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# Private investment in transportation infrastructure in Brazil: the effects of state action

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## Abstract

**Purpose** – The purpose of this paper is to discuss the impacts of the investment programs created by the Brazilian federal government on private investment in transportation infrastructure (crowding-in effect).

**Design/methodology/approach** – The study used two quantitative techniques of data analysis: cluster analysis and panel data analysis.

**Findings** – The results show that the investment programs created by the Brazilian federal government were successful in attracting private agents to invest in transportation infrastructure in the country. This effect is observed even in the cases of programs focused on public investments.

**Research limitations/implications** – Advancing the research area that seeks to assess the impact of public policies is the main practical and social implications of the papers. As a research limitation we can highlight that need for a comparison to other country investment's public policies.

**Practical implications** – Performance of public policies.

**Social implications** – Economic development.

**Originality/Value** – The paper discusses the effects of the Brazilian Federal Government programs for infrastructure investment in the private investment in the country (investment in transportation infrastructure). The issue is relevant for policies makers.

**Keywords** Investment, Infrastructure, Public policies

**Paper type** Research paper

## 1. Introduction

Contrary to the traditional argument that investments in logistics infrastructure is the duty of the state, some emerging countries have experienced a clear upward trend in private investments in transportation infrastructure, especially since the beginning of the 1990s (World Bank, 2015a, b, c, d). Along with this increasing participation of the private sector, economic liberalism claims that the state should limit itself to setting rules in favor of private investments, since its presence in the production sector would restrict the action of private investors in the economy, the so-called crowding-out effect (see e.g. The Heritage Foundation, 2015).

However, recent studies such as that of Mazzucato (2014b) claim otherwise: that governments that run the economy directly have a relevant role and capacity to create and shape new markets, directing the private sector's action, the so-called crowding-in effect (attraction).

This paper aims to discuss this issue, seeking to make a headway in relation to the theoretical approaches regarding the role of the state, based on the Brazilian experience in the infrastructure sector. Thus, based on theoretical references addressing investments and the New Institutional Economy, this paper seeks to answer the following research question:

*RQ1.* Have the state's investment programs in transportation infrastructure had any positive effects on private investment in Brazil since the 1990s?

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The results are based on two quantitative techniques of data analysis: cluster analysis and panel data analysis. The cluster analysis is used to find, based on data from the World Bank (2015a, b, c, d), countries that are similar to Brazil for the panel data analysis. The panel data analysis compares these countries, making it possible to find out the impacts of public policies on private investments.

The second part of this paper includes discussions about the relationship between public policies and private investments, with emphasis on the transportation infrastructure sector. The methodology used – cluster analysis and panel data analysis – is described in Section 3. The results are shown in Section 4. Finally, the conclusions are discussed in Section 5.

## 2. Public policies and private investments

The relationship between investments and the characteristics of the institutional environment is already consolidated in the academic literature (Acemoglu and Robinson, 2012; North, 1990). The main argument is that strong institutions stimulate economic development through a better allocation of resources (Besley and Ghatak, 2010) and inclusive institutions (Acemoglu and Robinson, 2012) evolve and change to minimize transaction costs (Williamson, 1985).

The academic literature also has plenty of studies evidencing that institutions do in fact matter. North and Weingast (1989), for instance, show that the establishment of stronger institutions with well-defined property rights stimulated England's economic growth with the Glorious Revolution of 1688. By analyzing investments in two regions of Ghana, Besley (1995) argues that institutions influence the level of investments made. Pongeluppe and Saes (2014) reconfirm this hypothesis by showing that less secure institutional environments tend to receive less investments.

According to The Heritage Foundation (2015), market openness, regulatory efficiency, government size, and rule of law are the principles of economic freedom. In economies with great economic freedom, state action or government control that interferes with individual autonomy limits economic freedom (The Heritage Foundation, 2015). By fulfilling the role of setting the rules for private investments, the state must act transparently, ensuring equal opportunities to all individuals in a society.

