to the HDI calculations, some GDP influence on the index is expected. Nonetheless, the HDI/GDP relationship varies depending on the country (Deb, 2015). Based on the conclusions of Ranis and Stewart (2012) on the extent of this influence, it is meaningful to investigate the relationship between the HDI index and economic activity (GDP) in Brazil.

Accepting the idea defended by the human capital school, which states that the improvement of human skills aggregates value and produces economic development, this empirical study intends to fulfil a gap in the literature regarding the influence of GE on the HDI index in Brazil from 1994 to 2017. Consonant to Deb (2015) and Blanchflower and Oswald (2005), this study supports the HDI index as capable of incorporating different dimensions of progress and capturing economic development in a broader sense. Following the research of Poker, Nunes and Nunes (2013) and Poker and Crozatti (2013) on Brazilian municipalities, the overall effect of social expenditure in Brazil on the human development index will be studied.

Furthermore, diverse outcomes were obtained by empirical studies in the field when the topic is the influence of GE on growth. This might have occurred due to the diversity of the methodological approaches employed, the different periods of analysis, and the distinct economic structure among the studied countries. For instance, capital expenditures were found to be non-productive for Sousa and Paulo (2016); meanwhile, for Rocha and Giuberti (2007), this component impacted positively on GDP. In this sense, the result of the interactions between the GE variables and economic development parameters might change depending on the way the spending is computed and classified. Based on the market perspective of the GDP growth measure and its relationship with economic government expenses outlined in the literature, the components of the Brazilian GE classified according to their nature of expense on GDP growth will be assessed.

Therefore in this research, the relationship between gross domestic product (GDP) human development index (HDI) will first be explored, then the relationship between components of government social expenditures (SOCEXP) and the human development index will be assessed; finally the relationship between the current (CURREXP) and capital (CAPEXP) components of government expenditure and gross domestic product (GDP) will be investigated. The results will then be synthesized toward developing an integrated framework for increasing economic growth and economic development in Brazil.

3.2.3 Procedures applied in this research

To carry out this research, the criteria proposed by Rezende (1997) for the functional approach was kept for the purpose of the analysis, the same way Sousa and Paulo (2016) did in their paper. The selection of the variables did not identify any relevant budgetary function that was not present in the original Rezende (1997) list (table 1). In this sense, the components of GE were separated according to their economic (capital and current) and functional classifications. Then, the values were normalised by the GDP of the respective year of analysis.

Eberhardt and Presbitero (2015) did not find any evidence for systematic non-linearity regarding the debt/growth relationship in their within-country empirical analysis. Among all the papers reviewed in this dissertation, the ones that utilised HDI as the endogenous variable considered linear models for econometric inference. Additionally, it is also important to emphasise the non-appropriateness of a quadratic model to measure the impact of spending on HDI tested in the study of Poker and Crozatti (2013). As such, in the scope of this analysis, the relationship between the proxies for economic development and GE variables is considered a linear one after Ram (1986), Barro (1990; 1991), Silva and Triches (2014) and Sáez, Álvarez-García and Rodríguez (2017).

After an initial analysis where general trends in spending and economic development variables were identified, an econometric approach is established. Firstly, in order to establish the correct direct of relationship between the variables under analysis, the granger causality test is conducted. Secondly, this research wants to examine the extent to which each component of the Brazilian GE has contributed to economic development. In the absence of a measure that better captures social indicators in Brazil, the HDI index was considered the most suitable proxy for social development in the sense of aggregating human development dimensions after Prasetyo and Zuhdi (2013) and Ranis and Stewart (2012). As such, the components of spending classified according to

Rezende (1997) functional approach were regressed on the HDI index (Poker, Nunes and Nunes, 2013; Poker and Crozatti, 2013).

Finally, this study moves on to consider GDP growth as the proper endogenous variable to reflect GE economic allocations (Rocha and Giuberti, 2007; Sousa and Paulo, 2016). As such, the components of spending classified according to their nature were regressed on GDP growth. Based on the framework outlined in the three regressions, an in-depth analysis of the influence of the preferences on allocation of government expenditures on economic development is assessed.

3.3 Variables and econometric models

3.3.1 Variables

The dependent variables used to test hypothesis in the regression analysis are measures that attempt to express economic development or economic growth. As independent variables, the components of public expenses already separated by the Brazilian National Treasury (BNT) in regard to its nature (economic classification) are computed: Capital expenses (CAP) and current expenses (CURR). Then, the same annual budgets separated according to its functions by the BNT (functional classification) are used to apply the methodology as in Rezende (1997). The variables are classified as minimum expenditure (MIN), economic expenditure (ECO) and, social expenditure (SOC). The variable SOC, for the sake of clarification and statistical inference, is broken down into four: education and culture (EDUC), health and sanitation (HES), housing and urban development (HUD) and social security and assistance (SSA).

In order to provide a robust and coherent result in the regression models, the examination of the current literature on GE steered to the decision of embracing control variables where relevant. Following Neduziak and Correia (2017), this research selected measures that theoretically would signal to economic development in distinct ways. Therefore, the rate of unemployment (UNEMP) and the rate of population growth (POPG) were added as control variables.

A summary of the variables adopted in this research and their meaning is described below:

1- HDI represents the absolute ratio as disclosed by the UNDP on a yearly basis.

2- Real GDP growth (RGDPG) is the discrete variation of real GDP growth in percentage per year.

3- Total Government Spending (GE) is broken down into its economic categories, expressed as a share of GDP (GE/Y) per year:

a) Current expenses (CURR) represent the spending on goods and services.

b) Capital expenses (CAP) represent the spending on investment, financial investments and, capital transfers.

4- Total Government Spending (GE) is separated according to Rezende (1997) classification, expressed as a share of GDP (GE/Y) per year:

a) Minimum expenditures (MIN) are considered to be the ones of exclusive control of the government.

b) Economic expenditures (ECO) refer to economic activities in which, technically, the government would not need to get involved.

c) Social expenditures (SOC) represent areas where the government does not assume a monopoly position. The variable SOC is further divided into 4 categories for econometric inference: spending on education and culture (EDUC); spending on health care and sanitation (HES); spending on social security and assistance (SSA); spending on housing and urban development (HUD).

