Corporate political action towards innovation: complementary effects under transaction costs

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1 INTRODUCTION

The interactions between organizations and governments concerning innovation issues are marked by conflicting interests that interfere in the search and distribution of subsidies. Firms might seek to establish political influence to protect their technological investments or to obtain public subsidies for their research and development (R&D) projects. One of the reasons firms seek to establish political influences is due to the importance of public policies and their effects on the competitive environment of organizations (Hillman & Hitt, 1999). Studies on corporate political actions are part of a research area that investigates the nonmarket environment and the interactions between organizations and other actors in the political arena (Camilo, Marcon, & Bandeira-de-Mello, 2012; Hansen & Mitchell, 2000; Hillman, Keim, & Schuler, 2004).

Firms, by pursuing incentives for innovation through political actions, could give rise to a substitute effect, represented by the decrease of firm investments in innovation, or to a complementary effect, reducing uncertainty and contributing to a more favorable environment for investments in innovations (Ozer & Markóczy, 2010). Although previous studies have found support for complementarity between corporate political actions and R&D investments (Taylor, 1997; Grossmann & Steger, 2008; Ozer & Markóczy, 2010) the literature also presents evidence that indicates harmful effects on economic performance (Baumol, 1990; Murphy, Shleifer, & Vishny, 1993).

In addition to testing the complementary effects between political actions and investments in R&D, we investigated such decisions considering the following scenario: the possibility of firms performing political actions individually and/or collectively; the limitations associated with political cooperation, such as the problem of collective action (Hansen, Mitchell, & Drope, 2005); the transaction costs associated with the uncertainty of political markets (North, 1990); and the market failures associated with the difficulty of providing a sufficient amount of R&D investments (Martin & Scott, 2000).

Thus, it was defined as a research problem: How does individual and collective corporate political action impact on firm investments in research and development? The overall objective of the study was to test, through an experiment, for the complementary effect between corporate political decisions and R&D investments. The investigation of these interactions required the adoption of an institutional approach to the phenomenon of political actions and innovation (Ostrom & Walker, 1997; Holmes, Zahra, Hoskisson, DeGhetto, & Sutton, 2016), which made it possible to discuss issues such as the problem of collective action, transaction costs, and decisions under uncertainty. This research adopted an endogenous perspective in the investigation of the substitutive/complementary effects of the political actions of firms in R&D investments, unlike more traditional research in the area of innovation, that investigates how some kinds of public subsidies might represent crowding-out effects or additionality effects on private R&D investments (Zúñiga-Vicente, Alonso-Borrego, Forcadell, & Galán, 2014; Kannebley, Shimada, & Negri, 2016; Marino, Lhuillery, Parrotta, & Sala, 2016).

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2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Political actions for innovation: an institutional perspective

Corporate political actions occur when firms search for favorable public policies and benefits, interacting with governments and exploring mutual interests. Three theoretical approaches can be identified concerning researches that investigate the allocation of resources for innovation, R&D investments, and the relationship between state and firms: a) approaches that focus on state intervention as a driver for research and development and also for promoting technological development; b) approaches that investigate firms and their innovative capacity as drivers of technological development; and c) institutional approaches that investigate the incentives and informal and formal rules, which guide the performance of different institutional actors that are part of the technology innovation system (Ostrom & Walker, 1997; Martin & Scott, 2000).

We adopted an institutional perspective regarding the evaluation of firm behavior and its relationship with governments. As proposed by the theory of collective action, government, market, and institutions are considered coordination mechanisms for the promotion of public policies (Ostrom & Walker, 1997). For political actions toward innovation policies, the problem of collective action implies that there is a lack of incentives for firms to use resources for collective political actions to obtain benefits arising from a particular public policy, since these would not be exclusive, that is, they would benefit companies widely. As a result, public policies, seen as a public good, are subject to the problem of collective action that occurs when individuals, and also firms, as part of a larger group, select strategies which generate results that are suboptimal from the group's perspective (Ostrom & Walker, 1997).

