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The quality of public expenditure and its influence on economic growth: evidences from the State of Rio Grande do Sul (RS)

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Contents

1. Introduction

In the last years, extensive amount of literature have emerged examining the relationship between fiscal policy and economic development, predominantly after the construction of the modern models of long run economic growth. These new studies have generated a large number of models linking public spending with economic growth rate. However, much less is known about the quality of this spending and its effects on the growth rate of a country or state.

The importance of the quality of public expenditure is highlighted by the large quantitative weight the public sector has on the economy nowadays, interfering, rightly or not, in the processes of economic development and, mainly, in people's lives.

A government could increase the public spending by a large amount but this does not mean that it would have an effective result on economic and social development; the quality of this spending also matters. This expenditure must provide good public policies that really achieve the objective to increase growth, and, hence, the living standard of the population. However, these effects of public spending on growth are complex to verify and difficult to quantify. In public policy, there is a complex and lengthy interaction between the inputs (mostly financial and human resources) and the outputs (increasing per capita GDP growth).

In addition, some expenditure has no impact on economic development, so it is important to investigate which kinds of public spending are being carried out effectively. Spending on interest or on retirement, for example, has a different nature from spending in education and health, so one has to define the different groups of public expenditure.

The main challenge dealing with public expenditure is to assess its quality and effectiveness in increasing growth and improving the living standards of the citizens. Therefore, this article seeks to analyze the public expenditure, mainly aspects related to its quality, and the effect on economic growth. The main objective is to explore the concepts of quality of public expenditure and the theories about its effect on the economy. Looking for some evidence of this occurrence, this work also analyzes the quality of public expenditure of the Brazilian state of Rio Grande do Sul (RS) and verifies whether it is affecting the economic growth, as measured by per capita GDP growth.

As Devarajan et al. (1996) had pointed out, the focus on growth is justified because growth is one of the objectives of any government, and it is useful to know the

contribution of its different types of spending to achieve this goal as a means of assessing the cost of pursuing other goals.

Thus, this study is divided into five sections, besides this introduction and a conclusion. The second section examines the public expenditure and its effects on economic growth, exploring the role of public finance, the concepts and classification of public expenditure and the different models of growth. Section 3 presents the dimensions and importance of the quality of public expenditure, explaining this concept and splitting it into two fields of analysis, composition of spending and effectiveness of public policies. The next section seeks to investigate the ways quality of public expenditure is assessed in the literature and how it can affect growth. Section 5 shows the methodology designed to measure the quality of public expenditure of RS. Finally, the last section presents and discusses the results obtained from the analysis performed.

2. Public expenditure and economic growth

2.1. The role of the public finance for growth

The discussion about the role of the government has changed in recent years regarding the assessment of efficiency and final objectives of the public activity and the functions of stabilization, allocation and distributive effects of the public expenditure. In addition, according to Musgrave (1969), after the Keynesian revolution, fiscal policy was elevated to a strategic position in macroeconomic theory and practice.

Public finances in the modern State became not only a means of providing financing for government spending, but also a primary way of intervening in the economy, enhancing the private productive structure and changing the rules of income distribution.

The public finance can affect the economic development in many different ways. However, according to the theoretical literature, it is possible to highlight the four main channels whereby the public finance influences economic growth: the institutional framework (the correct definition of laws, regulations and rules plays a key role), the tax system, the macroeconomic stability and the government spending (mainly the basic or essential spending, as on justice, education, health, public infrastructure, etc..) (Afonso et al., 2005).

Thus, this section explains briefly these ways public finances can affect the economy and explores the one that is the focus of this research – the public expenditure.

2.1.1. Institutional framework

The institutional framework in this context is the environment of rules and institutions in which the fiscal policies work. It is constituted by legal constraints (and often informal or cultural) that define the incentives for public and private consumption, savings, investments, production and innovation. The growth is generated directly through their effects on markets and indirectly by the agents' pressure for policies. The rules may affect the stability, sustainability and efficiency of fiscal policies and its connections with other policy areas. The institutional framework where private and public agents develop their economic activities is fundamental for growth (ECB, 2001).

According to Afonso et al. (2005), a well-defined institutional framework is key to growth. Property rights and efficient markets minimize institutional uncertainty and enhance the confidence and security of returns on investment. The government should promote competition, minimize transaction costs, induce agents to invest and innovate, and not undermine the functioning of markets, helping to internalize externalities and spillovers effects.

In addition, strong fiscal rules and institutions play an important role for economic development, preventing structural fiscal deficits that could generate inefficiency, create large public sectors and damage the sustainability of public finances. In this context, fiscal responsibility laws have a significant importance, preventing harmful fiscal administrations and creating trustworthiness in fiscal policy.

2.1.2. Tax systems

Taxes are generally distortive and transfer resources from the private to the public sector, considered more inefficient in their use. The distortionary taxes interfere in the private decision to save and invest, may modify the accumulation process of capital, and thus alter the growth rate of the economy (Milesi-Feretti and Roubini, 1998).

The level and structure of taxation of an economy can influence its growth rate through altering the allocative decisions. A high level of taxation mostly causes harmful

effects on the economic development because negatively impact the investment and saving decisions of private agents.

Nevertheless, very low taxation might also reduce economic growth, not generating sufficient resources to finance essential public services, improve the infrastructure and promote policies that enhance private and human capital.

2.1.3. Macroeconomic stability

The government through fiscal policies can contribute to macroeconomic stability and to good monetary policy, preventing inflationary pressures and maintaining low interest rates. Fiscal policy can be a mechanism to moderate short-run fluctuations of output and employment, aiming to shift aggregate demand in order to move the economy closer to potential output.

High deficits and large volume of debt can lead to unsustainable fiscal policy, create an unfavorable economic environment and harm expectations of the private agents for savings and investment decisions, in anticipation of higher taxes in the future. In addition to that, Afonso et al. (2005) affirm that small deficits prevent the absorption of a considerable portion of savings to finance the public sector (crowding out), which, consequently, benefits investors via lower interest rates and raising the capital stock.

2.1.4. Government spending

The last way a government can affect growth is through spending. Several fiscal policy instruments might produce long-run effects, but only the modern models of endogenous growth have introduced public expenditure as the engine of economic growth (Zagler and Durnecker, 2003).

According to ECB (2001), the main objective of government spending in order to promote economic development is to improve the marginal productivity of the private sector's physical capital and labor. Afonso et al. (2005) agree that public spending can increase human capital and contribute to innovation and technological progress through spending in research and development. Thus, public spending on education (human capital), and research and development (innovation) enhances labor productivity and, therefore, growth. Other expenditures affect growth through further

channels. Basic social safety nets, for example, reduce the need for preventive savings and increase the ability to take risks.

On the other hand, redistributive spending can reduce incentives to work, invest in human capital or to take innovative aptitudes, undermining growth. Afonso et al. (2005) even suggest that early retirement incentives or generous social assistance reduce labor supply and the incentive to preserve one's human capital.

This specific role of the government is the focus of the present article. Therefore, in the next section the concepts of public expenditure and their effects on economic development are further explored.

2.2. The concepts and classification of public expenditure

Public expenditure can be defined as the set of expenditures of the State for the operation of goods and public services (Baleeiro, 1958). It can also be set as the application of public resources to finance the public services or to invest in economic development.

Expenditure is the instrument used by the State to more directly affect its citizens' lives. The construction of a hospital and payment of a doctor or provision of a medicine are both actions to improve the health of the population and are financed by public spending. The same way as the construction of a school, a teachers' payment and the provision of schoolbook seek to improve the education of the population and are financed by government expenditure. At every level, government decisions about how much to spend, what to spend on, and how to finance its spending is of central importance (Abel et al., 2010).

However, unlike tax policy, where the theory of optimal taxation was already developed, expenditure policy does not have a theory of optimal allocation that could provide comparably well-defined rules for government spending. The main ideas of expenditure policy were the concepts of externalities and market failures. It indicates that public expenditure is only justified if its interventions could correct the inefficient provision of a product or service due to market failure (Paternostro et al., 2005).

Pioneers of this study, Samuelson (1954) and Musgrave (1969) had already explained that in public finance theory, there is not a "market type" solution to determine the level of expenditures on public goods, and public expenditure is allocated in a "non-optimal" way when compared with the private sector.

Given this, the objective of this paper is to overcome this discussion about the level of public spending and focus on the composition and the effects of this expenditure on economic development.

Public expenditure can be classified in several ways, depending on how you want to analyze it. In this paper, two different ways to classify the expenditure are used, following IMF (1986) and Brasil (2010) – the economic and the functional classification.

The economic classification seeks to express the economic characteristic of the transactions made by the government. It shows the kinds of transactions by which the government performs its functions and their impact outside the public sector in the market for goods and services, financial markets and income distribution.

This classification provides information about the macroeconomic effects of public sector spending in the economy and allows society to know what will be purchased and what the economic effect of the outlays will be.

The second classification is the functional that shows the purpose toward which the expenditure is directed. The functional classification basically seeks to answer on which area government expenditure is carried out. It permits to examine the trends in government outlays on particular functions over time and thus allows forecasting future expenditures (IMF, 1986).

The function represents the highest level of aggregation of the various areas of expenditure that the public sector participates. It is related to the institutional mission of a state's department, such as culture, education, health, safety, etc.

According to Lagemann (2009), the functional classification is the result of the combination of planning with budget. In the beginning, the budget only had the goal to control public accounts. However, nowadays, economic and social effects of public spending also matter.

2.3. Models of economic growth and the effects of fiscal policy

Over the recent decades, economists have sought to understand the long run economic growth and its sources. In the 1950s, Solow (1956) and Swan (1956) made pioneering studies creating a neoclassical framework to systematize the sources of economic growth and producing an analytical model for long-run growth, based on a production function and capital accumulation. In its simpler version, this production function has two inputs, capital and labor, presenting constant returns to scale in production and diminishing marginal productivity of both inputs.

The physical capital accumulation plays an important role for growth in this model, and due to their decreasing returns to capital, the process is unsustainable, because each additional unit of capital gives a lower return than the previous one, considering fixed labor. Thus, economies will progressively reach a point where savings provide investment only to cover depreciation and any increase in capital will no longer create economic growth. This point is called a "steady state" (Afonso et al., 2005).

Therefore, according to the neoclassical model, productivity growth is the only source of long-run economic growth. The increasing of population and technological progress alone determine exogenously the growth rate of output. However, fiscal policy only has an impact on determining the level of output, not affecting long-run growth rates, and raising the output growth only during a transition period to a new steady state level.