Following liberal thought, The Heritage Foundation (2015) claims that the state is the most efficient agent in supplying the so-called “public goods” (national defense, for example) and that its action beyond the necessary level limits economic freedom, thereby reducing investments. “Government provision of goods and services beyond those that are clearly considered public goods also imposes a separate constraint on economic activity, crowding out private-sector activity and usurping resources that otherwise might have been available for private investment or consumption” (The Heritage Foundation, 2015). This crowding-out effect, in which private agents no longer make investments in the presence of public investments, due to the competition for resources, among other factors, is discussed considering the Brazilian economy in the studies conducted by Sonaglio *et al.* (2010) and Jacinto and Ribeiro (1997). In this theoretical model, state action must therefore be effective only to “correct” existing market failures, investing in public goods and creating market mechanisms to internalize external costs (pollution, climate change).

Opposed to this argument, Mazzucato (2014a, b) advocates that unlike the crowding-out effect on private investments, governments, through public policies, have the role and the capacity to create and shape new markets (crowding-in effect). The author shows that major advances in different sectors of the economy would not have happened in the same way without the state's decisive role in boosting the sectors, through a direct action. Together with the private sector, the state acts by sharing investment risks and benefits, focusing on reducing

market failures and on boosting innovation-mission-oriented public investments. Mazzucato (2014b), arguing about the development of these sectors, emphasizes that “the State leads the growth process rather than just incentivizing or stabilizing it” (Mazzucato, 2014b, p. 92).

The controversy – public investments result in a crowding-out (or crowding-in) effect on private investments – will be tested for the Brazilian case in the transportation infrastructure sector. This is a sector that has been historically under the responsibility of the public sector.

### *2.1 Investment in transportation infrastructure: public and private investment*

There is a consensus in the literature that investment in infrastructure is a prerequisite for economic development. Romminger *et al.* (2014) indicate that there is a causal relationship between public investments in transportation and GDP growth. Aschauer (1989) shows that public expenditure on infrastructure stimulates the productivity of the economy, a fact that is also argued for by Fernald (1999). These studies are focused on evaluating public investments in the sector, since it involves large investments with characteristics of public good.

The participation of the private sector in infrastructure projects is a growing phenomenon, not exclusive to the transportation segment and to Brazil. The increased number of countries that invest through partnerships with private entities, as well as the increased number of investment projects, are indicators of this phenomenon.

The growth trend in the flows of private investments in Latin American countries has also gained significant importance in the literature, especially as to how this subject correlates with international capital investments. Forte and Santos (2015), for example, highlight the fact that Latin American countries have very different levels of economic development and show, based on cluster analysis, that groups of countries with better performance in certain variables (institutional and economic) attract greater flows of foreign investments.

Other studies focused on Latin American countries show that private investments are also boosted with: higher levels of aid for education in the country (Donaubauer, Herzer, and Nunnenkamp, 2012); higher levels of economic freedom and a lower political risk (Amal and Seabra, 2007); and appreciation of local currency and inflation control/reduction (Baingo, 2013).

Freitas and Prates (1998) show that Argentina, Brazil, and Mexico were the Latin American countries that received most of the foreign capital invested since 1990. As for investments in transportation, the target sector of this study, Brazil, India, and China are the three countries that carried out the most investment projects in partnership with the private sector between 1990 and 2014 (World Bank, 2015a, b, c, d). In addition to Brazil, Mexico, Argentina, Colombia, and Peru are countries in the Latin America and the Caribbean region that appear in the ranking of the ten countries that had the most investment projects in transportation infrastructure with the participation of private agents (World Bank, 2015a, b, c, d).

It should be noted that, since 1990, the private sector has been increasingly present in investments in transportation infrastructure. This growth can be seen in the total group of countries, according to data from the World Bank (2015a, b, c, d), and also when the analysis addresses Latin American countries only. Campos Neto (2014) notes that in 2013 private investments in transportation infrastructure in Brazil already surpassed federal public investments. This growth is a part of a special moment resulting from the launch of public programs aimed at the infrastructure sector and, in particular, the transportation sector.

