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Monitoring the Governance of State-Owned Enterprises

Assessing the Impact of Corporate Governance Reforms in Brazil

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Inter-American Development Bank
Institutions for Development Sector
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Abstract*

State-owned enterprises (SOEs) are often justified for correcting market failures, providing essential public services, and fulfilling social objectives. Yet, SOEs face unique governance challenges as agency conflicts usually increase with state ownership. This paper examines Brazil's efforts to address agency conflicts in SOEs, including new legislation (Law 13303 of 2016, the "Law on SOEs") establishing stringent criteria for the appointment of executives and for the accountability and a complementary monitoring mechanism known as IG-SEST. Using the difference-in-differences methodology, we assess the impact of those interventions on SOE's profitability and labor productivity. Although no significant effect of the more-stringent governance requirements of the Law on SOEs was detected, the group of federal SOEs, which adopted the IG-SEST monitoring mechanism, significantly increased their profitability compared to similar municipal and state SOEs. Because IG-SEST anchored its indicators in corporate governance parameters specified in the Law on SOEs, this result can be interpreted as potential evidence that institutional changes might require complementary mechanisms for effective implementation. These findings are consistent with previous work suggesting that corporate governance might require broader institutional reforms, including fiscal policies to mitigate government action with a negative effect on the performance and solvency of SOEs.

JEL Codes: G34, H11, H83, L32

Keywords: state-owned enterprises, state ownership, state capitalism, corporate governance, corporate governance reform

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Abbreviations

CGPAR	public commission in Brazil established in 1991 to review SOEs, called the Comissão Interministerial de Governança Corporativa e de Administração de Participações Societárias da União
CGR	corporate governance reforms
CNAE	Brazil's National Classification of Economic Activities, or Classificação Nacional de Atividades Econômicas
CVM	Brazil's Securities and Exchange Commission, or Comissão de Valores Mobiliários
DiD	difference-in-differences, referring to the econometric methodology
FONAFE	National Fund for Financing State Business Activity, or Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado
IG-SEST	monitoring mechanism developed in Brazil for SEST to track the performance of SOEs at the federal level
KCGI	Korean Corporate Governance Index
KIPF	Korea Institute of Public Finance
Law on SOEs	Brazil's Law 13303, passed into law in 2016
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares (OLS) regressions
PSM	propensity score matching
RAIS	Brazil's database on firm-level employment, or Relação Anual de Informações Sociais
ROA	return on assets
SEST	Brazilian Department for the Monitoring and Governance of SOEs, or Secretaria de Coordenação e Governança das Empresas Estatais
SOE	state-owned enterprise

Introduction

State-owned enterprises (SOEs) are entities partially or completely controlled by the government with the objective of providing goods or services to the public. In contrast to privately owned enterprises, SOEs have the purpose of correcting market failures, providing vital public services, and actively developing activities to meet strategic public policy or social objectives. The prevalence and expansion of SOEs across the globe is a well-documented phenomenon (Bruton et al., 2015; Musacchio and Lazzarini, 2014; Wright et al., 2022). In Brazil, for instance, nearly 200 federal SOEs were responsible for 40 percent of public investment on average from 2015 to 2019, and the value of their assets represented 65 percent of gross domestic product. Some of those companies are fully owned by the state, but there are also several cases of SOEs with majority state equity and minority private capital, as in the case of publicly listed state-controlled firms.¹

While state ownership potentially leads SOEs to foster economic activities that advance social objectives, the participation of the state as an owner may also create a host of governance hazards that can be detrimental to the firms' performance and their ability to reach their objectives. For instance, governments may try to appoint political allies as top executives in SOEs or influence their pricing and investment decisions to reap political dividends (Menozzi, Gutiérrez Urtiaga, and Vannoni, 2012; Shleifer and Vishny, 1994). Although many SOEs are expected to follow public policy objectives beyond profitability (Musacchio, Lazzarini, and Aguilera, 2015; Yeyati, Micco, and Panizza, 2004), unchecked government interference can undermine productivity gains and even create the risk of financial insolvency and fiscal distress—which not only harms private investors but also society as the ultimate owners of SOEs (Dixit, 2002; Pargendler, 2012; Vining and Weimer, 2015).

Remedies to mitigate governance problems in SOEs have ranged from privatization, a proposal that was largely adopted in the 1990s as part of market-oriented reforms (Megginson, 2005), to initiatives that seek to constrain discretionary government

¹ As informed by the Boletim das Empresas Estatais Federais, this document provides information on federal state enterprises, where the federal government holds the majority voting capital, along with mixed economy companies and subsidiaries. It covers budget, investment, and federal government contributions, as well as economic and financial information. Available at: <https://www.gov.br/economia/pt-br/centrais-de-conteudo/publicacoes/boletins/boletim-das-empresas-estatais-federais>. Public investment data sourced from the Observatório de Política Fiscal - FGV IBRE (<https://observatorio-politica-fiscal.ibre.fgv.br/series-historicas/investimentos-publicos/investimentos-publicos-1947-2022>).

meddling via governance improvements in transparency, monitoring, and incentives (Gupta, 2005; OECD, 2005; Pargendler, Musacchio, and Lazzarini, 2013; Poczter, 2016). Because privatization programs usually face strong political opposition, trigger heated ideological debates, and impose high transaction costs associated with the preparation and implementation of the sale of state equity (Durant and Legge Jr., 2002; Lazzarini, 2022; Ramamurti, 2000), the route of governance reform has been increasingly pursued by governments (IDB, 2019). For instance, in examining reforms in the energy sector in developing countries, Foster and Rana (2020) observe that “among the best-performing power sectors in the developing world are some that decisively implemented the 1990s reform model and others that retained a dominant and competent state-owned utility, guided by strong policy objectives.”