After these foundation studies, Arrow and Kurz (1970) developed a model of economic growth including fiscal policy, assuming implicitly that all public investment was productive. However, the fiscal policy still was playing an exogenous role in the model, not affecting the steady state growth rate, only the economy's transition growth rate (Devarajan et al., 1996).

This exogenous growth models, however, basically takes the rate of productivity growth as given, rather than trying to explain how it is determined. That is, the neoclassical models assume, rather than explain, the behavior of this essential determinant of long-run growth. In response to this shortcoming, a new branch of growth theory has been developed trying to explain increasing productivity and hence economic growth endogenously, or within the model – the endogenous growth theory (Abel et al., 2010).

The endogenous growth models, pioneered by Romer (1986) and Lucas (1988), try to explain the productivity growth emphasizing the formation of human capital, like acquisition of skills and training by workers, and research and development (R&D) activity by firms. With this increase in human capital and innovation, the marginal productivity of capital may not be diminishing for the economy as a whole (Abel et al., 2010).

Thereby, long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit-maximization agents and knowledge is assumed to be an input in production that has increasing marginal productivity (Romer, 1986). Capital

here is understood in a broad way to include human capital and knowledge spillovers, or to assume that capital accumulation has large positive externalities (ECB, 2001).

In this context, fiscal policy can play an important role on determining both the level of output and the steady-state growth rate, raising aggregate savings and increasing productivity through investments in public capital (infrastructure), formation of human capital, and research and development. These endogenous models constitute a useful framework to study the effects of fiscal policy on long-term growth (Afonso et al., 2005). And also, according to Devarajan et al. (1996), these studies of endogenous growth have generated a large number of models linking public spending with the long-term economic growth rate.

3. The dimensions and importance of the quality of public expenditure

In line with the modern theory of public finance and economic growth, the public expenditure performs a significant role in the economy. However, not only the quantity of spending affects the economic development, but also its composition and effectiveness of financed policies. Therefore, not only the expenditure quantity that matter, but also the quality of this spending.

The relevance of expenditure quality and its effects on economic and social development is reinforced by the quantitative weight that the public sector has in the economic arena.

According to Afonso et al. (2005), there is some governmental activity and related public spending that is essential for the performance of economy. This "core", or "essential", or "productive" spending may be as important to growth as private capital and labor. In addition, they express their concern about how this spending is done, emphasizing the relation between cost and benefit of public services: "Certain core spending items are essential for the economy to function and to grow. However, these services also must be delivered in a cost-effective way".

The effects of the public policies, in fact, have much more relation to application details – composition, method of implementation, operating system, control and evaluation – than your quantity income level of budget.

Thus, it is possible to define quality of public expenditure as a mix of a well-distributed budget and application and smart public policies that affect people's lives. Alternatively, in a more direct way, the quality of public expenditure depends on two

dimensions that have to be addressed on different methods – composition of spending and effectiveness of policies.

3.1. Composition of spending

The composition of public spending, application in different areas, and the quality of public policy, considering the way they are applied from different budget projects and activities, are the aspects that can affect most and support the economic development (Casasnovas, 2010). For example, spending in interest and retirement has a different nature from spending in education and health, thus it is important to outline the different groups of public expenditure.

As Gupta et al. (2005) explain, the composition of public outlays matters – concentrated spending on wages tend to have low growth impact while high shares allocate to capital and nonwage goods and services enhance faster output expansion.

Government expenditures can be differentiated according to their impact on the steady-state rate of growth. If they have a direct effect on growth rate, they are classified as productive; if they have not, then they are classified as unproductive expenditures (Barro and Sala-i-Martin, 1995).

Therefore, the restructuring of public expenditure towards a productive spending generates a positive effect on growth rate without creating distortions in the economy that adversely affect growth (Zagler and Durnecker, 2003).

However, Afonso et al. (2005) point out that the examination of different empirical studies indicates that is not feasible to have an objective and clear complete catalogue of "high quality" expenditure items – "there is no cookbook for growth. Economics gives an idea of the major ingredients, but it does not clearly tell the recipe".

As Casasnovas (2010) emphasizes, the fundamental conclusion of this topic, and justification of this kind of analysis, is that the composition of spending, not only its amount, is crucial for the assessment of the quality of public expenditure.

3.2. The effectiveness of public policies

However, besides the composition of expenditure, it matters if this spending is financing good quality policies. A government can spend a great amount of resources in education, but if the policies are not carried out effectively, for instance, this spending will not have impact in people's lives.

The enhancing of economic development depends significantly on the public policies offered by the State. The policies affect people's lives in many ways, mainly the lower income sector, which needs the public services and assets more. However, the effectiveness of these policies is directly influenced by the quantity of resources involved and, mostly, the quality of this expenditure.

According to Joumard et al. (2004), an action to increase the efficiency of public spending is to expand market signals that enhance effectiveness of public policy programs, with the fundamental idea of increasing competitiveness in the public provision of goods, improving their cost-effectiveness.

However, as Paternostro et al. (2005) explain, one weaknesses of the literature is that it has used the simplistic reasoning of connecting inputs (spending) and outcomes (economic growth). The major approaches suppressed the fundamental discussion of the relationship between public spending policy and its direct and indirect effects and consequences on short and long term. The effects of public policy on policy objectives can only be verified if the transmission channels and time period for the effects to be observed are fairly well defined. Without it, the link between inputs and outcomes is made subjectively, without empirical evidence.

Another significant issue of these analyses is the difficulty in measuring the effects of public sector spending on final results, separating the impact of public spending from other influences. And also, as Mandl et al. (2008) pointed out, only partly of the economic growth potential is under direct influence and not always achievable within one political cycle.

In addition to this, the focus on growth enhancing public expenditures can only be sustained with a strong link to efficiency issues.

4. Assessing the quality of public expenditure and its impact on growth

4.1. The impact of composition of public expenditure on growth

The previous section clarified that two complementary dimensions can address the quality of public expenditure – composition of spending and effectiveness of policies. As the approach to asses each dimension is different, in the present work it is

explored only one of them, the composition of public expenditure, and its impact on economic growth[1].

The question of how the composition of public expenditure affects economic growth does not have a straightforward answer neither from economic theory nor from empirical evidence. The theory only develops a rationale for government intervention when there is a market failure to provide public goods, internalize externalities or cover cost when there are significant economies of scale. Nevertheless, these frameworks do not provide operational rules to define the exact composition of public expenditure (Devarajan et al., 1996).

According to the neoclassical growth models, the composition of public expenditure does not impact economic growth, because government spending only affects the equilibrium factor ratios rather than the steady-state growth rate.

Even though, the modern models of endogenous growth do not support the same idea because they affirm that investments in physical and human capital can affect the economic development. Therefore, the public expenditure has an important role on the growth process. However, as Kneller et al. (1999) explain, "if the theory is reasonably clear, however, the empirical evidence is not". Therefore, the effects of the composition of public expenditure on economic growth rate are one of the central questions, but this relation is still not very well known.

As Devarajan et al. (1996) explicate, the size of government spending is an issue of public-choice, but its composition is open to policy debate. What is the optimal mix between "productive" and "unproductive"? When there is a fiscal adjustment, which public expenditure should be cut – health, education or infrastructure? According to them, this choice depends on the contribution of these components to economic growth.

In the last years, a large number of papers are showing evidences about the influence of composition of public spending on growth. One of the first studies was from Aschauer (1989), who found that the main component of government spending associated with positive growth effects is investment expenditure. Other studies (Barro, 1990; Easterly and Rebelo, 1993; Devarajan et al., 1996), also have found that the acquisition or the accumulation of physical capital goods by governments have effects on economic growth. However, as ponders Afonso et al. (2005), investment can be

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[1] The assessment of the effectiveness of public policies can be addressed indirectly by the evaluation of composition of spending. However, a more accurate analysis only may be done considering each policy separately, on a micro level. For more details of this approach, see Mandl et al. (2008).

productive or unproductive for growth depending on the efficiency of the projects (not building "white elephants") and institutional framework in which it is carried out.

Some other studies also found that public expenditures, especially on human capital and research and development (Romer, 1990), that secure property rights and the rule of law (Keefer and Knack, 2002), on education programs (Barro, 1991), and on health policies (Kneller et al., 1999; Bloom et al., 2001) can expand growth.

4.2. Evaluating quality of public expenditure and its limitations

The impact of public spending on economic goals such as growth and equity is difficult to assess because of the complex chain of linkages, time lags involved and interdependence among the targets (Paternostro et al., 2005).

Proper measurement of public sector efficiency is usually a complicated task. It gets harder due to the difficulty in accounting the value of outputs according to input costs, lack of empirical work that seeks alternate measures and, above all, with the difficult of comparing aggregate data to quantify the effects produced by the outcomes of public sector and their full costs associated.

Moreover, as Afonso et al. (2005) explain the evidence on economic growth of the composition of spending crucially depends on the quality of available data. Empirical studies on the macroeconomic level frequently have to be made using highly aggregated components of public spending, sometimes leading to ambiguous results.

They also add that instead of looking at the more disaggregated spending level, empirical analysis often have to use intermediate impact indicators, which present a feasible relation to growth, but do not produce definitive evidence.

5. Methodology to measure the quality of public expenditure of RS

Since the development of the endogenous models of economic growth in the 1980s, by Romer (1986) and Lucas (1988), many different studies have tried to examine the quality of public expenditure, understood as the composition of public spending and effectiveness of public policy, and its impact on economic development (Barro, 1990). The present work is based on this wide range of studies in order to assess the quality of public expenditure in Rio Grande do Sul State and measure the impact on its economic growth.

Two different methodologies were developed in this work. Both are primarily quantitative in nature, but also have a qualitative approach.

5.1. Approach and data

As already explained in section 3.1, this research focus in one aspect of the quality of expenditure only – the composition of public spending. The approach used in this research is mostly quantitative, performed through statistical analysis.

This analysis is divided in two different approaches, one descriptive and other explanatory. The descriptive analysis is based on the work of Barro and Sala-i-Martin (1995), Devarajan et al. (1996), Kneller et al. (1999) and Afonso et al. (2005). These studies were used to determine ex-ante which component of spending is productive or unproductive.