### *2.2 Investment programs in infrastructure in Brazil: PAC and PIL*

In Brazil, the public policies related to investments in infrastructure are also related to the creation of a positive image of the Brazilian governments (Abreu and Camara, 2015). This is not only due to the impacts generated by the economic-social development provided

by the investment, but also by the political visibility that this type of public policy generates for the government. According to Abreu and Camara (2015), “public policies for infrastructure are great vectors of political alliances with segments of society and political leaders.” Despite the numerous programs historically created by the Brazilian Government, this paper focuses on discussing the possible effects resulting from the Growth Acceleration Program (PAC) and the Logistics Investment Program (PIL).

According to the Ministry of Planning (2015), the PAC, created during President Lula’s second term, in 2007: “[...] promoted the resumption of planning and execution of major social, urban, logistics and energy infrastructure projects in the country, contributing to its accelerated and sustainable development.”

The scope of PAC’s investments covered the segments of social and urban infrastructure, logistics infrastructure, and energy infrastructure (Ministry of Planning, 2015). In the logistics segment, the program includes investments in highways, railways, ports, waterways, and airports. Data reported by the program show that public investments, which were approximately 1.62 percent of the GDP in 2006, rose to 3.27 percent in 2010.

In 2011, the second edition of the program was launched (PAC2). This program featured investments with public funds, through partnerships between the federal government and the state and municipal governments, without focusing on the investments made in partnerships with the private sector.

In 2012, the federal government created the PIL. Unlike the PAC, the PIL focuses on the significant increase of investments from the private sector in logistics infrastructure projects, aiming at the “renovation and integration of the Brazilian transportation system, in order to meet the growth demands of a country with continental dimensions” (Logística Brasil, 2015). The federal government believes that the existence of a consolidated demand for infrastructure is ideal to attract investors.

The program is structured to attract investments in transportation infrastructure in Brazil, creating mechanisms for investments in highways, railways, ports, and airports. Through these mechanisms, investments should reach in total R\$198.4 billion (Logística Brasil, 2015). The search for partnerships with the private sector is made through programs of highway concessions, railway concessions, and investment programs in ports and airports. The National Bank for Economic and Social Development (BNDES), Caixa Econômica Federal and Banco do Brasil are the three public banks that finance the works, in order to facilitate the development of long-term projects.

Based on the discussion regarding incentives for investments in the transportation infrastructure sector, the following research hypothesis will be tested:

*H1.* Public investments in the transportation infrastructure sector lead to a crowding-in effect on private investments.

### 3. Materials and methods

The analyses in this paper are based on data from the World Bank (2015a, b, c, d) regarding the participation of the private sector in investments in infrastructure projects – Private Participation in Infrastructure Database. The historical analysis consists of data pertinent to investment projects in transportation infrastructure that took place between 1990 and 2014, and includes more than 80 countries.

The ten countries with the largest private investments in transportation infrastructure between 1990 and 2014 were: Brazil (BRA), India (IND), China (CHN), Mexico (MEX), Turkey (TUR), Malaysia (MAL), Colombia (COL), Argentina (ARG), Russia (RUS), and Peru (PER). These countries are analyzed in this study.

Prior to the main analysis of this paper, a statistical technique was applied to segment the observations of the database into homogeneous groups. In this case, the “cluster analysis”

technique was used. According to Fávero *et al.* (2009), “the cluster analysis technique, also known as cluster analysis, is a statistical technique of interdependence that allows the grouping of cases or variables into homogeneous groups according to the degree of similarity between individuals, based on predetermined variables” (p. 195).

It is a descriptive data analysis technique used to identify similar elements based on their characteristics (Fávero *et al.*, 2009). This technique seeks to:

[...] Divide a large group of observations into smaller groups so that observations within each group are relatively similar (that is, so that they mostly have the same characteristics) and observations in different groups are relatively dissimilar (Lattin *et al.*, 2011, p. 215).