5- Unemployment (UNEMP) reflects the number of Brazilians without occupation in percentage per year.

6- Population growth (POPG) stands for the rate of growth of the Brazilian population in percentage per year.

Variables	
▪ HDI = Human Development	▪ Education and culture (EDUC)
▪ RDGPG = Real GDP growth	▪ Health care and sanitation (HES)
▪ Current expenditures (CURR)	▪ Social security and assistance (SSA)
▪ Capital expenditures (CAP)	▪ Housing and urban development (HUD)
▪ Minimum expenditures (MIN)	▪ Unemployment (UNEMP)

▪ Economic expenditures (ECO)	▪ Population growth (POPG)
▪ Social expenditures (SOC)	

Table 3: Variables under analysis. Source: Authors' work

3.3.2. Econometric models

Since the main focus of this study is to examine the relationship between the variables previously mentioned, the application of ordinary least squares (OLS), under the classical linear regression model (CLRM) assumptions, is chosen because it expresses a linear relationship between HDI, GE, and RGDPG. The coefficients of the independent variables assess directly the overall effect on the endogenous variables (Poker, Nunes and Nunes, 2013; Silva and Triches, 2014).

First the causality between the two major variables of this study (HDI and GDP) will be tested; followed by an econometric estimation. Next the relationships between (i) HDI and the components of the functional classification of government expenditure (Rezende, 1997) and (ii) GDP and the components of the economic classification of government expenditure will be estimated. The models are based on Silva and Triches (2014), Sáez, Álvarez-García and Rodríguez (2017), and Poker, Nunes and Nunes (2013) approaches, which can be considered approximations of the Ram (1986) growth equation. The variable SOC is broken down into four other variables: EDUC, HES, HUD and SSA. This represents an attempt to link each type of social expenditure to the HDI index directly. Both equations are adjusted for the level of unemployment and total population.

Equation (1) below expresses HDI as a function of the functional components of government expenditure:

$$\mathrm{HDI_t} = \mathrm{f(GE, Functional))} = \beta_1 + \beta_2\mathrm{ECO_t} + \beta_3\mathrm{MIN_t} + \beta_4\mathrm{EDUC_t} + \beta_5\mathrm{HES_t} + \beta_6\mathrm{SSA_t} + \beta_7\mathrm{HUD_t} + \beta_8\mathrm{UNEMP_t} + \beta_9\mathrm{POPG_t} + \mathrm{u_t} \quad (1)$$

Where β_1 is the intercept in the regression and $\beta_{2\text{-}9}$ are the coefficients of the relevant independent variables.

The next regression expresses GDP as the endogenous variable and as a function of the economic components of government expenditure, treated as exogenous:

$$\mathrm{GDP}_t = \mathrm{f(GE, Economic)} = \beta_1 + \beta_2\mathrm{CAP_t} + \beta_3\mathrm{CURR_t} + \beta_4\mathrm{UNEMP_t} + \beta_5\mathrm{POPG_t} + \mathrm{u_t} \quad (2)$$

Where β_1 is the intercept in the regression and $\beta_{2\text{-}5}$ are the coefficients of the relevant independent variables.

The final forms of the equations will be determined after testing the variables for stationarity.

In this section, the methodology adopted toward achieving the aim of this research was explained. In addition, the definition of the variables and the econometric models were provided in great detail. The next section moves on to explain the data sample applied in the examination. Also, an in-depth analysis of the results and findings are outlined in a way to set the path to the discussions.

IV. Data Analysis and Findings

4.1 Introduction

The prior section outlined the research methodology, and the equations utilised to test what was planned. Under this framework, the independents, dependents, and control variables were defined and explained in a way to examine the relationship between the HDI, GDP growth and GE. This section describes the data applied in the project as well as why a specific time frame was chosen. Then, the results of the utilised econometric techniques are exposed.

4.2 Data description: Sample and sources of data

4.2.1 Why from 1994 to 2017?

From the 1980s to the early 1990s, Brazil experienced hyperinflation, fiscal shocks, and foreign exchange rate instability. The national currency changed the denomination four times, had undergoing constant adjustments until the stabilization promoted by the Real plan in 1994. Within this period, the hyperinflation

perversely worked in benefit of the government in controlling the public deficit, which was kept at relatively low levels. The fiscal repression generated by the retention of funds led to the reduction of the effective deficit at the end of each year (Barbosa, 1987; Ianoni, 2009).

The Real plan tackled the exchange rate policy and obtained success in controlling inflation. This new macroeconomic scenario generated a new pattern in the management of public resources, characterized by an increase in the deficit. In this context, the Real plan is seen among Brazilian scholars as a turning point, after which relative stability in macroeconomics was obtained in contrast to previous periods.

According to Fisher (1993), a stable macroeconomic framework, i.e. inflation and interest rates stables and at low levels, can lead to sustainable economic development. Thus, focusing on the study of the spending and its relationship with economic development after the Real Plan might enable the possibility of inferences regarding public policies in an inflation-steady environment. In this context, this research is based on a data sample from 1994 to 2017.

4.2.2 Sources of Data

This research aimed to accomplish a wide analysis based on secondary data, one that is able to examine the whole array of the Brazilian central government expenses. The spending components separated according to its economic classification as well as in regard to its specific functions were obtained from the BNT website under the budgetary execution item. It is important to emphasise that every fund spent by the central government during the period of analysis was listed, and as such, no specific component was left out of the econometric inference.

Furthermore, the HDI values were extracted from the World Bank World Development Indicators (WDI) database; both the Brazilian GDP and GDP growth from the International Monetary Fund (IMF) database. The values for the control variables unemployment and population growth were obtained from the Federal Reserve Economic Data (FRED) dataset. All the data was publicly available on the Internet and structured on an annual basis.

This paper relied on the e-views software, in its 9th version, to analyse time-series data over the period 1994 to 2017.