On the other hand, the explanatory analysis begins with the assessment of the relationships between variables (using a correlation matrix) and reaches the multivariate calculations with use of econometric models of linear regression. This approach allows an ex-post analysis of the expenditure components, determining which component of spending is productive or unproductive. The statistical technique of regression selected in this study has the purpose to calculate the level of sensitivity between the components of public expenditure and economic growth. According Paternostro et al. (2005), "the understanding of these relationships is fundamental to good public expenditure policy."

The empirical analysis uses mostly secondary data from 1986 to 2009 to examine the link between government expenditure and economic growth. This data is provided by the National Treasury Secretariat of Brazil (Secretaria do Tesouro Nacional – STN) and by the Foundation of Economics and Statistics of RS (Fundação de Economia e Estatística – FEE)[2].

To analyze the economic growth of RS state, one uses the per capita GDP growth from 1986 to 2009. The explanatory variables are related to public expenditure, categorized in three different ways, following the works of Devarajan et al. (1996), Kneller et al. (1999) and Paternostro et al. (2005):

1) Total public expenditure of RS as a share of GDP

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[2] For the descriptive analysis, it is used data from 1989 to 2009 due to accounting problems in previous years.

2) Economic Classification of expenditure, which aims to provide elements to assess the economic effect of transactions in the public sector. It is clustered in two types of outlays:

   a. Capital: payments on purchasing or producing a new or existing good. Spending on building a new hospital or a new road, or on assets like cars, computers and furniture. For this paper, this category in also divides two groups: Investments and Debt Amortization

   b. Current: payments on items that are consumed and only last a limited period of time, used up on the process of providing a good or service. It includes wages and salaries, expenditure on stationery, medicines for health service and interest payments. This category is divided in three groups: Wages and Salaries, Interest Payments and Other Current Expenditures.

3) Functional Classification of expenditure, which seeks to answer the purpose or function toward government action is directed. In this paper it is used the following functions:

   a. Heath

   b. Education

   c. Public Security

   d. Transportation (as a measure for infra-structure)

With these data, one tries to evaluate the quality of expenditure and attempt to determine which components of public spending have shown to be productive in RS.

5.2. Empirical analysis and econometric model

As mentioned in the latter section, the first analysis is based only in descriptive data from RS state. It is used the evolution of public expenditure since 1989 in its different categories to show if RS is improving the quality of its spending during the last years. Tables and graphs are constructed to show whether the RS governments are spending more on productive outlays. It is possible to discriminate the spending on this way, following Barro and Sala-i-Martin (1995), Devarajan et al. (1996), Kneller et al. (1999) and Afonso et al. (2005). Therefore, the ex-ante definition of productive and unproductive expenditure follows this structure[3]:

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[3] There is a lot of discussion about which component of expenditure is productive or unproductive, but this paper uses only the ones that have some consensus in the economic literature.

Productive expenditures:

a) Health

b) Education

c) Public Security

d) Transportation

Unproductive expenditures:

a) Retirement and pensions (as a measure for Social Security)

b) Interest payments

Productive expenditure is considered here in a strict way: an expenditure that enhances the physical or human capital or the component of public expenditure that an increase in whose share will raise the steady-state growth (Devarajan et al., 1996). Yet the unproductive expenditures are the one that its rise will lower the steady-state growth.

Our second approach is an explanatory analysis, which aims to explain the relationship between public expenditure composition and growth of per capita GDP for RS. It is used, as basic reference, the model developed by Devarajan et al. (1996), which has the great merit of not defining a priori which component of spending is productive or unproductive.

The model allows to test whether the share allocated to the different components of public expenditure today is associated with greater future growth. Each component of spending in total government expenditure, then, is the explanatory variables. To control for the level of public expenditure, it also includes the share of government spending in GDP. According to Devarajan et al. (1996), this allows to control the effects of expenditures financing on growth, which is a function of the level of spending.

In the model, they assume a production function with three arguments: the stock of private capital, k, and two types of public spending, g1 and g2. If the production function has constant elasticity of substitution (CES), then:

$$y = f(k, g_1, g_2) = [\alpha k^{-\zeta} + \beta g_1^{-\zeta} + \gamma g_2^{-\zeta}]^{-1/\zeta}$$

where $\alpha > 0, \beta \geq 0, \gamma \geq 0, \alpha + \beta + \gamma = 1, \zeta \geq -1$

The government finances its expenses using a fixed tax rate on income, *t*:

$ty = g_1 + g_2$

The share, Φ (0 ≤ Φ ≤ 1), of total government spending that is allocated to g1 is given by:

$g_1 = Φ \, ty$ and $g_2 = (1- Φ) \, ty$

The typical agent chooses consumption, c, and capital, k, to maximize his level of well-being, taking government's decisions as given:

$$U = \int_0^\infty u(c)e^{-pt}dt$$

Subject to k = (1- t) y - c, where p is the rate of time preference.

According to Devarajan et al. (1996), assuming that the utility function has constant elasticity, in order to obtain analytical solutions, it is derived the relationship between steady-state growth rate and share of government spending aimed to g1. After this, is possible to determine that productive spending is the one that leads to an increase in steady-state growth rate of economy. This definition implies that for a change in the composition of the expenditure increase the growth rate,

$$\frac{\varnothing}{1-\varnothing} < \left(\frac{\beta}{\gamma}\right)^\theta$$

where Φ = 1/(1+ ζ) is the elasticity of substitution.

Thus, the impact of a composition change on growth depends not only on the productivity of the two components of spending (β and γ), but also of their initial shares. A change in composition towards a more theoretically productive spending, for example, β > γ, may not lead to an increase in growth rate if share in total (Φ) initially was already "too high".

Also according to the model, the increased growth rate resulting from the change on the spending composition can occur without any change in total spending. Since an increase in total expenditure must be financed by the same amount of taxes, an increase on the growth rate only will happen if the productivity of that expenditure (β + γ) is greater than the revenue needed to finance it[4].

So, the relationship between expenditure composition and economic growth can be estimated by regressing the per capita GDP growth of RS on the different types of

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[4] For the mathematical deduction of this result, as well all the model details, see the original article – Devarajan et al. (1996).

public spending. Since the objective is to evaluate how each component of public spending is associated with the growth rate, the shares of each component in total government spending perform as explanatory variables. Following the Devarajan et al. (1996), the model also includes the portion of government spending in GDP in order to control for the level of the expenditure.

The basic equation for this work is the following:

$Y_t = \alpha + \beta_1 (\text{TE/GDP})_t + \beta_2 G_t + \varepsilon_t$

where

Y_t is the moving average *per capita* real GDP growth for RS state five-year forward;

α is the constant;

$(\text{TE/GDP})_t$ is the share of total government expenditure in GDP at time t;

G_t is a vector with the share of each type of public expenditure in the total expenditure at time $t;$ and

ε_t is the residual.

The five-year forward moving average of per-capita GDP growth for the dependent variable is chosen to reflect the fact that "public expenditures often take time before their effects on output growth can be registered" (Devarajan et al., 1996), and also to eliminate fluctuations caused by shifts in public policies. It means that, in this analysis, the spending in t affects the growth between t+1 and t+5.

The vector Gt is compound by many different types of public expenditure, following essentially the economic and the functional classification. From the economic classification, it is used the current and capital expenditures, and their subgroups: wages and salaries, interest payments and other current expenditures, from current expenditures; and debt amortization and investments, from capital expenditures.

From the functional classification, the vector includes expenses on education, health, public security and transportation. Besides that, it also includes a specific variable that is considered unproductive – retirement and pensions.

In the regression, the method used is the ordinary least squares (OLS), which obtains parameter estimates that minimize the sum of squared residuals. This tool allows analyzing how a single dependent variable is affected by several independent variables.

With this regression, the influence of each independent variable (explanatory variables of growth) on the dependent variable (per capita GDP growth) is tested. In addition, each regression generates a Coefficient of Determination (denoted by R^2), that is the proportion of variance explained by the model. This correlation, usually, is less than one, because there are many factors that determine the relationships between variables in real life[5].

6. Results

### 6.1. Composition of public expenditure

This section explores the results of the analysis about the quality of expenditure of Rio Grande do Sul from the methodology described in the previous section. The first assessments are only descriptive, but they already show traces that will be discussed in details in the explanatory analysis further on.

The first graph illustrates the expenditure of RS classified from an economic standpoint. Since 1989, it is possible to notice an increasing trend in the current expenditures (net of interest payments) facing a decreasing movement of capital expenditures. The current expenses were around 80% of the total expenditures in the beginning of the series, falling to almost 70% in 1992-93 and 1998. However, after 1999 this expenditure reached a plateau close to 90%, remaining at that level until 2009.

The capital expenditure had the exact opposite variation, higher in the 1990s, almost reaching 30% in some years, but falling to merely 10% in the last decade. As the literature indicates that capital spending is important to economic growth, this data shows the public sector in RS is not performing well in this matter.

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[5] It is important also to explain that when you estimate using the ordinary least squares (OLS), must pay attention to the violation of the assumptions of classical regression model under penalty of incurring biased estimators and even inconsistent. Thus, tests will be applied to detect the presence of autocorrelation and heteroskedasticity. If necessary, appropriate corrective action would be taken.

Graph 1 - Current and Capital Expenditures – 1989-2009
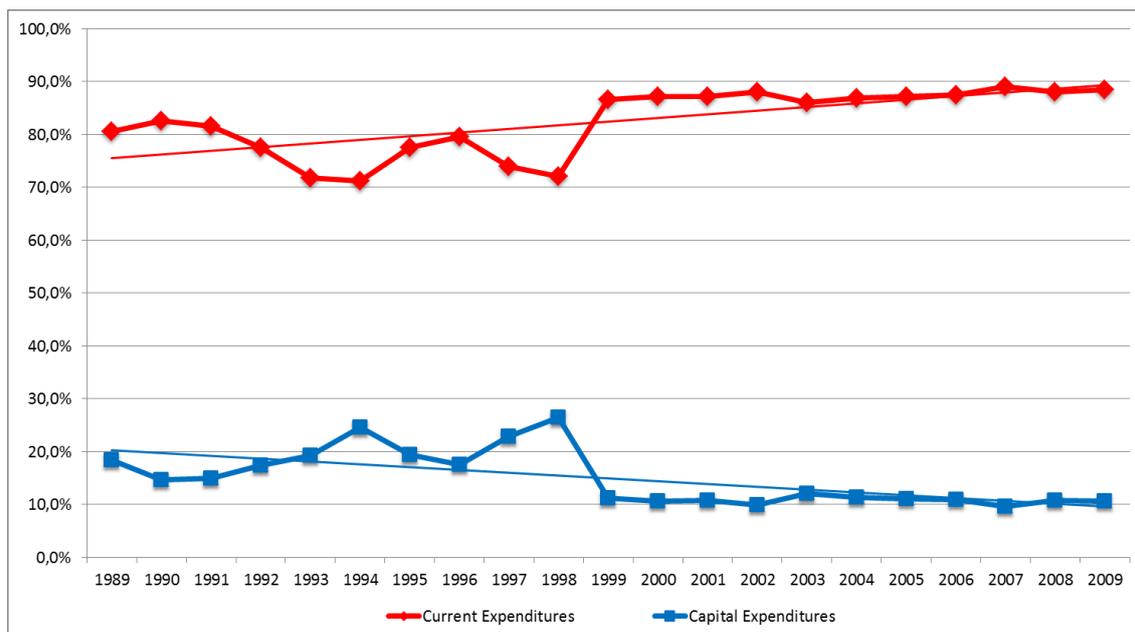
Source: Secretariat of Finance of Rio Grande do Sul

In the Graph 2, it is analyzed deeply three important groups of expenditures – Wages and Salaries, Debt Amortization and Investments.