This technique is used with the purpose of finding, among the ten selected countries, those that are most similar to Brazil, to then analyze the influence of Brazilian public policies on attracting the private sector to make investments in transportation logistics in the country. For the identification of clusters between these countries, we used variables that captured, for each of the cases under analysis, characteristics of the institutional environment, size, logistics efficiency, and economic growth. The variables used in the model are:

- Property rights (*PR*): this indicator measures “the degree to which a country’s laws protect private property rights and the degree to which its government enforces those laws” (The Heritage Foundation, 2015). The index ranges from 0 to 100 and the higher the score, the greater the guarantees of property rights in a particular country.
- Investment freedom (*IF*): “In an economically free country, there would be no constraints on the flow of investment capital” (The Heritage Foundation, 2015). This index portrays the existing constraints on the flow of investment capital. It ranges from 0 and 100, and the higher the score attributed to a particular country, the smaller the constraints on private capital investment.
- Logistic efficiency (*LOG\_infra*): the logistic efficiency of each country was measured based on data from the Logistic Performance Index (World Bank, 2015d). These data are part of a global survey and measure logistic performance in most countries.
- Economic growth (*GDP\_growth*): economic growth was measured according to the variation of the gross domestic product between 1990 and 2014, in each one of the locations. Data were obtained from the World Bank database (World Bank, 2015a).
- GDP per capita (*GDP\_percapita*): GDP per capita was also a variable inserted in the cluster analysis. The figures are from 2014, obtained from the World Bank database (World Bank, 2015b).
- Size (*POP*): the size of the countries was measured based on the variable that measures the size of the population. The figures are from the World Bank (2015c) and refer to the total population of each location in 2014.

Still with respect to the cluster analysis, it should be noted that the SPSS software version 21 was used.

Based on the results from the cluster analysis, the statistical technique called “Panel Data” was used to measure the effects of the government programs created in the period of analysis. This technique of analysis is used in studies that pervade a group of individuals/cases over time (Gelman *et al.*, 1995). This method of analysis, according to Gelman *et al.* (1995), can be used to: “(1) increase the accuracy of the estimated parameters, (2) minimize the problems of multicollinearity, (3) provide possibilities to reduce estimation bias, (4) allow the specification of more complicated behavioral hypotheses, and (5) a more accurate prediction of individual results.”

Fávero *et al.* (2009), in addition to emphasizing the reduction of multicollinearity problems, also claim that one of the main characteristics of this technique is related to the higher number of observations to work with, and the subsequent increased degree of freedom of the analysis. Another relevant aspect related to this statistical technique is the control of individual heterogeneity. Baltagi (1995) shows that the heterogeneity of individuals, firms, states, and countries is taken into account in panel data analyses, which is not seen in studies using cross-section or time series analyses (in these cases, there is a greater risk of obtaining biased results).

Considering this point, the use of the panel data technique is adequate to achieve the goals of this study. Despite the cluster analysis to compare similar countries, there is still considerable variability among the cases considered, which will be taken into account throughout the analysis.

We used the fixed and random effect panel data analysis technique. The fixed-effect model, generically represented by the following equation, considers changes in the cross-sections over time:

$$Y_{it} = \alpha_i + \beta X_{it} + \mu_{it} \quad (1)$$

In this case, the intercepts of the observations (in this study: the countries analyzed) may be different, and these differences may be due to the peculiar characteristics of each observation (Fávero *et al.*, 2009). Therefore, the technique corrects eventual problems of endogeneity in the analysis.

In the random effects models, generically represented by the following equation, the explanatory variables that are constant over time are analyzed. This is important because this technique assumes that the unobserved effect is uncorrelated with the explanatory variables, unlike the fixed effects models:

$$Y_{it} = \alpha_i + \beta X_{it} + \mu_{it} + \epsilon_i \quad (2)$$

In an analysis that considers aspects of the institutional environment, which have little or no variation over shorter time horizons, the consideration of the random models is pertinent to this research.

A total of seven variables, including explanatory and control variables, were included in the panel data analysis. The variables *PR*, *IF*, *POP*, and *GDP\_growth* were included in this analysis and are the same variables that were included in the cluster analysis. The difference is that the panel data analysis considered the variation existing in these indicators, and the period of time analyzed was from 1995 and 2014.