In the case of political actions for innovation, firms would face a second obstacle associated with market failure in the provision of R&D investments (Romer, 1990). In this sense, both the benefits arising from political actions, as well as those arising from R&D investments, would have characteristics of public goods (Getz, 1997). The nature of the discussed benefits points out the existence of few incentives for corporate political investments and in R&D, depending on the institutional circumstances, even tough, in reality, one can identify that firms engage in rent-seeking behavior and in lobbying practices that might create entry barriers, for example (Grossmann & Steger, 2008). In this scenario, one of the most likely hypotheses is that investments in political actions would act as substitutes for R&D investments. Such situations raise other solutions to the collective action problem, such as government intervention (Choi & Lee, 2017).

Government intervention, when there is market failure, is often seen as one of the solutions to the problem of collective action. When it comes to innovation policies, Mazzucato (2013) argues that the state is a key partner of the private sector and has the function of taking risks in the early stages of technological development (Mazzucato, 2013). The role of the state might also vary depending on the actual country's economic development stage, being more centralized or decentralized considering its role in the political and economic domain (Mahmood & Rufin, 2005). One of the limitations of this view is the fact that the state is also subject to failure. Understood as a nonmarket failure, this is exemplified by the misuse of the state machine by rulers and legislators for their benefit (Wolf, 1987).

Ostrom (2005) argues that it is not a matter of choosing between the state or the markets, but rather a decision that considers the set of institutions, all subject to weaknesses and failures. In this context, different institutional arrangements, such as associations and relationship networks, are used to solve some aspects of the problem of collective action. It should be noted that such arrangements are also subject to failure. Some institutional arrangements such as gangs and cartels solve collective action problems for some participants, but while harming

others. A predatory state can solve collective action problems for those in power but at the expense of productivity and the reduction of benefits of others (Ostrom, 2005).

The adoption of the institutional perspective is closely related to the idea that the state and firms establish interactions as a "two-way street", mutually influencing technological policies (Holmes et al., 2016). According to the authors, while the state establishes financing lines and protection for intellectual property, firms create innovation strategies by adapting and using political strategies to influence and ensure benefits from technological policies.

2.2 Political actions and R&D investments: complementary and substitute effects

Little attention has been given to the joint analysis of technological innovation and corporate political actions (Taylor, 1997; Ozer and Markóczy 2010; Holmes et al., 2016). Mixed results have been observed regarding the effects between these two types of investment (Lai, 2020; Chu & Hoang, 2020).

In a literature review, Taylor (1997) found support for the hypotheses of complementarity and substitution between investments in political actions and R&D. According to the author, the concept of Schumpeterian waves, for example, would reinforcethe hypothesis of substitution by suggesting that firms, in the face of imminent destruction, would find increasing marginal returns in political activities as a mean to obtain advantages. On the other hand, firms use political actions in search of favorable policies, including technology and innovation policies. The search for political strategies allows companies to have access to legislators and, thus, shape regulations that will lead to a more innovation-friendly environment (Ozer & Markóczy, 2010). In this context, political action is seen as complementary to investments in technological innovation (Taylor, 1997), reducing uncertainty. This argument reinforces the hypothesis that there is a greater probability of cooperation between firms in both the political and technological environment (Taylor, 1997). Ozer and Markóczy (2010) analyzed the hypotheses previously investigated by Taylor (1997), and identified the positive and significant relationship between political activities and R&D investments in the U.S. industrial sector.

Grossmann & Steger (2008) proposed an oligopoly model to investigate the effects of anti-competitive behaviors (lobbying and rent-seeking) of established firms to create entry barriers to new technologies and the effects on R&D investments of these firms. The results supported the hypothesis of complementarity between anti-competitive behavior and R&D investments, capable of creating entry barriers. Thus, R&D investments would be the product of firms' attempt to increase demand while spending on lobbying, for example, would discourage new entrants, since the industry maintained an adequate level of competition.