4.3 Data analysis

4.3.1 Visual examination of data

The initial analysis focused on the trends obtained by application of the Hodrick and Prescott Filter. This tool enables the observation of the behaviour of the variables under investigation during the period of examination. Brazil's HDI index showed an increasing trend until 2002, with fluctuations during the period from 2002 to 2007. After this time frame, the overall growing trend kept the pace until 2013 when the index started to rise at lower rates. Regarding the GDP growth series, the cycles of evolution seem volatile, but it is noticeable a constant average growth above the 2% level on the run to the financial crisis of 2008. Since then, the national GDP growth has shown a downward trend (figure 4).

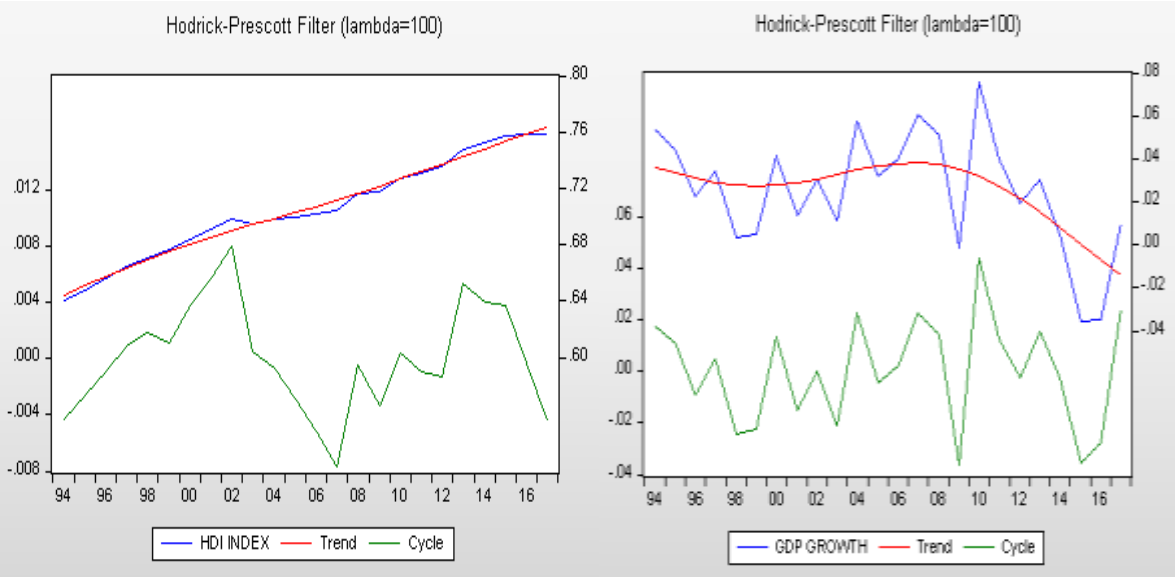

Figure 4: HDI index and GDP growth trends. Source: Authors' work.

Brazilian current expenditure showed an increasing trend in the short term, with few fluctuations during the period 1994 to 2017. Meanwhile, capital expenditures presented greater fluctuations, assuming a decreasing trend from the early 2000s until 2017 (figure 5).

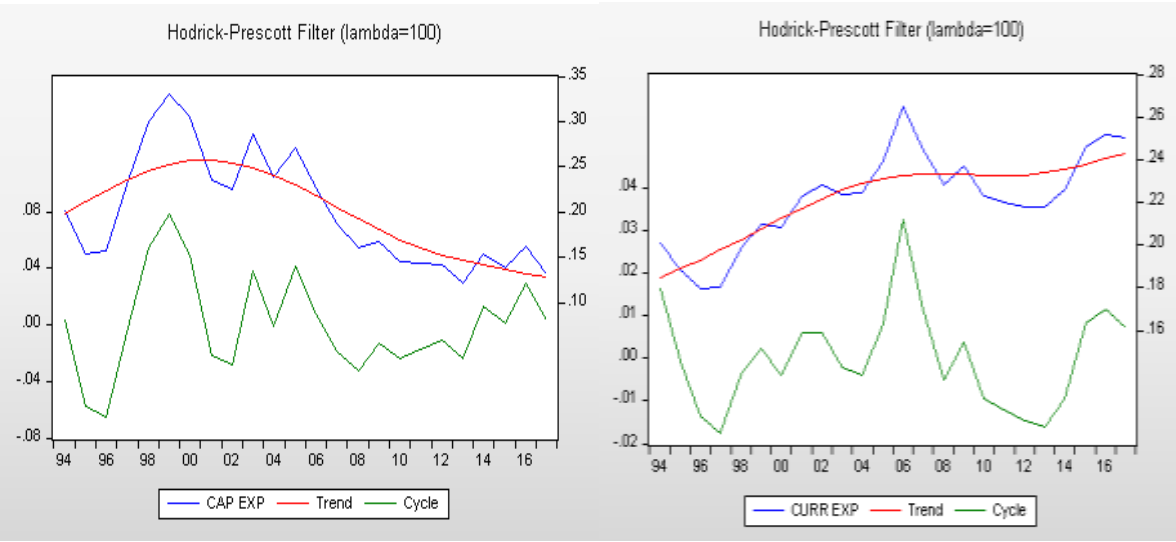

Figure 5: Capital and Current expenditures trends. Source: Authors' work

Figure 6 illustrates GE according to Rezende (1997) approach. Minimum expenditures fell steadily after experiencing steady growth until the middle 2000s. However, economic and social expenditures exhibited a steady growth pattern until 2010. After that, economic expenditures' trend slightly dropped contrasting to a surge in social spending. Therefore, the socialisation trend on public spending seems to be prevailing in a state previously focused on minimum expenditure.