The Wages and Salaries here also include the payment for retired servants. This group had an impressive growth in this last 20 years. After 1993, this kind of expenditure rose from 26% of total expenditure to 51% in 2009, whereas this percentage reached 54% in 2003 and 2007.

On the other hand, the participation of the other two groups fell in the same period. The Debt Amortization has been stable since 1999, after the renegotiation with the federal government, around 8% since then. However, before this period, this payment had reached 19% in 1994.

According to the growth literature, investment expenditure is associated with positive effects on economic development. Nevertheless, in RS, the share of this spending is falling in the last 20 years, mostly in the last decade. While the average investment was about 5% of total expenditure between 1989-1999, in the next 10 years it fell to around 3%.

Graph 2 - Wages and Salaries, Debt Amortization and Investments Expenditures – 1989-2009
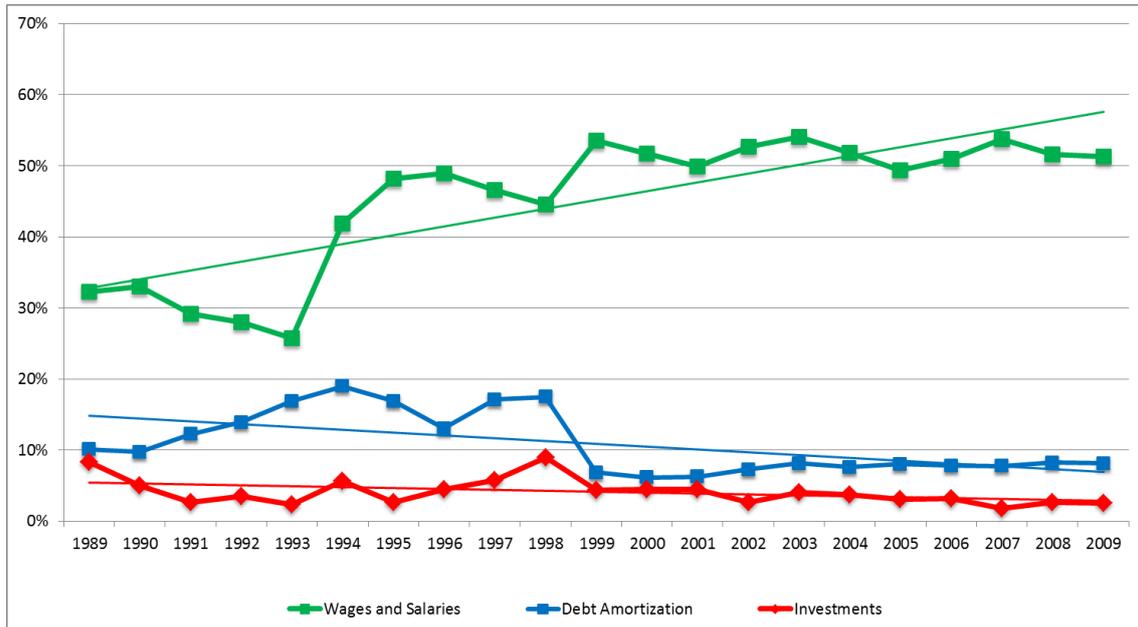
Source: Secretariat of Finance of Rio Grande do Sul

Graph 3 presents a close look to the investments of RS. There is a clear downward trend in the last two decades. The investment reached 8% in 1989 and 9% 1998, but fell to 2% in 2007, the worst year of the series.

Graph 3 - Investments Expenditures – 1989-2009
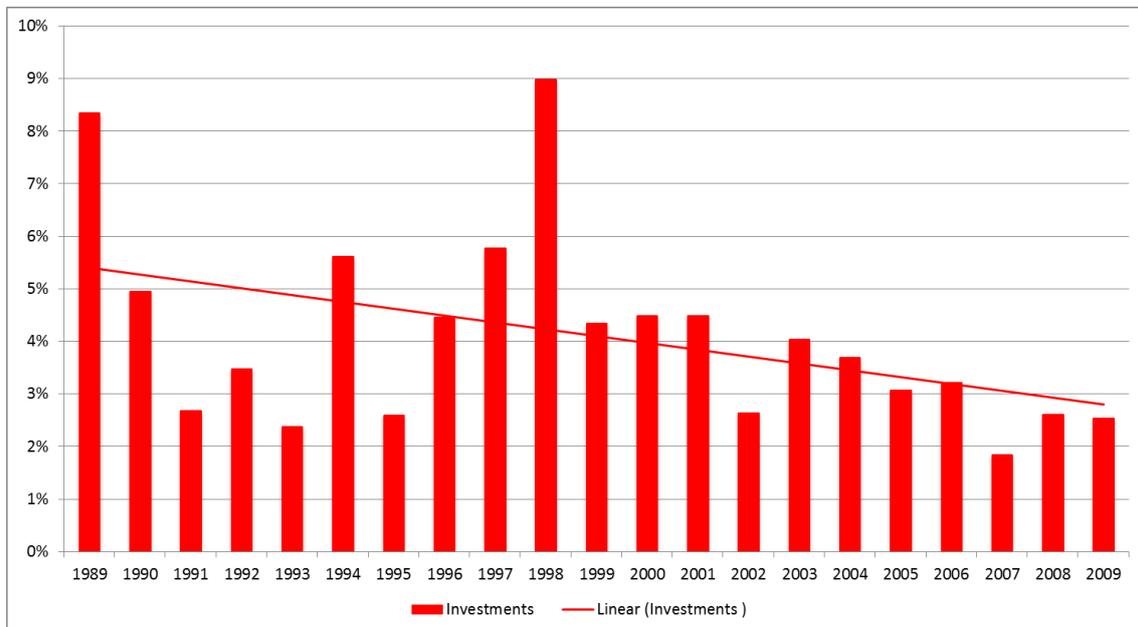
Source: Secretariat of Finance of Rio Grande do Sul

Now one starts to look at the expenditure with a different perspective. Following the methodology, we have set an ex-ante definition of productive and unproductive expenditure. Therefore, the next analyses follow this definition settled in the previous section.

The next graph shows the evolution of productive and unproductive public expenditures of RS. One notices that the productive expenditure is more variable throughout the years. In the series, this variation was around 17%, with the best year being 1990 – 43% – and the worst being 1996 – 26%. However, as the trend line shows, there was a decline in this expenditure. This tendency is not deeper due to recovery occurred in the last two years. In 2009, the productive expenditure reached 39% of total expenditure.

On the other hand, the unproductive spending seems to be more stable, but with a soft upward trend in the last two decades. The only significant variation was between 1993 and 1998, falling form 28% to 20%, but this could be only an accounting error. After this, the unproductive expenditure average was around 25% in the last years.

**Graph 4 - Productive and Unproductive Expenditures – 1989-2009**
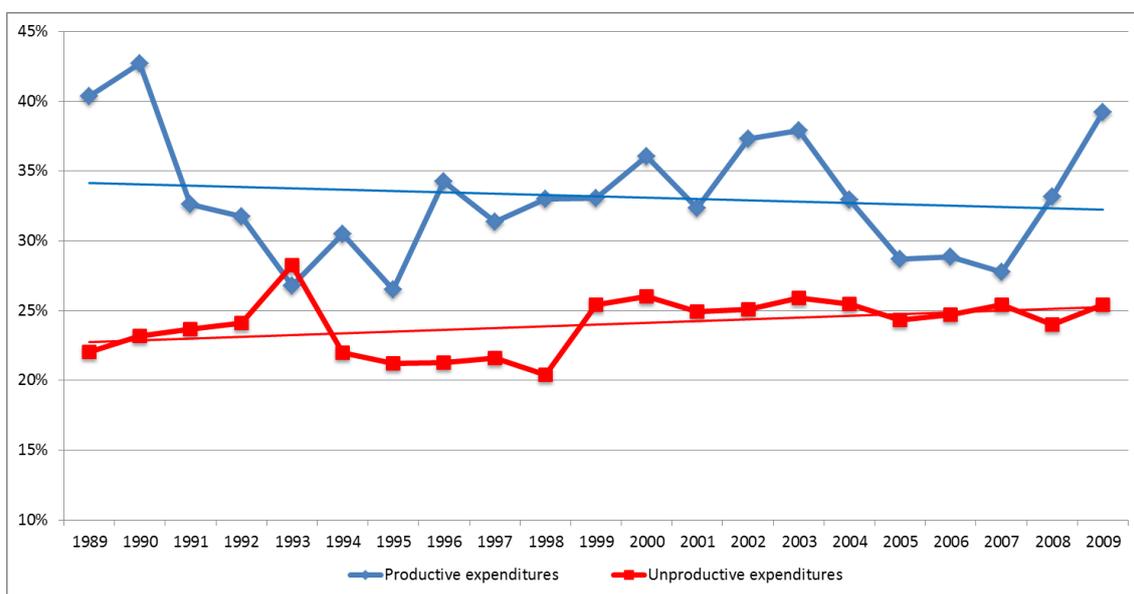
Source: Secretariat of Finance of Rio Grande do Sul

The previous analysis explored the productive and unproductive expenditures on an aggregated level. Now one begins to focus on the components of these expenditures. The next graph shows the evolution of all different kinds of productive spending. As one can see, education is the largest share of the productive spending in every single year. In 2009, it represented 18% of total expenditure.