From the perspective of the innovator who engages in political actions, Tullock (2005) identified the possibility of rent-seeking behavior having positive effects. According to the author, even in the face of the fact that innovative companies withdraw existing companies from the market through political actions, the price reduction caused by innovation represents net benefits for society.

The complexity of firm-government interactions is highlighted by Lai (2020), when exploring the relationship between rent-seeking behavior and productivity. The developed model raises alternative explanations for positive impacts of rent-seeking behavior, that augments marginal benefit of R&D, leading to a high level of investment in it and, at the same time, enables the government to extract more rents from the firms, reducing firm productivity, what might explain the mixed results when dealing with these issues (Lai, 2020).

Therefore, in order to elaborate the hypotheses, this study investigates the existence of complementary effects between political investments, both individual and collective, and R&D investments, particularly in an institutional context with uncertainties and transaction costs.

2.3 Hypotheses development

When it comes to political activities, firms in one industry have three alternatives: (1) act as a *free-rider* and do nothing; (2) engage on individual political action, often assuming the leadership of the initiative; or (3) assume a role of follower and join a firm association (Shaffer, 1995). Hillman & Hitt (1999) define individual actions as efforts conducted by individuals or companies alone, while collective action refers to those of a collaborative or cooperative nature between two or more individuals, or firms, to affect a public policy.

While individual political actions present the possibility of obtaining exclusive and private benefits, such as those arising from political advantages, collective political actions, in particular, present benefits whose characteristics bring them closer to public goods. Such characteristics can lead to situations of non-cooperation between the parties, known as collective action problems. Moreover, a firm has little incentive to bear the costs of political action when it knows that it will not be excluded from the public policy resulting from decisions favorable to the industry (Lenway & Rehbein, 1991). As follows, firms would have greater incentives to pursue political actions individually. Hence, the following hypothesis was proposed:

H1 The higher the individual political activity, the greater the investment in innovation.

Political activities of firms can also be carried out collectively through firm associations (Cavazos & Szyliowicz, 2011). Coordination mechanisms such as business associations in certain industries can facilitate cooperation (Schuler, 1996), which is one of the strategies for collective political actions (Shaffer, 1995, Rajwani, Lawton, & Phillips, 2015). Cooperation through coordination mechanisms, such as communication, could be a feasible strategy to overcome resource and political action know-how limitations (Shaffer, 1995).

Due to the possibility of obtaining public subsidies through collective political action, and considering the scenario where collective problems and free riders are a possibility, the experiment was designed to allow communication between some of the groups, motivating the definition of a second research hypothesis:

H2 The higher the collective political activity, the greater the investment in innovation.

To test these hypotheses a business game simulation was used as a research environment. To simulate the political market environment, a linear experiment with public goods was incorporated into the simulation.

In this scenario, the dilemma imposed by the problem of collective action in the political environment could be investigated in the context of organizational competitiveness in which market and nonmarket strategies were allowed. Moreover, two types of political actions could be tested regarding their individual and collective nature, as well as the complementary effects between them and investments decision in R&D. The possibility of interferences between organizational variables and investments in R&D motivated the inclusion of control variables in the models.

2.4 R&D investments determinants and control variables

Different researches in the area of innovation seek to understand individual firm characteristics that are determinants of R&D investments. According to the innovation literature, there are two key determinants of R&D investments: internal finances and sales

(Becker, 2013). The argument for cash flow involves market imperfections and the inability of firms to attract enough funds to invest in R&D, which leads to a dependence on positive cash flow as a financial source for this type of investment (Becker, 2013). The size of the company, measured by revenue, explains how large companies have scale advantages, greater efficiency in execution, and greater ability to guarantee investments for high-risk projects due to market imperfections (Becker, 2013).

In Brazil, in a survey with 1500 companies, a positive relationship was identified between gross revenue and R&D expenses (Jensen, Menezes-Filho, & Sbragia, 2004). Similar results were found by analyzing a firm-level longitudinal database of US manufacturing firms, in which it was observed an increase in total R&D expenditure following growth in sales (Coad & Rao, 2010).