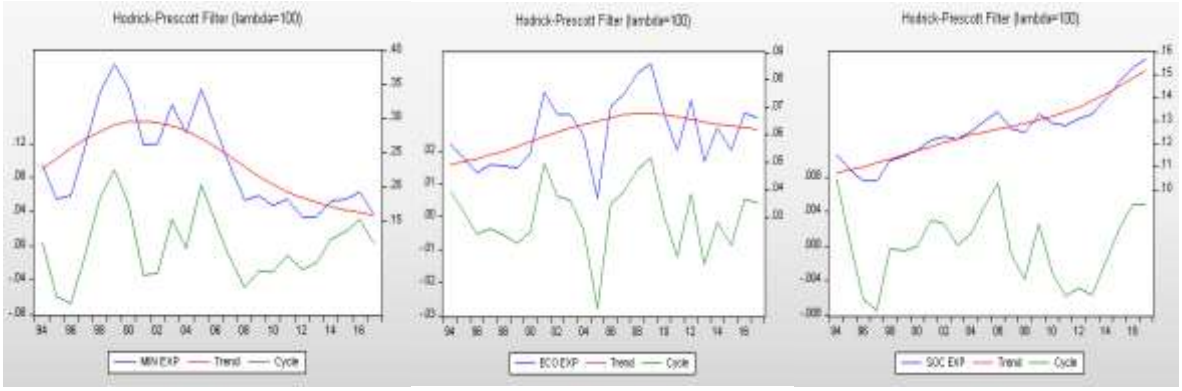

Figure 6: Minimum, economic and social expenditures trends. Source: Authors' work

Figure 7 reveals contrasting trends. While spending on education has been increasing during the analysed period, expenditures on health and sanitation presented a descending trend up to 2010. Since then, the health and sanitation spending has increased.

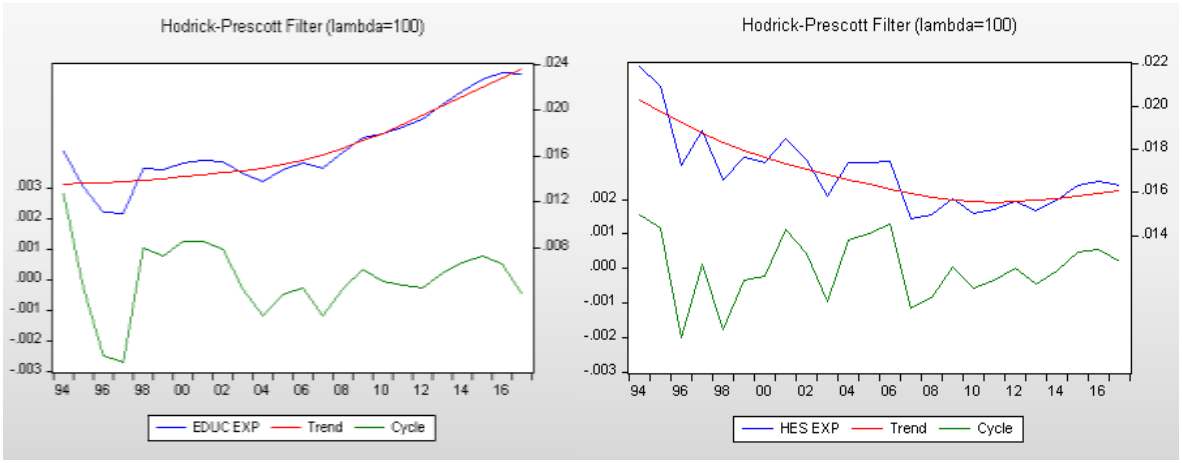

Figure 7: Spending on education and culture and on health and sanitation trends. Source: Author's work.

Spending on social security and assistance and on housing and education showed similar patterns during the reviewed period (figure 8). Both have shown an upward trend. Social security and assistance spending skyrocket after 2012, when the HDI index entered into to slow progress phase and the GDP growth plummeted. This contrast signals to the possibility of a negative influence of spending on social security and assistance on economic development in recent years.

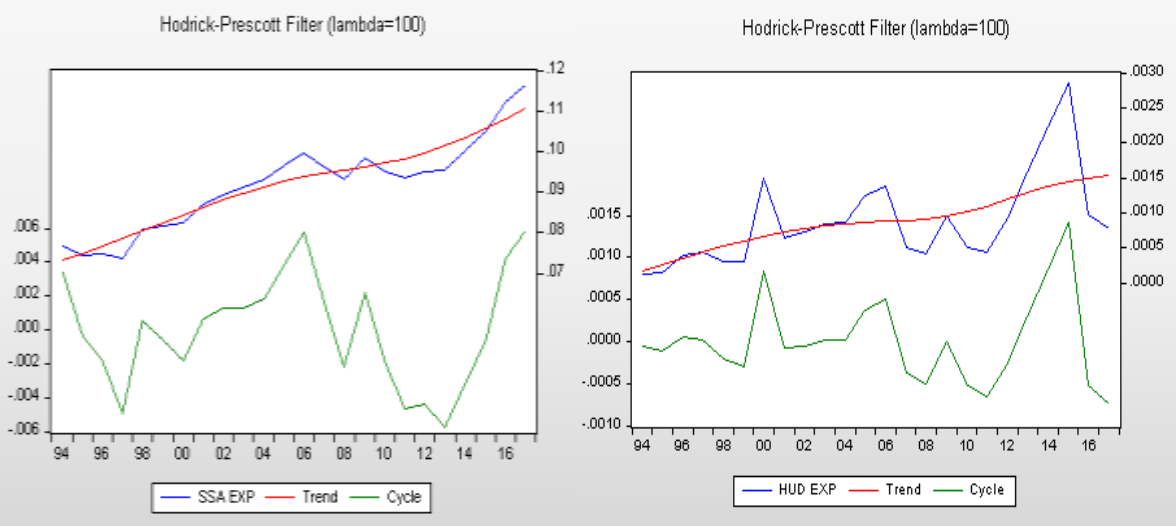

Figure 8: Spending on social security and assistance and on housing and urban development trends. Source: Author's work.

Overall, an upward trend in current and education spending seems to move along with an increase in the HDI index. In contrast, health expenditures exhibited different trends from the ones illustrated by the index. Also, capital expenditures and GDP growth showed similar trend patterns. Examinations based on more complex econometric technique such as the regression analysis are necessary to a precise inference on the relationship between the analysed variables.

4.3.Regression analysis

The variables were checked for stationarity by the augmented Dickey-Fuller (ADF) unit root test with the number legs automatically set by the Schwarz Info Criterion. The outcome pointed out public expenditures variables and unemployment series as non-stationary at the level, and stationary at the first difference, which means they are integrated of order one, I (1). The verifications were accomplished with intercept, with trend and intercept, and with none of them. In this sense, the regressions were done on differences (hence variables are prefixed by 'D.) except for real gross domestic product growth (RGDPG), which already goes through the differencing process in its computation. All the models were checked for the CLRM assumptions as described in the analysis.