The second most represented productive spending in recent years is health, with 10% participation in 2009. Its evolution in the last two decades was impressive. In 1989, this spending had only 2% share of the total budget. Almost the same as health expenditure is public security, with 9% in 2009, the third largest share of productive expenditure. Over the years, it has been stable, not escaping from the historical average of 7%.

The one that has fallen most is transportation. From around 7% of the budget in the first decade on average, it fell to 3% in the last 10 years. As infrastructure is an important engine for growth, this result reflects a problem the RS governments have been facing.

Graph 5 - Education, Health, Public Security and Transportation Expenditures – 1989-2009
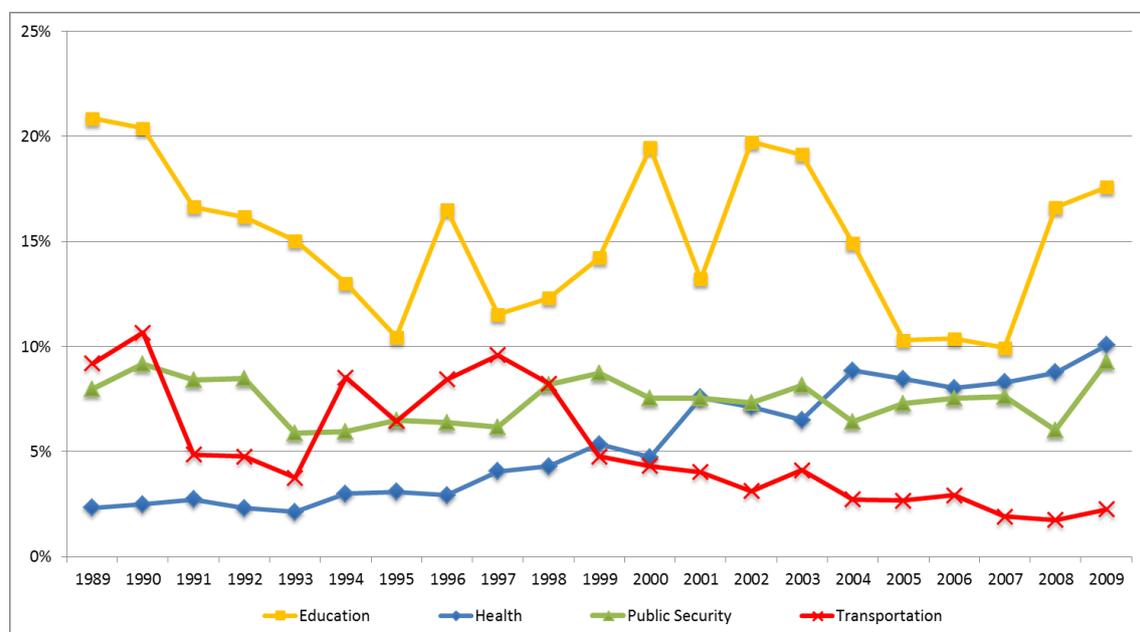
Source: Secretariat of Finance of Rio Grande do Sul

Exploring the details of each productive spending, one is able to understand the level and trends of these outlays. Education is the largest expenditure of RS. Its variation over the years is substantial. However, a decreasing tendency is very clear. The downward slope is not even stronger due to the recovery in the last two years, causing the spending level to return to the past levels after three years of expenditures around 10%. In 2009, the share rose to 18%. Even so, the amount is still below the level of two decades ago, which was around 21%.

Graph 6 - Education Expenditures – 1989-2009
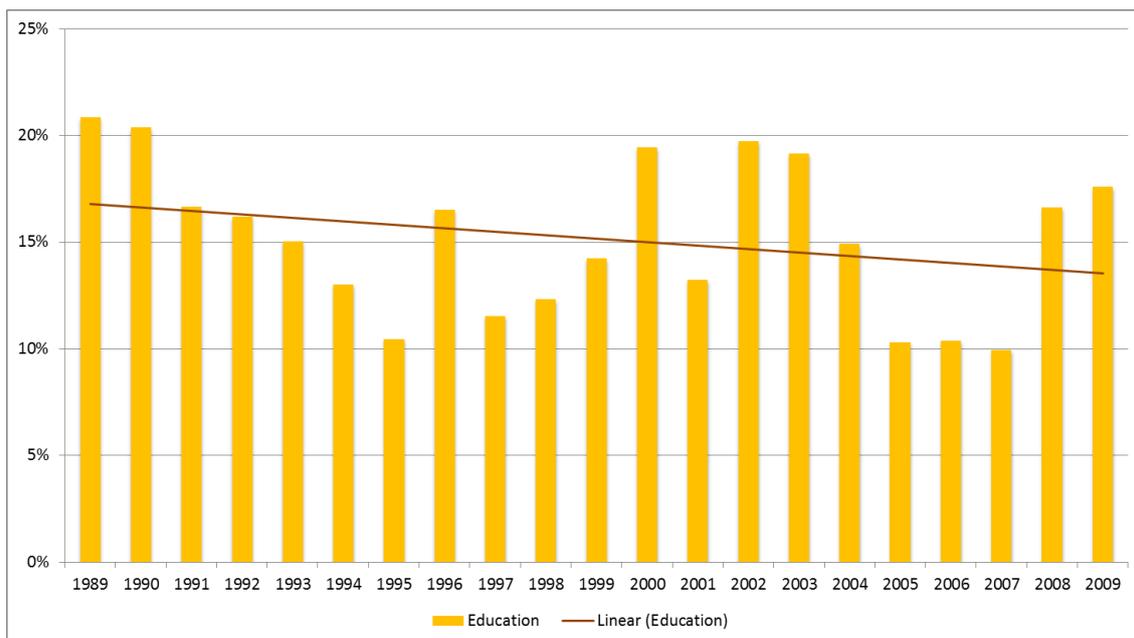
Source: Secretariat of Finance of Rio Grande do Sul

The most impressive growth is in health expenditure. There was an almost constant progression since the beginning of the series, causing the expenditure to rise from 2% in 1989 to 10% in 2009. This increase was probably due to the increase of resources transferred from the federal government in order to improve the states' population health, mostly after 1996 with the Brazilian health care system regulation[6].

Graph 7 - Health Expenditures – 1989-2009
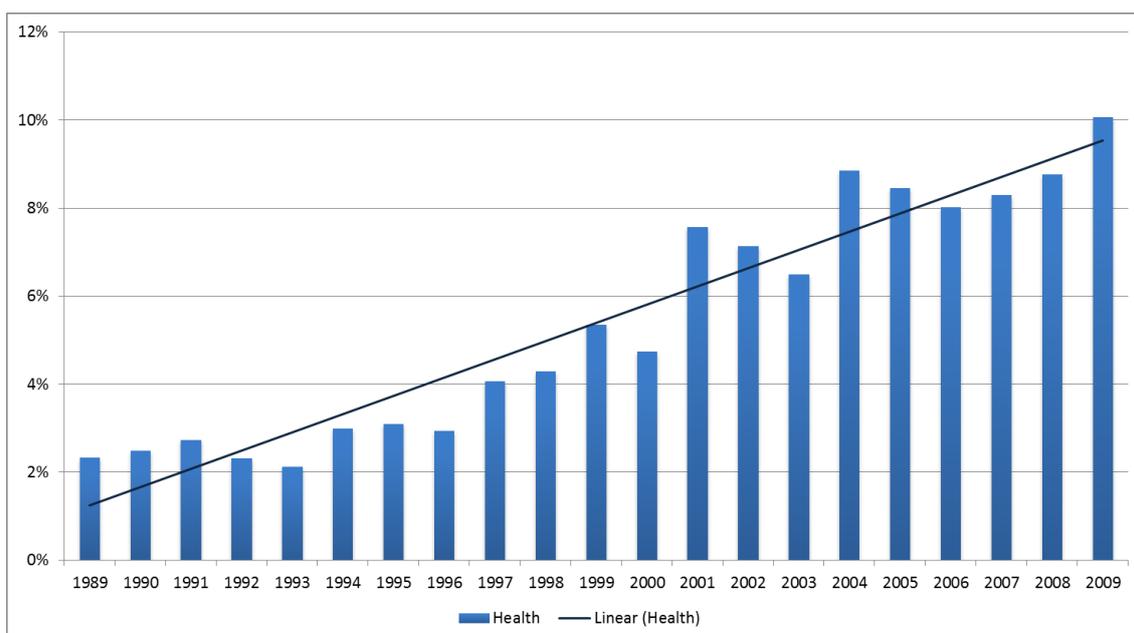
Source: Secretariat of Finance of Rio Grande do Sul

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[6] In 1996, there was the redefinition of the management model of SUS (Sistema Único de Saúde), the Brazilian health care system.

The share of expenditure in public security remained practically stable during the last two decades – 7% on average. The problem of this stability is not only the possible modest effect on economic growth but also the lack of investment on this sensible area. Crime has been increasing in the last years, but the spending in public security is not keeping the same pace.

Graph 8 - Public Security Expenditures – 1989-2009
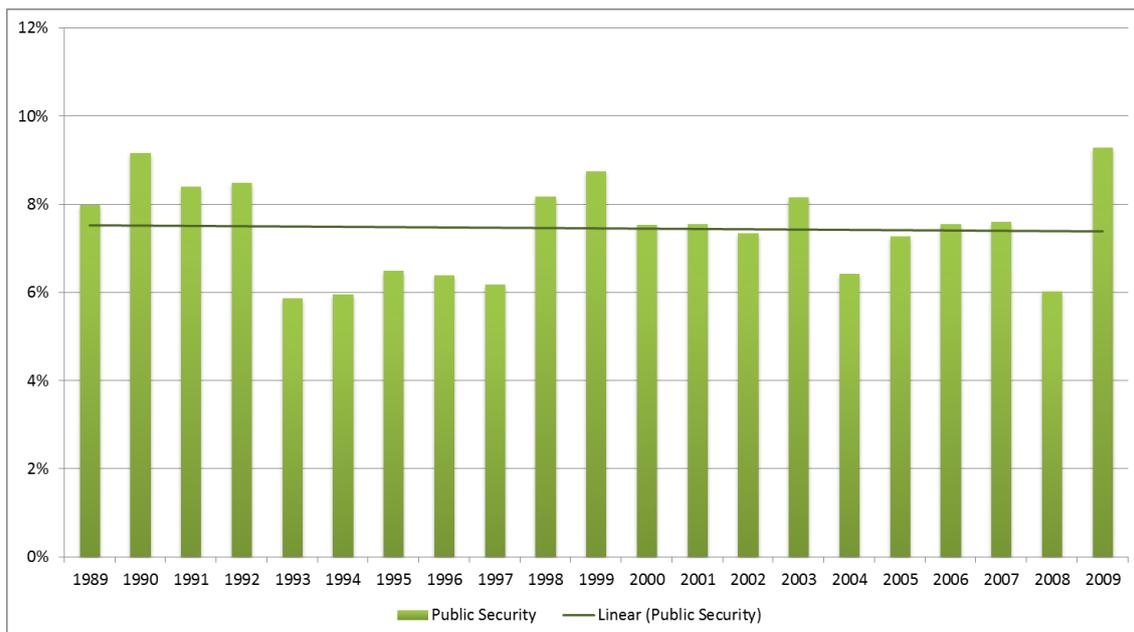
Source: Secretariat of Finance of Rio Grande do Sul

The last productive expenditure analyzed here is the spending in transportation, being as a measure of infrastructure. Unlike health, this spending was the one that had declined most in the last 20 years. In 1990, the level of transportation was 11% of total expenditure, but has fallen since then, reaching 2%. Considering the recent economic literature, investment in physical capital has capacity to affect the long-term growth. Therefore, the absence of investment in transportation could undermine growth, due to lack of construction of new highways or maintenance of the existing roads, for example.