Other three variables were included in the analysis, in order to measure the impact of Brazilian Government policies on private investments in transportation infrastructure. Applied to Brazil only, the variables *pac*, *pac2*, and *pil* refer to, respectively, the first edition of the PAC, the second edition of the PAC, and the PIL. All three variables were included in the model as dummy variables, in order to differentiate the previous periods and, if appropriate, after each of the existing government programs. The following periods (years) were assigned to each of the variables as follows:

- *pac*: 2007, 2008, 2009, and 2010;
- *pac2*: 2011, 2012, 2013, and 2014; and
- *pil*: 2012, 2013, and 2014.

Finally, the variable *inv* is the dependent variable of the model under analysis. This variable refers to investment data of the Private Participation in Infrastructure Database.

The panel data analysis was performed in the Stata software (version 12) and a total of four models were considered, in which the variables and main characteristics of each one are shown in Table I.

**4. Results and discussion**

For a better presentation, the results of the two statistical techniques applied were analyzed separately. Following the order of preparation of the analyses, the results of the cluster analysis will be shown and discussed first. Subsequently, the results of the panel data analysis will be explored.

*4.1 Cluster analysis*

The output of the cluster analysis divides the ten countries that received the most investments in transportation infrastructure from the private sector into five distinct groups, based on institutional, logistics infrastructure, size, and economic growth variables. In the division of groups, the variables *GDP\_growth*, *POP*, and *GPD\_per capita* were, respectively, the most discriminating of the cluster analysis.

Among the ten countries, Argentina and Russia were grouped in Cluster 1, and the variables *PR* and *IF* were the two most discriminating in the composition of this cluster. This result allows us to conclude that, among the characteristics of this group of countries, the institutional environment is the most common between the two countries.

Cluster 2 includes: Brazil, Malaysia, Mexico, and Turkey. *PR* and *LOG\_infra* are the two variables that had greater importance in the differentiation of this group compared to the others, with *IF* also having significant importance for such differentiation. In terms of *PR*, these countries are in the upper middle axis among the ten countries analyzed. Malaysia’s score was 55 (the highest *PR* in the ten countries of the sample), while the score of the other three countries was 50. With an average *PR* of 40.50, the common characteristic shared by the countries in this cluster is their high *PR* level.

The third cluster is composed exclusively of China. *GDP\_growth* and *POP* are, respectively, the two variables that most differentiated this cluster from the others, but it is worth noting that *LOG\_infra* and *PR* also had significant importance.

Cluster 4 includes Colombia and Peru. *IF* and *LOG\_infra* are the two variables that most contributed to the differentiation of this group. The institutional environment, with regard to investment freedom, is the main characteristic connecting these two countries in this cluster.

Finally, Cluster 5 is composed only of India. In this case, *GDP\_per capita* and *POP* were the two variables that, respectively, had greater importance in the segregation of this cluster and the others.

The above results provided a basis for the panel data analysis, whose results and discussions (focused on Cluster 2) are shown below.

*4.2 Panel data analysis*

The central aim of this analysis, Brazil, is included in Cluster 2, along with Malaysia, Mexico and Turkey, all of which share the most similarities in terms of: quality of the

Analysis ID	Type	Period of analysis	Variables included in the analysis
1	Fixed effects (FE)	From 1990 to 2014	<i>pil</i> , <i>pac</i> and <i>pac2</i>
2	Random effects (RE)	From 1990 to 2014	<i>pil</i> , <i>pac</i> and <i>pac2</i>
3	Fixed effects (FE)	From 1995 to 2014	<i>pil</i> , <i>pac</i> , <i>pac2</i> , <i>PR</i> , <i>IF</i> , <i>POP</i> , and <i>GDP_growth</i>
4	Random effects (RE)	From 1995 to 2014	<i>pil</i> , <i>pac</i> , <i>pac2</i> , <i>PR</i> , <i>IF</i> , <i>POP</i> , and <i>GDP_growth</i>

**Source:** Prepared by the authors

**Table I.**  
Characteristics of the models analyzed via panel data analysis

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institutional environment, logistics infrastructure, economic growth, population income and size. Despite these similarities and the fact that these four countries are among the top ten countries that received investments in transportation infrastructure from the private sector between 1990 and 2014, the investments during the period of analysis reported different behaviors, as shown in Figure 1.