To estimate the regression model between RGDPG and DHDI, the result of a Granger Causality Test conducted is as below and shows that there is a weak (>0.05 <0.10) unidirectional causality from DHDI to RGDPG; i.e. DHDI granger-causes RGDPG.

Date: 03/21/19 Time: 20:34
Sample: 1980 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DHDI does not Granger Cause RGDPG	25	2.79043	0.0853
RGDPG does not Granger Cause DHDI		0.56329	0.5781

Consequently, a time series regression of RGDPG is conducted on DHDI and the estimated model is produced below (an AR1 process was introduced to remove serial correlation in the residuals in the first estimation):

Dependent Variable: RGDPG
Method: Least Squares
Date: 03/21/19 Time: 20:37
Sample (adjusted): 1992 2017
Included observations: 26 after adjustments

Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006554	0.010981	0.596853	0.5564
DHDI	3.352464	1.265994	2.648089	0.0144
AR(1)	0.451558	0.187309	2.410766	0.0243

R-squared	0.299479	Mean dependent var	0.024973
Adjusted R-squared	0.238564	S.D. dependent var	0.027361
S.E. of regression	0.023875	Akaike info criterion	-4.523799
Sum squared resid	0.013110	Schwarz criterion	-4.378634
Log likelihood	61.80939	Hannan-Quinn criter.	-4.481997
F-statistic	4.916346	Durbin-Watson stat	1.835257
Prob(F-statistic)	0.016686		

Inverted AR Roots	.45

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.872186	Prob. F(2,21)	0.4326
Obs*R-squared	1.994061	Prob. Chi-Square(2)	0.3690

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.016241	Prob. F(1,24)	0.8997
Obs*R-squared	0.017583	Prob. Chi-Square(1)	0.8945
Scaled explained SS	0.011395	Prob. Chi-Square(1)	0.9150

Figure 9: Model 1 regression outputs. (D) stands for difference. Source: Authors' work.

The estimated model above outlines the interaction between the RGDPG and DHDI. The entire model is valid (F-statistic has a p-value of 0.016). The Breusch-Pagan-Godfrey test for heteroscedasticity in the residuals and the Breusch-Godfrey serial correlation LM test did not reject the null hypotheses of no heteroscedasticity or no serial correlation. The findings are that in the period of the study (1990-2017), a change in the HDI index (p-value of its coefficient=0.0144) had a significant effect on RGDPG: a one change in HDI in the current period increased RGDPG by 3.35%.

In order to examine the influence of Brazilian GE on economic development, the next model is based on time-series models similar to the ones utilised by Silva and Triches (2014) and Poker, Nunes and Nunes (2013). Model 2 (R-squared 0.691) encompasses Rezende (1997) methodology and examines the influence of the minimum and economic expenditures as well as education and culture, health and sanitation, housing and urban development, and social security and assistance spending on HDI. An AR1 process was introduced to remove the serial correlation in the residuals found in the first estimation. The Breusch-Pagan-Godfrey verification did not reject the null hypothesis of no heteroscedasticity.

Dependent Variable: DHDI
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 01/19/19 Time: 13:07
Sample: 1994 2017
Included observations: 24
Convergence achieved after 9 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002702	0.003992	-0.677001	0.5103
DECO	-0.093377	0.041231	-2.264730	0.0413
DMIN	-0.053666	0.020928	-2.564286	0.0235
DEDUC	1.846093	0.755259	2.444317	0.0295
DHES	0.610712	0.588788	1.037236	0.3185
DSSA	-0.921424	0.395734	-2.328390	0.0367
DHUD	0.837482	0.985891	0.849467	0.4110
DUNEMP	0.001151	0.001034	1.113459	0.2857
DPOPG	0.007277	0.003616	2.012356	0.0654
AR(1)	0.148566	0.389441	0.381485	0.7090
SIGMASQ	4.03E-06	2.45E-06	1.648344	0.1232

R-squared	0.691249	Mean dependent var	0.005333
Adjusted R-squared	0.453748	S.D. dependent var	0.003691
S.E. of regression	0.002728	Akaike info criterion	-8.666042
Sum squared resid	9.67E-05	Schwarz criterion	-8.126101
Log likelihood	114.9925	Hannan-Quinn criter.	-8.522796
F-statistic	2.910509	Durbin-Watson stat	1.949339
Prob(F-statistic)	0.037256		

Inverted AR Roots	.15

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.898125	Prob. F(8,15)	0.5419
Obs*R-squared	7.772821	Prob. Chi-Square(8)	0.4560
Scaled explained SS	1.401398	Prob. Chi-Square(8)	0.9942

Figure 10: Model 2 regression output. (D) stands for difference. Source: Authors'work

The objective of the second estimation was to assess which components of government expenditure (GE), had a significant impact on the HDI index. The coefficients of DMIN (p-value 0.0235), DECO (p-value 0.0413) were found significant at the 5% level; a 1% increase on minimum and economic expenditures had the effect of shrinking the HDI measure by 0.05% and 0.09%, respectively. These findings open space for a wide debate on the application of the GE related theories. According to the endogenous theory, minimum expenditure should exercise a positive influence on economic development by enabling the growth of the private sector. Moreover, social variables DHES (p-value 0.3185) and DHUD (p-value 0.4110) were found non-significant to explain DHDI. The positive sign of their coefficients indicates a positive influence as indicated by the literature, but the significance is not relevant. This research expected the health component of expenditure to be significant, as it should influence life expectancy, which is taken into account in one of the HDI dimensions.