Although recent research is consistent in identify cash flow as a variable correlated with R&D spending, in general, mixed results have been pointed out regarding the size of the firm and other variables, such as the country and age of firms (Becker, 2013). One of the proposed models on this research explored the relationship between corporate political decisions and R&D investments and incorporated gross sales revenues and cash flow as control variables.

3 METHODOLOGY

3.1 Experiment design

Business games function as a simulated experiential environment, and are defined by Keys and Wolfe (1990, p.308) as "a simplified and restricted situation that contains sufficient likelihood or illusion of reality to induce, in the exercise participants, answers such as those of the real world". In addition to having great potential as a learning environment, they have also been explored for some time as research designing tools (Cohen & Rhenman, 1961; Keys & Wolfe, 1990; Sauaia, 2013; Mrtvi, Westphal, Bandeira-de-Mello, & Feldmann, 2017).

Studies of corporate political actions are limited due to the difficulty of access to the political decisions of corporations, which restricts the use of interviews and surveys (Shaffer, 1995). In this sense, the use of business games to analyze the participants' decisions in an experimental environment becomes a relevant alternative for conducting studies of corporate political actions.

The BSS simulator - *Business Strategy Simulation* - adopted in this study, was specifically designed for researching corporate political action in the business gaming environment (Mrtvi, 2012). The BSS simulator consists of two main modules, market, and nonmarket modules. In this simulation, nine companies started operations from equal equity conditions ($600,000.00) with the possibility of obtaining loans.

The nonmarket module was adapted for this study to evaluate individual and collective political actions based on the linear experiment with public goods (Ostrom, 2000). Thus, two types of political decisions were included, and each participant (representing his firm) was responsible for deciding between not entering the political market, or investing in the individual public project or collective public project toward favorable innovation policies (or both) within the limit of 20% of the initial capital available.

The collective political decisions implied a collective action problem and, in addition, the participants didn't have access to the individual decision of other firms on collective political investments, which allowed the emergence of free-riders.

The return on political investments was defined at 5% for individual investments and 30% for collective investments. As an incentive, grades (up to one point) served as a payoff and incentive for participation. Grades were proportionally distributed based on the final business game ranking. The participants of the research were volunteer students of the last year of a

business administration major course at a public university. Therefore, 8 sessions were performed and the valid data, used in the regression models, were from 72 subjects, collected during 8 rounds, totaling 576 observations. In four sessions, communication between participants was allowed, while in the other four sessions, communications were prohibited. Due to the existence of missing values for some variables, the number of observations was 575.

The data was collected by the BSS simulation and organized in Microsoft Excel® for later analysis conducted in Stata software®.

3.2 Measures

The dependent variable, *R&D investment*, was measured using the accumulated R&D investment (natural logarithm) by each firm. Two independent variables were measured: *individual corporate political action* and *collective political action*. Both individual and collective political action were measured based on the participant's decisions, considering the ratio between the investment made and the maximal possible investment in the round (political investment / 20% of initial capital).

It is worth notice that each participant was responsible for the input of their decision on the system, including the collective political investment, which allowed the emergence of free-riders.

Since other firm characteristics might function as determinants for R&D investments, *accrued gross revenue* (natural log and lagged variable) and *free cash flow* were used as control variables. We controlled the sessions that allowed communication by using a dummy variable (Model 2).

3.3 Models and tests

One initial exploratory model (Model 1) was designed to establish the relationships between political actions and R&D investments. For the first model, we chose panel data regression with fixed effects (FE) (Table 2) instead of regression with random effects (RE), according to the Schaffer and Stillman test results (Sargan-Hansen statistic 31,449 Chi-sq (4) p-value = 0.0000).