Graph 9 - Transportation Expenditures – 1989-2009
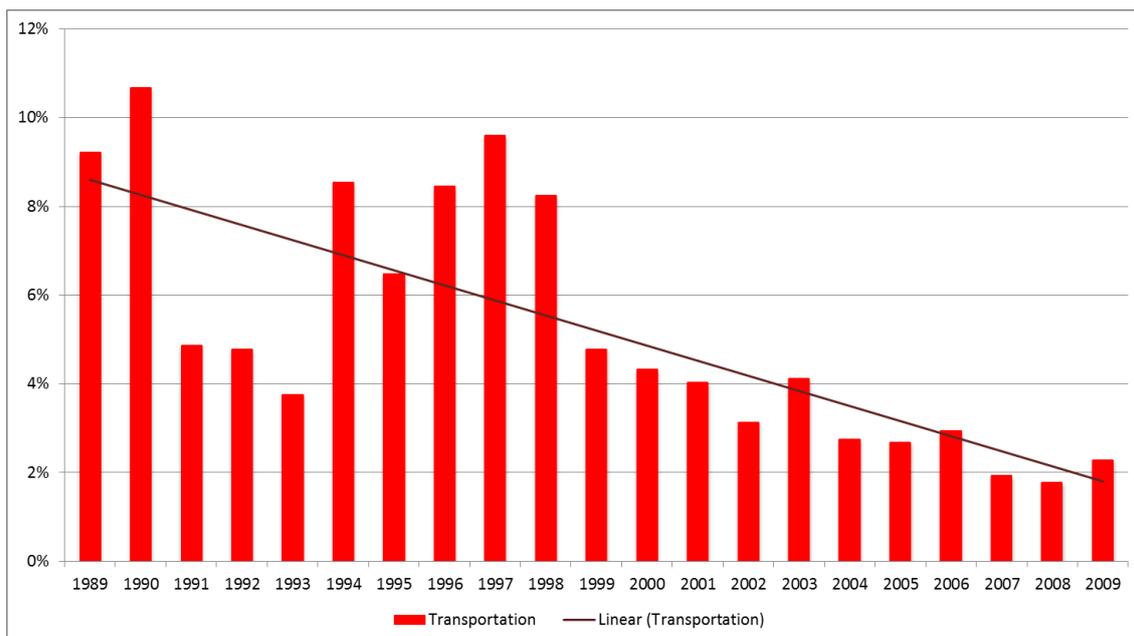
Source: Secretariat of Finance of Rio Grande do Sul

Analyzing now the unproductive expenditures in detail, each one has a different situation. The spending in retirement and pensions, as a measure for Social Security, is considered unproductive for economic growth because this outlay does not lead to any provision of public goods and services. There is an upward trend in this expenditure in the last years, mainly due to an increase on the spending average in the last decade, when it jumped from 19% to 23% of total expenditure of RS.

The share of interest payment, though, has a downward trend in the last years, mostly after 1994 when the Brazilian stabilization plan, called "Plano Real", came into effect. Before this plan, the payment on interest reached 9% in 1993. Since then, the average on interest payment was around 2%.

Graph 10 - Retirement and pension and Interest payments Expenditures – 1989-2009
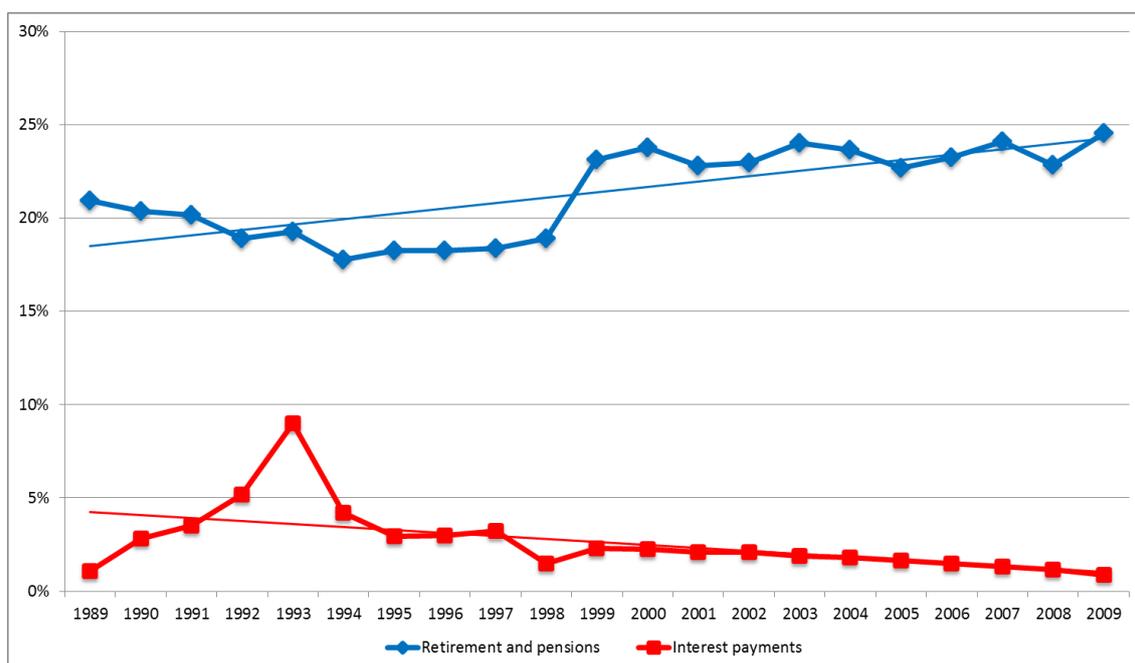
Source: Secretariat of Finance of Rio Grande do Sul

6.2. Impact on economic growth

After the descriptive analyses, this section examines the explanatory analysis, focusing on correlation between variables and econometric regression analysis, as already explained in methodology.

It begins with the correlations between the variable to be explained – per capita GDP growth of RS – and the explanatory variables – the different classification of public expenditure. From this analysis, it is possible to have an idea of which variables are related linearly with the GDP growth and what direction is this association.

First, however, it is important to explain that the variables that have a linear association do not necessarily have a cause-effect relation between them. It is always essential to qualify the quantitative information to assert if that linear relation makes sense according to the existing economic theories. Sometimes two distinct events without any realistic link between each other, purely by accident, end up showing a close statistical association[7].

The first table of this section (Table 1) shows the correlation between *per capita* GDP growth of RS and the different kinds of public expenditure used in this research.

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[7] Such phenomenon is called in statistics "spurious correlation".

According to the correlation matrix, only three variables are significantly correlated to the GDP growth at the 5% level – Current Expenditures, Retirement and Pensions and Interest payments. If one raises the significance level to 10%, it is possible to include also Health, Public Security and Unproductive Expenditures in this group.

Although not all variables prove to be statistically significant, it is possible to observe the direction of the linear relationship. The participation of Total Expenditure on GDP shows a negative relation with GDP growth, very weak though. That is, according to the theoretical literature, the level of public expenditure of RS is above the optimal level, because the increasing amount of expenditure is diminishing growth.

However, the correlation index of Current and Capital Expenditures are not in line with the developed models of economic growth. The relation between current spending and growth is positive and powerful, while the relation between capital spending and growth is negative and weak.

When one disaggregates this spending in smaller groups, it is possible to observe other interesting results. Investments in RS have a positive relation with growth, but its volume is very low. Productive and unproductive expenditures are consistent with the literature, showing positive and negative correlation, respectively.

Only two subgroups show results not consistent with literature: Education and Retirement and Pensions. The first one has a negative correlation with GDP growth, maybe demonstrating that this spending is not being done in a cost-effective way. Nevertheless, the positive correlation of retirement and pensions probably occurs because the governments in RS are increasing this kind of spending over the year due to the pressure of public servants and the increase in tax revenues occurred from the economic growth. Further studies are needed prove this, though.

It is also necessary to point out the high positive correlation of the Health and Public Security and the negative correlation of Interest payments with *per capita* GDP growth.

However, the correlation index only shows some evidence of causality between the variables and economic growth. One needs to go beyond trying to find clear-cut answers.

Table 1 - Correlation GDP Growth and Public Expenditures

	per capita GPD t+5	
	Pearson Correlation	Sig. (2-tailed)
Total Expenditure/GDP	-,052	,827
Current Expenditures	,567[**]	,009
Wages and Salaries	,229	,331
Other Current Expenditures	,235	,319
Capital Expenditures	-,157	,507
Investments	,050	,836
Debt Amortization	-,209	,376
Productive expenditures	,166	,485
Education	-,025	,917
Health	,436	,055
Public Security	,418	,067
Transportation	-,265	,259
Unproductive expenditures	-,437	,054
Retirement and pensions	,493[*]	,027
Interest payments	-,559[*]	,010

[**]. Correlation is significant at the 0.01 level (2-tailed).
[*]. Correlation is significant at the 0.05 level (2-tailed).
N = 20

To understand the sources of economic growth better in RS and verify the quality of the public expenditure, one uses explanatory analyses. With them, it is possible to explore the relationship between public expenditure composition and growth of per capita GDP for RS and look for causality effects in this link. Through the coefficients obtained in the regression analysis, it is possible to observe the influence of each variable (public expenditures) on the dependent variable (per capita GDP growth).