The coefficient of DEDUC (p-value 0.0295) was found significant at the 5% level and having a positive impact on human development as measured by the HDI. The outcome points out a 1% expansion on education spending leading to a 1.84% surge on the endogenous variable. This discovery supports the human capital school that defends investments on human capacitation as the main factor in promoting economic development. However, DSSA (p-value 0.0367) was detected as significant while exercising a negative influence on DHDI. Results showed a 1% rise on social security and assistance spending decreases the index by 0.921%. The negative influence of social assistance expenditures suggests that the money spent on social programs and on pensions is not reflecting in economic development. Moreover, while the control variable DUNEMP (p-value 0.2857) was found non-significant, DPOPG (p-value 0.0654) was significant at the 10% level to positively influence the index. This means a 1% increase in POPG leading to a 0.007% rise in the HDI.

The last estimation investigates the effects of GE on RGDPG taking into consideration the spending economic classification (nature of expense). The Breusch-Pagan-Godfrey verification rejected the null

hypothesis and as such the estimation was accomplished with the White heteroskedasticity-consistent standard errors and covariance method. The Lagrange multiplier (LM) serial correlation test statistics supported the null hypothesis of no autocorrelation in the residuals.

Dependent Variable: GDP_GROWTH
Method: Least Squares
Date: 01/19/19 Time: 11:40
Sample: 1994 2017
Included observations: 24
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.025980	0.007512	3.458473	0.0026
DCAP	-0.044799	0.119787	-0.373988	0.7126
DCURR	-0.926137	0.434194	-2.133005	0.0462
DUNEMP	-0.010028	0.002947	-3.402687	0.0030
DPOPG	-0.064483	0.176244	-0.365875	0.7185

R-squared	0.637369	Mean dependent var	0.025305
Adjusted R-squared	0.561026	S.D. dependent var	0.027476
S.E. of regression	0.018205	Akaike info criterion	-4.991239
Sum squared resid	0.006297	Schwarz criterion	-4.745811
Log likelihood	64.89487	Hannan-Quinn criter.	-4.926127
F-statistic	8.348728	Durbin-Watson stat	1.891658
Prob(F-statistic)	0.000461	Wald F-statistic	4.756629
Prob(Wald F-statistic)	0.007893		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.238156	Prob. F(2,17)	0.7907
Obs*R-squared	0.654113	Prob. Chi-Square(2)	0.7210

Figure 11: Model 3 regression output. (D) stands for difference. Source: Authors' work.

In this estimation (R-squared 0.637), DCAP (p-value 0.7126) has a negative but not significant influence on the output growth. Conversely, DCURR (p-value 0.0462) was found significant to explain RGDPG. This means that a 1% increase in current spending decreases the output growth by 0.92%. The negative effect of DCURR is consonant to the existing literature since it does not contribute to higher production capacity in the economy. Although CAP was expected to have a positive and significant impact; once it is at a higher level, it only subsidises the increase in the marginal product of private capital. Control variable DUNEMP (p-value 0.0030) showed up influencing RGDPG negatively as expected. An increase in unemployment reduces the possibility of generating income, therefore, setting constraints to GDP growth. The results pointed out a 1% growth in unemployment decreasing GDP growth by 0.01%. DPOPG (p-value 0.715) variable was found to be non-significant.

In the next section, the findings are evaluated and appraised according to the underlying theory and previous search and an integrated model is developed.

V. Discussion

The previous section showed the data utilised in this work as well as the outcomes of the econometric techniques employed. Now, an in-depth analysis of the findings is provided and critically appraised in the context of other previous research.

5.1 Analysis of the findings

The findings of the last section together provided important information about the relationship between GE and economic development in Brazil. In the context of this analysis, this research adopted the approach of Devarajan, Swaroop and Zou (1996), also found in Rocha and Giuberti (2007) and Sousa and Paulo (2016), where the variables were classified as productive or non-productive only after the examination itself. This approach considers productive expenditures turning into non-productive when they trespass an optimum level.

5.2.1 GDP/HDI relationship in Brazil

This estimation showed that the direction of causality is from HDI to growth: increase in HDI increases the rate of GDP growth. The higher the change in the HDI, the higher is the rate of GDP growth. This outcome was not expected once the index encompasses the income dimension in its composition. Nonetheless, this study concludes that the high positive relationship between the economic progress measures for low-income countries proposed by Deb (2015) stands for Brazil, but not with the expected causality direction. As HDI was found Granger-causing GDP growth, the idea that the path to success on the HDI index does not depend on spectacular growth performance is supported (Ranis and Stewart, 2012).

5.2.2 GE and the effects on the HDI

In this estimation, minimum and economic spending were found non-productive, which means both have impacted negatively on the HDI index during the analysed period. Minimum expenditure was expected to have had influenced positively on HDI once they should provide the path and set the bedrock for the economic development (Sousa and Paulo, 2016). Similarly, economic expenditure, which is expenditure in sectors where the government do not necessarily have to intervene, was expected to positively influence the index.

In regard to the social variables in this model, education and culture spending were found productive to enhancing the HDI index, which gives support to the human capital school ideas (Lucas, 1988; Poker, Nunes and Nunes, 2013). This result was expected once mean years of schooling are accounted in the index calculations. Spending on health and sanitation had a positive coefficient yet no significant and as such, cannot be classified as a productive component. This result goes against what was expected since the spending on health and sanitation, theoretically, favor social welfare and the quality of the workforce (Poker and Crozatti, 2013). Furthermore, social security and assistance spending was found non-productive, which leads to the conclusion that the money spent on assistance might have passed the inflection point in the productivity curve (Neduziak and Correia, 2017). In addition, spending on housing and urban development proved to be not statically significant and therefore was not considered productive in terms of promoting HD as measured by the HDI.

Control variables, unemployment and population growth utilised in the second model, which were chosen after Neduziak and Correia (2017), gave support to the findings. As expected, population growth was found productive as it allows for the labor force expansion. This positive impact is consonant with the literature since population growth leads to a rise in the income level. In contrast, unemployment had no significant relationship with HDI whatsoever.

5.2.3 GE and GDP growth

The traditional classification of government spending according to its economic components (current and capital expenditure), in Brazil officialised by the law 4.320/64, enables the assessment of the economic effect of public sector transactions (Sousa and Paulo, 2016) on economic growth. Model 3 showed that economic components have no positive effect on GDP growth in Brazil.