Furthermore, although there is a wealth of studies examining the effect of privatization programs (see for reviews, Estrin and Pelletier, 2018; Megginson, 2017; Radic, Ravasi, and Munir, 2021), there is still scant understanding about what are potential policy actions to improve the governance of SOEs and how they might affect firm-level performance. This paper focuses on examining these questions.

Specifically, this paper examines institutional changes that affected the governance of SOEs by introducing regulations pertaining to transparency, executive appointments, and monitoring. Specifically, this research studies institutional reforms that modified the governance of SOEs in Brazil in the mid-2010s. The first institutional reform was the enactment of the Law 13303,² known as the “Law on SOEs,” in 2016, a legislation that applied to all state-controlled companies in the country and that revamped the monitoring and transparency devices, as well as guidelines for executive appointments, within SOEs. This legislation also created more-stringent auditing procedures and established stricter criteria for the selection of executives and board members for larger SOEs (i.e., SOEs with gross revenue exceeding 90 million BRL per year). Those more-stringent requirements allowed for the assessment of the impact of the Law on SOEs on those larger SOEs compared to the other companies not subject to those requirements. The second reform started in 2017, when the Brazilian Department for the Monitoring and Governance of SOEs (Secretaria de Coordenação e Governança

² Law No. 13.303, of June 30, 2016. Available from <http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/lei/l13303.htm>.

das Empresas Estatais, or SEST)³ implemented an index of corporate governance practices, or governance indicator, called IG-SEST, which is designed to monitor SOEs controlled by the federal government and their implementation of practices as specified by the Law on SOEs. This allowed for the comparison of Brazilian SOEs controlled by the federal government, subject to close monitoring, to other SOEs at the state or municipal level, whose practices and performance were relatively less scrutinized.

Data was collected on 59 federal-level SOEs as well as on 123 SOEs at the state or municipal levels, and for the period spanning 2011 to 2020. Within this cohort of 182 companies, 62 are not publicly listed. This is a unique feature of this database, as most research in this field focuses on publicly listed SOEs. The impact of those governance reforms is examined both in terms of profitability (return on assets, or ROA, and net margin) and productivity (revenue per employee). These variables serve as good proxies for other key performance indicators: ROA is a well-known financial performance measure but is also highly correlated with fiscal risk, reflecting the allocative efficiency of SOEs in managing assets to generate profits. Net margin serves as an indicator of a company's overall profitability and efficiency in converting sales into net earnings after all expenses, while labor productivity serves as a proxy for how SOEs are managing human resources and therefore connects with the discussion of how those firms may pursue multiple objectives. For instance, SOEs are often used by the government for patronage or to generate public sector employment, potentially leading to misallocation and operational losses that can also escalate to fiscal risk (IDB, 2022).

First, to test whether the corporate governance reform (CGR), or specifically the changes implemented by the Law on SOEs, can alter the performance of SOEs, DiD regressions are estimated by comparing SOEs subject to the more-stringent auditing requirements of the Law on SOEs to the other SOEs that were not required to follow more-rigorous rules (that is, SOEs below the revenue cutoff established by the Law of SOEs). Second, to test the potential role of increased transparency and monitoring as provided by the creation of an index of governance practices, DiD analyses are

³ SEST was formed in 1979, and it monitors companies in which the federal government holds the majority of the share capital with voting rights, directly or indirectly—in other words, public companies, government-controlled companies, their subsidiaries and controlled companies and other companies, called federal state companies.

conducted to compare the federal SOEs subject to IG-SEST to a matched sample of state-level and municipal-level SOEs with similar characteristics but which were never assessed by the IG-SEST, since the index only encompassed SOEs owned by the federal government.

The findings partially support the general hypothesis that implementation of governance improvements cause a positive effect on the performance of targeted SOEs. While the DiD analyses indicate a positive effect of the more-stringent Law on SOEs on labor productivity, a pre-trend analysis reveals that SOEs were already improving prior to 2016, possibly due to adjustments that anticipated the increase in public scrutiny due to the implementation of the Law of SOEs. Yet, the results show that federal SOEs exhibited financial performance improvements after the introduction of IG-SEST and compared to (matched) state and municipal SOEs. Since the IG-SEST tracked governance improvements as specified by the Law on SOEs, this result is interpreted as suggestive of a potential complementarity between country-level institutional (legal) changes and monitoring mechanisms to guarantee the enforcement of the new rules at the firm level.⁴

Although the analysis and results are at the firm level, the findings presented here also suggest that CGR may require other complementary reforms, including improvements in fiscal policy and governance, which can create more checks and balances against government interference in SOEs with potential negative effects from a country-level fiscal perspective. In other words, effective CGR might require a broader set of institutional changes that combine general governance rules, firm-level monitoring, and strict fiscal governance measures to constrain the discretionary use of SOEs and improve their allocative efficiency.