Brazilian history with regard to investments in transportation infrastructure with the participation of the private sector can be divided into two main periods. The first period, with a more intense participation of the private sector, took place between 1996 and 1998. After this period, there was a reduction until 2007, when a second increase period began. During this second period, 2014 and 2012, respectively, were the years that had the largest volume of investments.

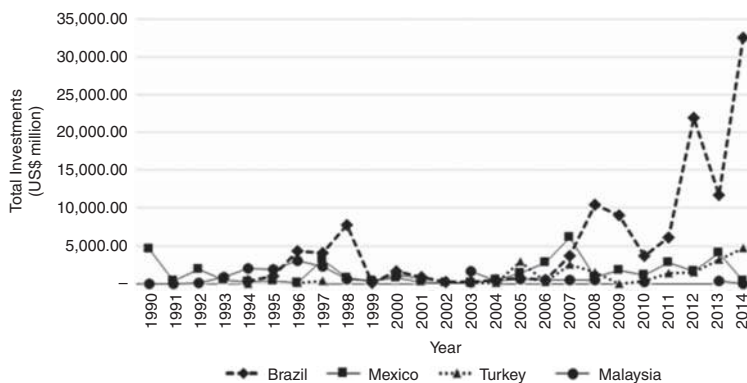
This increase was not seen in the same proportions when the focus of analysis includes the other countries that make up Brazil's cluster. In Mexico, the peak of investment contracts with the participation of the private sector in the period of analysis took place in 2007, followed by the second highest figures in 1990. After 2007, these investments became smaller, not exceeding US\$5 billion per year.

Turkey historically reported, from the beginning of the 1990s, a low rate of private investments in the sector. Between 2007 and 2014, there was an increase in private investments in transportation infrastructure. Despite this increase, the comparison with Brazil shows that this occurred on a much smaller scale. Investments in 2014 did not exceed US\$5 billion.

Finally, Malaysia is the country of Cluster 2 where the private sector reported the lowest participation in investments in transportation infrastructure in the period of analysis. The peak of private investments took place between 1994 and 1997, with average annual investments of approximately US\$2.2 billion.

In Brazil, the impact of the PAC and PIL policies on private investments in transportation infrastructure was measured by the panel data analysis, with fixed and random effects, the results of which are shown in Table II.

Analyzing the variables related to the investment programs proposed by the Brazilian federal government, both the PIL and the two editions of the PAC were decisive for attracting more private investments in transportation infrastructure. The results of Models 1, 2, 3, and 4 show that both programs reported positive results related to the level of private investments observed in Brazil, which made this country stand out in relation to the other countries in Cluster 2.



Source: Prepared by the author, with data from the World Bank (2015a, b, c, d)

**Figure 1.**  
Investments (in millions of US dollars) with the participation of the private sector in the four countries of Cluster 2

Variables	1 (FE) inv	2 (RE) inv	3 (FE) inv	4 (RE) inv
<i>Pil</i>	15,956.67*** (7.88e-12)	15,956.67*** (2.15e-12)	15,607.54*** (266.5926)	15,653.65*** (377.1464)
<i>Pac</i>	4,906*** (3.11e-12)	5,314.733*** (166.3739)	5,010.836** (1,423.562)	5,145.866** (301.2842)
<i>Pac2</i>	4,335*** (3.15e-13)	4,743.733*** (166.3739)	4402.612* (1,722.561)	4,545.86* (293.2709)
<i>PR</i>			-30.30076 (63.51252)	-19.97773 (47.81636)
<i>IF</i>			23.08131 (14.75322)	13.57039 (9.305702)
<i>POP</i>			4.33e-06 (7.35e-05)	2.95e-06 (2.97e-06)
<i>GDP_growth</i>			-1,510.897 (1,779.451)	-1,328.966 (1,759.246)
Constant	1,449.35*** (6.09e-13)	1,401.267*** (166.3739)	1,515.575 (9,380.598)	1,583.263 (2,916.21)
<i>R</i> <sup>2</sup> (within)	0.7122	0.7119	0.7155	0.7152
<i>R</i> <sup>2</sup> (between)	0.9900	0.9900	0.9893	0.9974
<i>R</i> <sup>2</sup> (overall)	0.7630	0.7632	0.7670	0.7681
Number of observations	68	68	68	68
Number of groups	4	4	4	4