In face of the possibility of the explanatory variables' correlation (x) with the error terms (u) instrumental variables (z) were applied in models 2, 3, and 4 as a correction mechanism of estimators (Cameron & Trivedi, 2005). To estimate instrumental variables for the panel data, we selected two instruments. The first instrument was the *collective political investment forecast,* made by the participant, and it was based on the average estimate for the specific decision round. This instrument was chosen since it was related to collective political investments, without influencing the R&D investment decision. Since two independent variables were being instrumentalized, the *net individual political revenue* was chosen as the second instrument. It was calculated based on the difference between the amount received and the amount invested in the individual political action in the previous round (t-1). It is assumed that previous political incomes *(z)* impact the decision of future political investments, but don't directly interfere in the R&D investment decision.

In the second model (Table 2), which incorporates the selected instrumental variables, panel data regression with random effects (RE) was more adequate than fixed effects according to the Hausman test (chi2(3) = 0.71, prob>chi2 = 0.8710).

The data analysis technique used in models 3 and 4 was panel data regression with fixed effects (robust standard errors), clustered by individuals and applying instrumental variables.

On models 3 and 4 (Table 2), the Kleibergen-Paap rk Wald F test was performed for weak instruments, which is equivalent to the Cragg-Donald test but for robust data (Baum,

Schaffer, & Stillman, 2010). We used the Stata command XTIVREG2 to evaluate both instruments (Table 1). Based on the results, the selected instruments were considered valid.

Table 1
Instrument tests for models 3 and 4

Tests	Results[1]	Conclusions
Kleibergen-Paap rk Wald F statistic (weak identification test)	Model 3 F = 36,88 >7,03 Model 4 F= 16,50 > 7,03	Instruments are not weak (reference values from Stock & Yogo, 1995, retrieved from Stata).
Sanderson-Windmeijer (SW) F test (excluded instruments)	Model 3 SW F (1, 71) = 74,29 e 136,49 Model 4 SW F (1, 71) = 36,64 e 38,68 Values > 19,93 Prob > F = 0,0000	Rejection of the hypothesis that separately the instruments are weak
Kleibergen-Paap rk LM statistic (under identification test)	Model 3 25,71 (p-value = 0,0000) Model 4 23,899 (p-value = 0,0000)	Rejection of the hypothesis that the instruments are under-identified
Anderson-Rubin Wald test (first stage)	Model 3 F(2,71)= 16,27 p-value = 0.0000 Chi-sq(2)= 33,06 p-value = 0.0000 Model 4 F (2,71)= 4.28 P-val= 0.0175 Chi-sq (2)= 8.73 P-val= 0.0127	The endogeneous regressors are relevant
Stock-Wright LM S statistic (first stage)	Model 3 Chi-sq(2)=19,32 P-val= 0.0001 Model 4 Chi-sq(2)= 7.64 P-val= 0.0219	

[1]Outputs of XTIVREG2 command from Stata

4   REGRESSION RESULTS

Corporate political actions are associated with the search for favorable public policies, including technology and innovation public policies. In this sense, obtaining political returns would be associated with reduced uncertainty, constituting a complementarity effect between political investments and R&D investments (Ozer & Markóczy, 2010; Taylor, 1997). To investigate the effect of political behavior on innovation two hypotheses were analyzed. The first hypothesis, *H1 The higher the individual political activity, the greater the investment in innovation,* was accepted. There was a positive and significant relationship between individual political investments and R&D investments in the two main panel data models: model 3 - FEIV (0.0171 p-value<0.001) and model 4 - FEIV (0.0123 p-value<0.01); and also in model 2 -

Table 2
Individual and collective corporate political action impacts on R&D investment decision