Capital expenditures were expected to have a positive coefficient because theoretically public spending on capital increases the physical capital of a country, which would intensify the productivity of the private sector and promote growth (Rocha and Giuberti, 2007). They were found non-significant. Then, current expenditures were found significant but affected output growth negatively, since they have the purpose of providing public services and paying for federal employees. This finding has strong support in the literature and is supported by neo-classical theories (Landau, 1983; 1986).

Regarding the control variables, the results pointed out population growth was not significant to explain GDP growth; Unemployment was found significant and non-productive to explicate GDP growth, once a high percentage of the workforce without occupation impacts on the aggregated production, reducing the overall income level. Despite the non-significance of capital spending to promote growth, the non-productiveness of current expenditures support the conclusion of a negative impact of GE on GDP growth.

The findings are summarised in Figure 13 below:

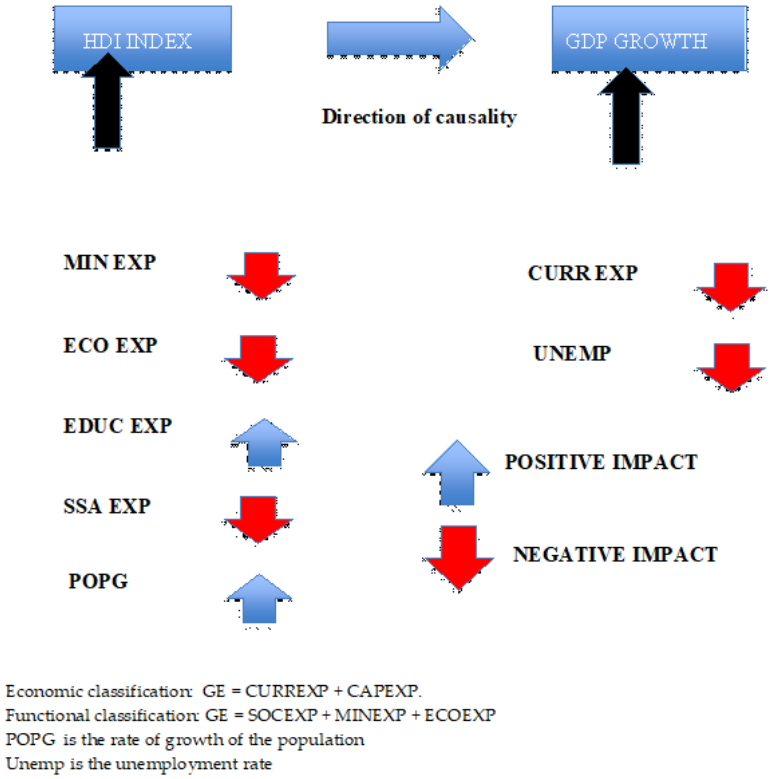

Figure 13: Integrated framework. Source: Authors' work

5.3 Critical evaluation

This study contributes to the academic literature over the explanation of the GDP/HDI relationship in Brazil (Deb, 2015; Ranis and Stewart, 2012). Also, relevant contributions to the relationship between government expenditure and economic development were accomplished by exploring the influence of GE variables on the HDI index (Razmi, Abbasian and Mohammadi, 2012; Poker, Nunes and Nunes, 2013; Poker and Crozatti, 2013) and on GDP growth (Rocha and Giuberti, 2007; Silva and Triches, 2014; Sousa and Paulo, 2016).

This investigation found education spending having a positive relationship with the HDI index. This result is in line with the human capital school and with the works of Landau (1983; 1986), Barro (1991), Rocha and Giuberti (2007), and Poker, Nunes and Nunes (2013). This outcome suggests that the spending on human capacitation allows more people to take part in the production process, aggregating value to their work, enhancing income levels and promoting economic development in a comprehensive way. Also, it supports the view of human capital as an asset to the extent of the higher the investment in it, the more returns a society is going to achieve (Lucas, 1994; Jahan, 2017). The increasing levels of expenditure on education verified on the initial analysis had results materialised by the HDI index. Nonetheless, the relationship between health expenditures and the index was non-significant. Still, this research concludes that the positive influence of this component, represented by the plus sign of the coefficient, is in accordance with Poker and Crozatti (2013) Razmi, Abbasian and Mohammadi (2012). The non-significance of the result might be related to the approach utilised in this work, in which econometric inference was made on the spending of the health and sanitation components together on the integral HDI measure (with all its dimensions). As outlined earlier, Poker and Crozatti (2013) verified the relationship between the health dimension of the index alone and health spending.

In contrast to the positive relationships previously found, minimum and economic spending were found statistically significant and impacting negatively on the HDI index. The negative influence of these components on economic development is in accordance with Sousa and Paulo (2016) result. However, the outcome was significant for this research while non-significant for them. The endogeneity issue probably contributed to this divergence. Sousa and Paulo (2016) verified the relationship between GE variables and GDP per capita whereas this dissertation approached the HDI as endogenous.

The non-productiveness of minimum expenditures goes against the endogenous growth theory since this component should provide pure public goods, which are supposed to collaborate with the private sector of the economy. Based on Devarajan, Swaroop and Zou (1996), this outcome suggests that both minimum and economic government spending have passed the optimum level. The negative influence of economic spending alone opens space to the possibility of "crowding out" effects. In addition, spending on social security and assistance were also found to be non-productive in contrast to Neduziak and Correia (2017) outcome, where the relationship was examined towards GDP. The significance level of social security and assistance expenditures on the estimation translates that the magnitude of distributive policies is not contributing to HD as measured by the HDI, which insinuates excessive spending in this component (Devarajan, Swaroop and Zou, 1996). This raises questions on the effectiveness of social security and assistance policies, which is not within the scope of this work. These significant outcomes of Model 2 support the success of the Rezende (1997) functional approach to establishing a relationship between GE variables and the HDI.

The test for causality between HDI and GDP growth in Brazil showed that it is changes in HDP which influence changes in the level of economic activity (ie economic growth). The found causality direction between the HDI index and the output growth combined with the significance of the spending on education on the index supports the view of Ranis and Stewart (2012) towards education spending. In this sense, the level of the education of the population enhanced by education spending seems to be the most important factor contributing to the evolution of the HDI index over time in Brazil. However, income distribution policies represented by social security and assistance expenditures have had an opposite effect on the index, which goes against UNDP standards (Jahan, 2017).