The next table (Table 2) presents the first regression results taking as dependent variable the GDP growth and independent variable current expenditure (net of interest payments), according to the econometric model proposed in the methodology section.

In this first model, the regression coefficient of current expenditure is positive, 0,119, and statistically significant[8]. It means that a unit increase in this ratio increases the five-year forward moving average *per capita* real GDP growth of RS state by around 0,12 percentage points. However, this finding is not in line with many studies,

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[8] Considering the level of significance of 5%. In this case, P-value is lower than 5%.

e.g. Barro (1990) and Gupta et al. (2005), that found current spending is associated with lower per capita growth.

Nevertheless, according to Devarajan et al. (1996) who found the same result as this study, this could happen if the current spending is below a certain level that makes it productive. In addition, as they explain, "several components of current expenditure, such as operations and maintenance, may have higher return than capital expenditures".

In addition, the effect of government spending level on per capita growth is negative, but statistically insignificant. Therefore, the deadweight loss generated by the taxation needed to finance this spending is greater than the productivity of government spending. This is probably because the level of total expenditure of RS is above an optimal level, resulting in diminishing returns to scale, crowding out the private sector and decreasing productivity.

Another important point to emphasize in a regression analysis is the coefficient of determination, represented by R squared (or R^2). This coefficient expresses the proportion of variability in a data set that is accounted by the statistical model, providing a measure of how well the model is likely to predict future outcomes.

In this first regression, the value of this coefficient is 0.288. It means that the influence of explanatory variable on the dependent variable is considerable – current spending explains 28,8% of the variability of GDP.

Table 2 - Regression GDP Growth and Current Expenditures

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	-,060	-1,844	,083
TE/GDP	-,196	-1,047	,310
Current Expenditures	,119	3,097	,007

Dependent Variable: per capita GPD t+5
Adjusted R Square: 0,288

Table 3 reports that relationship between the capital component of public expenditure and per capita growth is negative, but this coefficient is statistically insignificant. Once again, this contradicts the theoretical models of economic growth. Public spending in capital goods is supposed to increase the stock of physical capital. Moreover, in combination with private-sector investments, public spending would increase productivity and causing favorable growth effects.

This does not mean that public capital expenditures of RS have a negative impact on economic growth. There are two explanations for this point. First, as the

objective of this paper is to evaluate the composition of expenditure, an increase in capital expenditure has to be higher than in current expenditure to lead to an increase in the share of capital in total expenditure. Second, the level of capital expenditure is much smaller than the current expenditure in RS and is decreasing over the years. Therefore, an increase in this share could not be sufficient to alter the growth rate since this amount invested is still too small.

Table 3 - Regression GDP Growth and Capital Expenditures

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	,021	,802	,434
TE/GDP	-,024	-,104	,918
Capital Expenditures	-,043	-,629	,538

Dependent Variable: per capita GPD t+5
Adjusted R Square: -0,089

In order to understand the effects better of current and capital expenditures on per capita GDP growth, one should disaggregate them in two groups. The current spending is divided in Wages and Salaries and Other Current Expenditures. Both are in line with the aggregate model, presenting positive coefficients and being statistically significant. As explained before, this contradicts the main findings in the recent literature of growth. However, this may happen if those expenses are allocated in such way they can generate returns in human capital and productivity, and hence economic growth.

Table 4 - Regression GDP Growth and Wages and Salaries and Other Current Expenditures

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	-,075	-1,537	,144
TE/GDP	-,099	-,332	,744
Wages and Salaries	,112	2,689	,016
Other Current Expenditures	,137	2,370	,031

Dependent Variable: per capita GPD t+5
Adjusted R Square: 0,251

When disaggregated into two groups – Investments and Debt Amortization – the capital expenditure shows diverse answers although both are statistically insignificant. The Investments coefficient is positive here. This result is different from the capital expenditure model and is in line with the theoretical literature, which holds that the expenses in physical capital good can enhance economic growth. However,

this impact seems to be low, because a unit increases in Investments rise only 0,09 units of GDP growth rate.

Yet, Debt Amortization has negative effect on growth, which is predictable since spending does not provide any new public goods or services, but only repays the debt accumulated by the State.

Table 5 - Regression GDP Growth and Investments and Debt Amortization

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	,019	,708	,489
TE/GDP	-,019	-,082	,936
Investments	,090	,458	,653
Debt Amortization	-,080	-,929	,367

Dependent Variable: per capita GPD t+5
Adjusted R Square: -0,120

Next, it is necessary to analyze the relationship between composition of expenditure and growth according to the functional classification of spending and to the clustering spending as productive and unproductive.

The first examination in this idea is about productive expenditure and GDP growth. As explained before in the methodology, spending considered productive are those carried out in education, health, public security and transportation.

However, the coefficient presented in Table 6 does not show significant impact on growth. The impact of productive expenditure is positive, but small, and is statistically insignificant.

Table 6 - Regression GDP Growth and Productive Expenditures

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	-,004	-,101	,921
TE/GDP	-,023	-,101	,920
Productive expenditures	,056	,665	,515

Dependent Variable: per capita GPD t+5
Adjusted R Square: -0,086

Unproductive expenditure, though, demonstrate a negative impact on GDP growth, being statistically significant. Its coefficient is relatively substantial and goes in accordance with what economic authors say – that unproductive expenditure can undermine growth.

Table 7 - Regression GDP Growth and Unproductive Expenditures

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	,093	2,547	,021
TE/GDP	-,331	-1,503	,151
Unproductive expenditures	-,168	-2,599	,019

Dependent Variable: per capita GPD t+5
Adjusted R Square: 0,202

The next investigation decomposes the productive and unproductive in functional levels of spending, seeking to further understand the sources of growth. The explanatory model tries to find evidence of causality between expenditure shares according to functional classification and per capita GDP growth. One finds that Health, Public Security and Transportation spending have a positive impact on growth, but only Health and Public Security are statistically significant[9].

The coefficient of Health indicates that one percentage point increase in the share of health expenditure could lead to 0,34 percentage points in economic growth. For public security this number is even higher, a 0,64 percentage point impact. Both have significant impact according to the model.

Here, the impact of transportation, being a proxy for spending in infrastructure, spending is positive on growth, but is statistically insignificant and has a small coefficient. As explained before when analyzing capital expenditure, it is not possible to affirm that investments in public infrastructure (mainly physical capital goods), like roads, bridges, airports and ports, have any impact on the economic development of RS.

Public spending in education has a negative coefficient, statistically insignificant though. This expenditure could be understood as a proxy for investments in human capital, which according to the endogenous growth models, could enhance the productivity of labor and, hence, economic growth. However, for RS state, this seems not to be true.

One of the problems is that the classification of educational spending includes all different kinds of outlays, such as schoolbooks, teacher training, retirement, and pensions. Therefore, not all of these expenses could be associated with human capital investments. Another problem could be that the educational public policies of RS are not effective in improving the education outcomes.

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[9] Considering level of significance of 10%.

In addition, all of these variables together produce a coefficient of determination of 0.220, meaning that the influence of explanatory variables on the variability of GDP is 22,0%.

Thus, when observing these public expenditures, there is a relative importance for the economic growth of RS. To ensure public safety and health, for example, the state could be providing a favorable environment for the development and expansion of economic activity on the part of private agents, which promotes growth.

Here again, the effect of total government spending on growth is negative and not statistically significant.

Table 8 - Regression GDP Growth and Education, Health, Public Security and Transportation

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	,000	-,010	,992
TE/GDP	-,307	-1,169	,262
Education	-,101	-,922	,372
Health	,337	1,750	,102
Public Security	,637	1,885	,080
Transportation	,034	,206	,840

Dependent Variable: per capita GPD t+5
Adjusted R Square: 0,220

When investigating the unproductive spending, it reveals that only one part of it has a significant impact on growth – Interest payments. The interest payment is a fee paid by the government for borrowing money in the past. It does not provide any real good or service; it is only a financial spending. According to the economic literature, the interest payment can affect growth if its level supports budget deficits, which could prevent the government from investing in essential areas.

In the model, the Interest payments negatively affect the per capita GDP growth. The coefficient is statistically significant and shows that a percentage point increase in this spending led to a decrease of 0,14 percent of GDP growth.

Retirement and pensions, though, has a positive impact but it is not statistically significant, so it is not possible to affirm that this spending influence the per capita GDP. As already explained, this expenditure probably is more a consequence than a cause of growth.

Table 9 - Regression GDP Growth and Retirement and pensions and Interest payments

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	,034	,807	,432
TE/GDP	-,325	-1,630	,123
Retirement and pensions	,108	,779	,448
Interest payments	-,143	-2,397	,029

Dependent Variable: per capita GPD t+5
Adjusted R Square: 0,347

The final model includes all the productive and unproductive expenditures in one regression. This model was the one with higher adjusted R Square, 0,443, i.e., 44% of the variability on per capita GDP growth rate is explained by the variability of independent variables. Therefore, this model seems to be the best one to explain the RS economic growth.

Including all variables, the coefficients change from previous models due to the interaction between the variables and the different adjustment to the dependent variable. Only education spending is statistically non-significant and, therefore, cannot explain growth. Besides that, its coefficient is very small, even positive. Transportation expenditure is significant only if the level of significance is 20%, so it is not possible to say that it influences the GDP growth. Moreover, its coefficient is negative.

Expanding the level of significance to 15%, it can be said that health and retirement and pensions are statistically significant, but with opposite influence on GDP growth. Health, in this model, has a higher explanatory power than the previous one, with coefficient of 0,472. On the other hand, retirement and pensions has a negative effect on GDP growth, unlike previous models. Here, controlling for the effect of other variables on the dependent variable, the retirement and pensions seems to have a negative impact on growth. Kneller et al (1999) already pointed out this effect when they said the major 'unproductive' expenditure group is social security expenses.

Public security and Interest payments presented similar results to previous models. Both are statistically significant to explain growth, Public Security having considerable positive effects and Interest payments, negative.

Finally, for the first time, the share of total government expenditure in GDP has a statistically significant negative coefficient, -0,512. It means that an increase in 1% of the participation of public spending in GDP reduces the per capita GDP growth rate by 0,51 percent. As explained before, this effect could be due to the volume of public expenditure that has exceeded a certain optimal point. Devarajan et al. (1996) explain

the deadweight loss produced by the taxation needed to finance this expenditure is greater than the productivity of the public spending.