Variable	R&D Investment (ln)			
	Model 1- FE (robust cluster)	Model 2 REIV	Model 3 – FEIV (robust cluster)	Model 4 – FEIV (robust cluster)
Individual political action	0.00320*	0.0122***	0.0171***	0.0123**
	(0.00155)	(0.00323)	(0.00324)	(0.00434)
Collective political action	0.00231	0.00976***	0.0139***	0.00982**
	(0.00138)	(0.00277)	(0.00261)	(0.00343)
Gross revenue[1](ln)	0.329***	0.203**		0.123
	(0.0891)	(0.0647)		(0.113)
Free cash flow	0.0000000617			0.000000120*
	(0.0000000577)			(0.0000000608)
Communication (dummy)		-0.754		
		(0.466)		
_cons	5.606***	7.296***		
	-1.209	(0.853)		
N	575	575	576	575
Number of clusters	72	72	72	72
F	$F(4,71) =$ 15.91		$F(2, 71) =$ 19.16	$F(4, 71) = 15.15$
		Instrumented: Individual political action, Collective political action Instruments: Gross revenue[1](ln), Communication (dummy), Collective investment forecast	Excluded instruments: collective investment forecast, net individual political revenue	Excluded instruments: collective investment forecast, net individual political revenue [2]Included instruments: gross revenue [1](ln), free cash flow

[1]Lagged variable
* p<0.05, ** p<0.01, *** p<0.001

REIV (0.0122 p-value <0,001). The second model allowed for the control of the communication treatment, once it was permitted in only half of the sessions. The second hypothesis *H2 The greater the collective political activity, the greater the investment in innovation,* was also accepted (Table 2) since the positive and significant relationship between collective political investments and R&D investments was verified in the two main models (3 and 4) and also in model 2. It is emphasized that model 1, because it was an exploratory model, did not consider possible problems of endogeneity between the variables *gross revenue*, *free cash flow*, and *political investments*, which motivated the elaboration of the three subsequent models and the use of the instrumental variable.

In model 4, the free cash flow had a positive and significant relationship with R&D investments (p-value<0.05), as predicted by the literature review. The size of the firm, despite having a positive relationship with R&D investments, was not significant (p-value>0.05), a similar result to the one found by Ozer & Markóczy (2010), who analyzed the moderating effect of the firm size variable.

This research treated the political variable as endogenous, a premise adopted by Baron (1995) and pursued in several studies in the nonmarket area (Boddewyn, 2003), which made possible the study of complementarity effect from the corporate political action perspective. Although there was a less favorable scenario for political action, such as information asymmetry and the emergence of free-riders, the complementarity effect between political and R&D investments was still observed. In the next section, the results are discussed considering the impact of the experiment design and its relevance.

4.1 Discussion and implications

Our discussion highlights the conditions in which the complementary effect was observed and the importance of the methodological approach to include the transaction costs into the experiment.

The complementarity effect observed in the research reflects a positive effect of rent-seeking since the political actions presented a positive and significant correlation with innovation investments. Two reasons are observed and explain such effects. First, the institutional characteristics and incentives, translated into rules that were applied into the experiment scenario, allowed testing the incentives for individual political actions and the cooperation ability of the participants. The experiment scenario was based on an oligopoly model, with technologically differentiated firms (which had market incentives to innovate) and the existence of competition. These conditions are highlighted in Grossmann & Steger's (2008) model, in which they argue that the existence of competition is essential for the complementary effect, since the decrease of rivals (due to anti-competitive behavior, for example) could lead to a limitation of economic growth due to distortions in the oligopoly.

A second explanation refers to overcoming the market failure in the provision of R&D (Hall & Reenen, 2000; Jaffe, Newell, & Stavins, 2005). In this context, political action can be understood as a way of firms to reduce market imperfections through property rights realignment (Boddewyn, 2003; Kim & Mahoney, 2005) without prejudice to R&D investments, as evidenced by the complementary effect. It is worth noticing that the experiment design also included partial uncertainty about the return on private R&D investment through a random component in the R&D returns function (about 30% of the return was due to randomness).

Results suggest that corporate political action (individually or collectively) may constitute a viable alternative institutional arrangement and coordination mechanism to overcome the problem of collective action in the political arena and market failure in the

provision of R&D investments, although subject to failure, like any other institution (Boddewyn, 2003; Ostrom, 2005).

In this experiment, the innovation as a political issue, the uncertainty, as well as the payoffs (the percentage of return of political projects) was part of the scenario in which the participants' decisions were made. In the case of payoff, the incorporation of the public good experiment on the business simulation allowed the inclusion of the collective action problem and free-riders, which, in addition to incorporating conditions of uncertainty about the returns of cooperation, created the conditions for the inclusion of political transaction costs in the experiment.