**Table II.** Results of the panel data analysis for the proposed models

Notes: \**p* < 0.1; \*\**p* < 0.05; \*\*\**p* < 0.001

Source: Prepared by the author, based on the results of the analysis

The results of these four models also show that the PIL plays an even more decisive role in the increase of private investments in infrastructure. This fact is in line with the purposes of this investment program, which is to attract the private sector to invest in strategic sectors in Brazil, as is the case of the transportation infrastructure sector. In all the analyses, the coefficient of the results of variable *pil* is considerably higher than the coefficients related to the variables *pac* and *pac2*, which assigns a greater importance to the PIL in attracting the private sector.

In relation to PAC (first and second edition), the results show that although the program focuses on investments made by the state (federal government, in partnership with states and municipalities), the fact that priority is given to the infrastructure sector in the country is also decisive in attracting the private sector to make investments. The level of significance found in the models does not allow us to discredit the importance, albeit indirectly and at a lower level, of these investment programs promoted by the government in stimulating investments from the private sector. Thus, *H1* is not rejected.

Therefore, the answer to the central question proposed in this paper (*RQ1*) is affirmative. The analysis shows that there has been, in fact, a positive effect of Brazilian Government programs initiated in the 1990s in attracting private agents to invest in transportation infrastructure.

These aspects are in line with the theory proposed by Mazzucato (2014a, b), which says that the state plays an important role in directing particular sectors of the economy. The “institutionalization of investments,” expanding the sources of funding, in addition to the public commitment to the sector under analysis, directs the business community to make investments. The comparison between countries in Cluster 2, in which countries are quite similar in relation to the quality of the institutional environment and logistics infrastructure, for example, shows this differential role that states may play.

It is also worth noting that the creation of infrastructure investment programs depends on the availability of funds from the public treasury. As mentioned by Abreu and Camara (2015), the PAC uses public budget for its implementation, in partnership with states and municipalities. This same dependence is attributed, to a lesser extent, to the PIL, since the projects are largely funded with resources from the public administration.

Thus, periods whose availability of public funds is restricted end up adversely affecting the preparation of investment programs that rely on government funding and disbursements. In this case, the increased attraction of private agents is related to the granting of other guarantees in return for the investment.

## 5. Conclusions

Based on the theoretical grounds presented and on the results discussed above, this paper shows that, in Brazil, investments in infrastructure in the 1990s were positively influenced by the investment programs created by the federal government.

Taking Brazil as an example, the most important consideration of this first set of results is that the state plays an important role in directing investments and the interest of the public sector in less dynamic sectors of the economy, such as the infrastructure sector. The state is therefore not limited to correcting market failures or improvements in the institutional environment. The public administration has the power to act in the creation of incentives for private agents to make investments in logistics infrastructure. With the investment programs created (in this case: PAC1, PAC2 and PIL), regardless of their main purpose, there was a greater flow of investments in transportation infrastructure from the private sector in Brazil, whose institutional environment, among the countries of Cluster 2, was the most fragile. Therefore, no crowding out effect was observed in the market, contrary to many theorists in the literature on investments and market failures expected.

The results obtained by the econometric models analyzed are in line with the theory proposed by Mazzucato and Penna (2014) and Mazzucato (2014a, b). The analyses show that the state plays an important role in boosting investments in certain sectors of the economy, especially sectors that may have large socio-economic impacts. The results make it possible to argue in favor of the importance of the “institutionalization of investments,” and that the public commitment of the state with a certain sector of the economy channels the actions of the private sector.

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