Brazil entered into the group of nations that are considered at high HDI standards (higher than 0.70) after 2005. According to Ranis and Stewart (2012), high HDI countries with high per capita income can achieve success through moderate expending on education and good education indicators despite a weak income distribution outcome. Based on the results achieved and on the underlying theory, this research concludes better HDI outcomes for Brazil rely on education spending rather than simply higher GDP growth. To this extent, this study suggests a revision of public policies related to social security and assistance, since they have contributed negatively to the HDI measure, according to our findings.

Finally, Model 3 disclosed current expenditures having a negative effect on GDP growth. This result matched the findings of Rocha and Giuberti (2007), Silva and Triches (2014) and Sousa and Paulo (2016) in regard to the influence of this component of spending on growth. However, in contrast to Rocha and Giuberti (2007) and Silva and Triches (2014), but in accordance with Sousa and Paulo (2016), this study revealed a negative (but not significant) coefficient for capital expenditures. It is important to analyse the negative coefficient of capital spending allocation in Model 3 along with the significant negative influence of economic expenditures on the HDI. These results open space to discussion on whether national government investment allocation decisions were appropriate or not. Spending on specific functions where governmental participation is not mandatory along with capital investments is not improving economic development.

In summary, given the significance of the estimation results, the positive contribution of education spending to economic development supports the neo-classical approach to GE (Solow, 1956; Queiroz and Poker, 2012). Also, the results are consonant to Landau (1983, 1986) and Barro (1991) findings, where an overall negative impact of spending on growth was found together with a positive effect of education spending, which contributes in favor of the human capital school (Lucas, 1994; Poker, Nunes and Nunes, 2013).

The importance of increasing HDI is clear considering its effect on economic growth. All the above are summarised in the integrated framework in Figure 13.

5.4 Summary

This section of the research evaluated the empirical results and critically assessed the findings. Models that referred to the effects of GE on both the HDI index and on GDP growth respectively yielded results, which were contrary to expectations. While social spending variables affect the HDI index differently, economic GE variables impact negatively on GDP growth. These findings support the human capital school. GDP growth was found to have a positive relationship with the HDI index, but higher HDI levels seem to rely more on education spending rather than on GDP growth.

VI. Conclusion

6,1 Review of research

The aim of this research was to study the relationship between government expenditure, economic growth, and human development in Brazil, and to examine public policy implications and this has been achieved. In previous sections, the methods of analysis and findings were outlined and debated in the light of current theories and empirical research. This section provides an overview of the previous sections, reflects on

the research completed and makes suggestions for public policies towards economic development. Lastly, the limitations of the research and the opportunities for future investigation on the topic are outlined.

In summary, this research estimated the effects of government spending components on the HDI index and the extent of the HDI/GDP relationship for Brazil; positively or negatively, there is evidence that most of the spending components of the Brazilian central budget are connected to economic development. For the sake of simplicity, the main findings during the analysed period are outlined below:

a) The HDI index influences GDP growth in Brazil; the relation is strong and positive.
b) Spending on education positively affects economic development as measured by the HDI index.
c) Minimum and economic expenditures impact negatively on the HDI index.
d) Spending on social security and assistance impact negatively on the HDI index.
e) Higher HDI levels seem to rely more on education spending rather than on GDP growth.
f) Current expenditure has a negative relationship with GDP growth.
g) Reduction in unemployment increases GDP growth.

The human capital school supports the outcome found for education spending (Landau, 1986; Lucas, 1994; Poker, Nunes and Nunes, 2013). There is evidence that this component of spending supports the evolution of the HDI measure in Brazil. Education spending seems to be the leading factor to this purpose. Following this finding, the positive influence of health expenditures on HDI was expected to be significant (Poker and Crozatti, 2013; Razmi, Abbasian and Mohammadi, 2012), but the tests pointed out otherwise.

Furthermore, important components of public spending such as the minimum, economic and social security and assistance expenditures showed negative effects on the HDI index. This outcome suggests that expenditures normally considered as productive, can become unproductive when exceeded (Devarajan, Swaroop and Zou, 1996). The desired human development is not being delivered by these components of spending. In summary, the positive relationship between spending on education and economic development was expected, but the other up mentioned negative connections between GE variables and the HDI index as well as the negative and non-significant impact of capital expenditures on GDP growth were not.

Overall, the Rezende (1997) functional approach was effective in establishing a connection between GE variables and the HDI index. The outcomes disclosed by the estimations are corroborated by previous empirical works in which the importance of spending on education to human and economic development was emphasised (Landau, 1986; Rocha and Giuberti, 2007; Poker, Nunes and Nunes, 2013).

6.2 Implications of this study

The current research provides empirical evidence for government decision-makers in regard to the allocation of public resources, its effects, and consequences. It synthesises the impacts of several components of government expenditures on the HDI index. In this sense, the social spending components need to be comprehended individually. The overall spending in social areas (Rezende, 1997) does not necessarily lead to better human development. If the overall aim of the Brazilian government is human development, spending on education must be considered. Also, the results disclosed the need for revision of the Brazilian public policies related to social security and assistance.

Moreover, despite the reduction of minimum expenditure over the last few years, the state's involvement (Rezende, 1997) in this area has contributed negatively to economic development. As such, this study recommends the reduction of minimum expenditures to enhance the HDI index. The HDI index contributed positively to GDP growth, not the other way around as suggested by Deb (2015). Also, despite the non-significance of capital spending on output growth, the substantial results involving current spending support the view that spending has contributed negatively to economic development. Thus, a fiscal adjustment oriented to the reduction of current expenditures in a way to make overall expenditure more effective is recommended (Rocha and Giuberti, 2007).

This research opened the way to the exploration of the relationship between the Brazilian federal budget and the national HDI index. Future researches can incorporate this comprehensive measure of development to more sophisticated econometric techniques and to different methodologies. In addition, a cross-country national GE study, encompassing economic blocks or continents, would bring a better comprehension of the interaction between national governments spending levels and the HDI index.

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