The political market has a high transaction cost since political agreements lack enforcement mechanisms, absent in political agreements (North, 1990). Thus, in this experiment, political cooperation could not be imposed (due to the absence of explicit punishment mechanism) and also could not be verified by other firms, since the participants of the experiment did not have access to the information of the companies that contributed politically, or not, considering collective participation.

The complexity of the relationship between rent-seeking behavior and productivity, and mixed results concerning its impacts (Lai, 2020), suggests that institutional elements are important aspects that influence political decisions and their outcomes. Lai (2020) for example, proposed in her model that the level of corruption in a country (or the weight of political contributions) directly influences productivity outcomes associated with rent-seeking.

This experiment design made it possible to model circumstances that included elements that impact the decision-making process, in particular, the transaction costs and uncertainties. This type of modeling creates possibilities for future research that explores different parameters related to the degree of uncertainty regarding the return on R&D investments, different payoffs concerning the return on political investments, as well as higher transaction costs in the political market.

4.2 Research limitations

Although the quasi-experiment included the logic of experiment with public goods and a certain amount of decision under uncertainty, at the same time, the design of the experiment pre-determined the types of political connections that were allowed. This research design partially reduced the transaction costs in the political market.

Issues related to access to politicians and bargaining power, for example, were not implemented in the experiment. This may explain the fact that the size of the firm was not statistically significant in model 4, when we applied instrumental variables, even though market power might be translated into political influence (Grier, Munger, & Roberts, 1991), a hypothesis that was not investigated in this experiment. In this sense, the experiment with public goods itself presents clear rules of interaction in the political environment (institutional dimension), which can limit transaction costs.

The statistical models used in the research, panel data with fixed effects, and the use of instrumental variables, were adopted to minimize the effects of not observed variables. However, positive framing effects associated with the innovation political issue itself must be considered when interpreting the results.

5   CONCLUDING REMARKS

The decision-making environment of this research was the product of the combination of business simulation and the experiment with public goods. This methodological approach

allowed the identification of specific characteristics of firms associated with political decision-making, in a competitive relational political context (higher frequency of interactions) where participants were confronted by collective action problems.

The complementary effects observed suggest circumstances in which the political action of firms, in search of incentives for innovation, is legitimate and capable of fostering private investments in R&D. Unlike conventional literature on rent-seeking behavior, the study deepens the analysis of corporate political decisions and points out to a more complex scenario in which a series of circumstances around cooperation and competition tend to affect the political behavior of firms.

More specifically, the results contribute to the understanding of political decisions when alternative types of political actions (individual and collective) are available. In an environment where companies are prone to corporate governance and compliance practices, collective political action (whether through business associations or other arrangements) is also a viable coordination mechanism that doesn't limit private R&D investments.

While political cooperation is positively related to R&D investments, competition, property rights and low levels of corruption are factors that cannot be ruled out from the political decision-making context.

One of the contributions of this study is the methodological approach that allowed the joint treatment of individual and collective political decisions, seen as one of the frequent methodological limitations of research in CPA (Hansen et al., 2005). In addition, the use of the business simulation as a research environment served as a mechanism for merging the logic of economic experiments with public goods and the competitive organizational context. In doing so, this approach contributes to understanding how different rules and incentives might influence market and nonmarket's (political) investment decisions, particularly considering the inherent incompleteness of institutions and the presence of transaction costs.

These results allow an expansion of discussions about the active role of firms individually or collectively in the political arena, also contributing to an important research agenda on firm participation in the determination of public policies (Kerr, Lincoln, & Mishra, 2013). Despite the mixed results found in the literature on corporate political action and its impact on economic growth (Lai, 2020), the investigation of different institutional circumstances associated with firms, markets, and governments constitutes an important research agenda that may shed light on understanding how different arrangments and institutions might evolve and promote healthier corporate-government relations.

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