Table 10 - Regression GDP Growth and Education, Health, Public Security, Transportation, Retirement and pensions and Interest payments

Explanatory variables	Coefficients	Stat t	Sig. (p-value)
(Constant)	,141	1,952	,075
TE/GDP	-,512	-2,152	,052
Education	,046	,369	,719
Health	,472	1,590	,138
Public Security	,591	1,847	,090
Transportation	-,234	-1,344	,204
Retirement and pensions	-,572	-1,580	,140
Interest payments	-,201	-2,750	,018

Dependent Variable: per capita GPD t+5
Adjusted R Square: 0,443

7. Conclusion

The present study aimed to explore the concepts of public expenditure, especially regarding its quality, and its effects on economic growth, particularly from the state of Rio Grande do Sul (RS). The analysis of the expenditure quality can be divided into two different fields: composition of spending and effectiveness of policies. This article sought to investigate only the composition of spending and its effects on economic development.

According to the latest theoretical models of economic growth – endogenous growth models – the composition of government spending plays an important role, mainly through outlays that increase human capital and labor productivity, thereby leading to raise the steady-state growth rate.

However, the link between quality of public expenditure, more specifically its composition, and economic growth is not easily observed in real life and its evaluation is not a simple task to accomplish. Several models have been developed over recent years providing important clues to the causes of economic growth, but there is no manual yet. There are countless variables, including public spending, working at the same time and influencing the development of a country or state.

Thus, a quantitative analysis was developed to explore the quality of public expenditure of RS – measured by its composition – and economic growth of the state.

Despite the restrictions presented in the literature for this kind of analysis, it was possible to obtain some interesting results.

Analyzing the evolution of productive and unproductive expenditure in the last twenty years, one can observe a reduction trend in productive expenditure and an increase in unproductive expenditure as a share of total public spending. This decrease on productive expenses was caused primarily by the downward trend of education spending and of infrastructure investments, especially on transportation. However, the health spending increased in the last two decades, due to the evolution in management of the Brazilian public health system and in federal transfers to states, avoiding a more expressive reduction in productive expenditure. Since the rise of unproductive expenditures was primarily due to the increase in the number of retirees and people recovering pension, thus overshadowing the fall in interest payments during the last two decades.

This result exposes signs that the government spending of RS has not been carried out effectively towards a greater economic development. This also reflects the severe public finance crisis that RS has passed, leading to the decrease of spending in areas that may boost physical and human capital and thus greater economic development.

Exploring in detail the composition of public expenditure on RS and its relationship to economic growth with a more sophisticated methodology – correlation analysis and linear regression – it was possible to identify which government spending has effectively produced consequences on economic growth.

The results revealed some important indications. The current expenditures of RS have a positive influence on growth. Regarding its subgroups, wages and salaries and other current expenditures, both have the same positive effect. This fact may be occurring because they are being allocated effectively to produce economic growth. However, on the other hand, this effect might be the opposite, i.e., the current expenditures are not causing greater economic growth but rather the GDP growth is generating a rise in tax revenue, thus making room for a higher level of public spending.

Capital expenditures showed no effect on the state's economic growth in the last two decades, though. The results for investments and debt amortization also showed that these categories of expenses have not affected the economic development of RS. The explanation for this finding could be that the level of capital

expenditure is too small in RS over the recent years, not being sufficient enough to alter the GDP growth rate.

In relation to productive spending, only health and public security seem to influence growth positively. Since spending on education and transportation may not have been carried out effectively according to the analysis results. Regarding unproductive expenditures, the results show that retirement and pensions are not generating effects on economic growth. However, the influence of interest payments seems to be significant, adversely affecting economic growth in recent years.

The latter result obtained was regarding the effect of government spending weight to economic growth. According to results, the volume of public expenditure in RS seems to be above an optimal level, because its effect on growth is significantly negative.

Thus, this article aimed to explore the quality of public expenditure of RS, especially on its relationship to economic growth. In general, it is clear that the state of RS has reduced the share of some productive spending in the last two decades, mainly in education and infrastructure; and increased the amount of unproductive expenditures, especially in retirement and pensions.

However, from the regression analysis one observed that some of the expenses of RS do not seem to be influential in its economic growth, despite which is touted in the literature. Investments, for example, have shown to have no influence on economic growth, as education does. This can demonstrate that such outlays are not being conducted in an effective manner, perhaps due to elaboration or definition problems of the undertaken policies on these areas or difficulties in implementing the proposed programs and projects.

Given this, public agents have the challenge to make public expenditure more productive, generating the greatest economic growth possible, thus benefiting the whole population. This task, however, is extremely complex. Further studies still must be developed to support managers in decision-making process of allocating public spending to engender economic development, enhancing quality of life and the well-being of citizens. This study aimed to contribute in this issue, since public spending should be performed as effectively as possible, always seeking to improve the living standard of population.

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Appendix I – Shares of Public Expenditure in the Total Expenditure of RS

Table 11 – Share of Current Expenditures and its Subgroups in the Total Expenditure

Year	Current Expenditures	Wages and Salaries	Interest Payments	Other Current Expenditures
1989	81,6%	32,3%	1,1%	48,3%
1990	85,3%	33,0%	2,8%	49,5%
1991	85,1%	29,2%	3,5%	52,4%
1992	82,6%	28,0%	5,2%	49,5%
1993	80,8%	25,7%	9,0%	46,0%
1994	75,5%	41,9%	4,2%	29,4%
1995	80,5%	48,1%	3,0%	29,4%
1996	82,5%	48,9%	3,0%	30,6%
1997	77,2%	46,6%	3,2%	27,4%
1998	73,5%	44,6%	1,5%	27,4%
1999	88,8%	53,5%	2,3%	33,0%
2000	89,4%	51,7%	2,2%	35,4%
2001	89,3%	49,9%	2,1%	37,3%
2002	90,1%	52,7%	2,1%	35,3%
2003	87,9%	54,1%	1,9%	31,9%
2004	88,7%	51,8%	1,8%	35,1%
2005	88,9%	49,4%	1,7%	37,9%
2006	89,0%	51,0%	1,5%	36,6%
2007	90,4%	53,7%	1,3%	35,4%
2008	85,3%	49,4%	1,1%	34,8%
2009	91,2%	40,7%	0,7%	49,8%

Source: Secretariat of Finance of Rio Grande do Sul

Table 12 – Share of Capital Expenditures and its Subgroups in the Total Expenditure

Year	Capital Expenditures	Investments	Debt Amortization
1989	18,4%	8,3%	10,1%
1990	14,7%	4,9%	9,7%
1991	14,9%	2,7%	12,2%
1992	17,4%	3,5%	13,9%
1993	19,2%	2,4%	16,9%
1994	24,5%	5,6%	18,9%
1995	19,5%	2,6%	16,9%
1996	17,5%	4,5%	13,0%
1997	22,8%	5,8%	17,1%
1998	26,5%	9,0%	17,5%
1999	11,2%	4,3%	6,8%
2000	10,6%	4,5%	6,2%

2001	10,7%	4,5%	6,2%
2002	9,9%	2,6%	7,3%
2003	12,1%	4,0%	8,1%
2004	11,3%	3,7%	7,6%
2005	11,1%	3,1%	8,0%
2006	11,0%	3,2%	7,8%
2007	9,6%	1,8%	7,7%
2008	14,7%	2,5%	12,2%
2009	8,8%	2,1%	6,7%

Source: Secretariat of Finance of Rio Grande do Sul

Table 13 – Share of Productive Expenditures and its Subgroups in the Total Expenditure

Year	Productive expenditures	Health	Education	Public Security	Transportation
1989	40,4%	2,3%	20,9%	8,0%	9,2%
1990	42,7%	2,5%	20,4%	9,2%	10,7%
1991	32,6%	2,7%	16,6%	8,4%	4,9%
1992	31,7%	2,3%	16,2%	8,5%	4,8%
1993	26,8%	2,1%	15,0%	5,9%	3,8%
1994	30,5%	3,0%	13,0%	6,0%	8,5%
1995	26,5%	3,1%	10,4%	6,5%	6,5%
1996	34,3%	2,9%	16,5%	6,4%	8,4%
1997	31,4%	4,1%	11,5%	6,2%	9,6%
1998	33,0%	4,3%	12,3%	8,2%	8,2%
1999	33,1%	5,3%	14,2%	8,7%	4,8%
2000	36,0%	4,7%	19,5%	7,5%	4,3%
2001	32,4%	7,6%	13,2%	7,6%	4,0%
2002	37,3%	7,1%	19,7%	7,3%	3,1%
2003	37,9%	6,5%	19,1%	8,2%	4,1%
2004	32,9%	8,9%	14,9%	6,4%	2,7%
2005	28,7%	8,4%	10,3%	7,3%	2,7%
2006	28,9%	8,0%	10,4%	7,6%	2,9%
2007	27,8%	8,3%	9,9%	7,6%	1,9%
2008	33,2%	8,8%	16,6%	6,0%	1,8%
2009	39,2%	10,1%	17,6%	9,3%	2,3%

Source: Secretariat of Finance of Rio Grande do Sul

Table 14 – Share of Unproductive Expenditures and its Subgroups in the Total Expenditure

Year	Unproductive expenditures	Retirement and pensions	Interest payments
1989	22,0%	20,9%	1,1%
1990	23,2%	20,4%	2,8%
1991	23,7%	20,2%	3,5%

1992	24,1%	18,9%	5,2%
1993	28,3%	19,3%	9,0%
1994	19,3%	15,1%	4,2%
1995	21,2%	18,2%	3,0%
1996	21,3%	18,3%	3,0%
1997	21,6%	18,4%	3,2%
1998	20,4%	18,9%	1,5%
1999	25,4%	23,1%	2,3%
2000	26,0%	23,8%	2,2%
2001	24,9%	22,8%	2,1%
2002	25,1%	23,0%	2,1%
2003	25,9%	24,0%	1,9%
2004	25,5%	23,7%	1,8%
2005	24,3%	22,7%	1,7%
2006	24,7%	23,2%	1,5%
2007	25,4%	24,1%	1,3%
2008	23,0%	21,8%	1,1%
2009	21,0%	20,3%	0,7%

Source: Secretariat of Finance of Rio Grande do Sul