Background: State-Owned Companies and Governance Reform

As noted earlier, state-owned companies are created for a range of reasons, usually guided by social objectives, such as providing health, sanitation, or education. However, SOEs can stray from those objectives to serve political agendas, become inefficient, or both. SOE oversight and performance have been recommended by international

⁴ Nonetheless, the results should be interpreted with caution given the limited number of observations and the fact that the reforms examined—the new Law on SOEs and the IG-SEST monitoring mechanism—occurred roughly at the same time.

development organizations, though empirical evidence on the efficacy of these governance improvements remains limited.

Governance Problems in State-Owned Enterprises

Fundamentally, governance problems in SOEs derive from two main types of agency problems. The principal-agent problem occurs because the managers of SOEs may implement actions that diverge from operational efficiency and social objectives that guided the creation of those firms (Lazzarini and Musacchio, 2018; Shleifer and Vishny, 1994). Society, as the ultimate principal, delegates the corporate control of public organizations to members of the ruling government, who might use those organizations to support political objectives instead of pursuing performance dimensions that are valued by society (Dixit, 2002; Moe, 2012). Government officials also tend to have weak incentives to monitor the performance of SOEs and their executives, and they might instead use SOEs as vehicles to appoint political allies as key managers and decision makers (Inoue, 2020; Li and Xia, 2007; Lin and Milhaupt, 2013).

Furthermore, when SOEs are subject to multiple performance goals—for example, being profitable while also keeping wages high or avoiding layoffs in the areas where they operate—the managers of SOEs will face a multitask problem, which creates complications for the assessment of managerial performance and the design of effective pay-for-performance contracts (Bai and Xu, 2005; Firth, Fung, and Rui, 2006). This problem should be particularly critical when the social objectives of SOEs are ill-specified and left for the interpretation of managers and government representatives monitoring those firms.

The second problem, the so-called principal-principal conflict, occurs due to the presence of diverse owners and/or interested parties in the state with distinct and conflicting objectives. For instance, this conflict tends to escalate in the case of SOEs that also have minority private investors (Dharwadkar, George, and Brandes, 2000; Jiang and Peng, 2011; Young et al., 2008). The public listing of state-controlled SOEs and the attraction of those investors may improve transparency and facilitate the monitoring of SOE managers (Gupta, 2005; Poczter, 2016). Yet, it creates new challenges when governments can use their controlling shares to push for actions and strategies that hurt profitability. Although private investors might realize that SOEs pursue objectives other than profitability, and still agree to purchase their shares, those objectives can be volatile

and change according to the interests of the ruling government (Shleifer and Vishny, 1998; Vickers and Yarrow, 1988; Vining and Weimer, 2015).

The principal–principal problem can also emerge even in SOEs that are private or wholly owned by the state, in cases where distinct state or government units have diverging objectives and still can influence the governance of those firms. For instance, the ministry responsible for public finance or internal auditing units may require fiscal discipline and impose limits on SOE expenditures, while ministries related to the sector or industry of the SOE may push the firm to implement pricing and investment policies that can undermine profitability or even solvency. In several cases, there is discretion to manage the financial relationship between SOEs and the government, with few restrictions on SOEs to request additional funds and no limits on how the government can extract the surpluses that SOEs might generate, potentially leaving those companies with losses or little capital to fund their own projects. Governments also can use SOEs for political and social objectives, for instance by using them to subsidize certain investments or divert resources to allied parties (IDB, 2019; 2022).

In principle, SOEs could commit to a well-known mandate setting clear and stable goals, but this would require a robust legal framework to avoid frequent and discretionary changes in the original mandate (Schapiro, 2017; Sustein and Vermeule, 2020) as well as regulatory provisions to protect the interests of minority stakeholders (Guillén and Capron, 2016). Likewise, from a fiscal perspective, the principal–principal problem can be attenuated not only by monitoring SOEs and limiting their debt and expenditures, but also by reducing the government’s capacity to intervene in SOEs in a discretionary way. Consequently, as it will be discussed next, proposals to improve the governance of SOEs have pursued not only changes at the firm level (such as improved reporting or technical criteria to hire executives), but also broader initiatives aimed at improving rules and regulations disciplining SOEs, their managers, and the ability of governments to intervene at will.

[Reforming the Governance of SOEs](#)

In an effort to build a more-robust environment to curtail discretionary government interference in SOEs and mitigate the governance problems discussed before, some countries have passed specific legislation applicable to SOEs and created public units responsible for supervising SOEs. Those efforts were facilitated by the creation and

dissemination of policy guidelines to govern companies with relevant stake equity—such as guidelines proposed by multilateral organizations such as the Organisation for Economic Co-operation and Development (OECD), the World Bank, and the Inter-American Development Bank (IDB). For instance, the OECD proposed six key corporate governance principles in 1990, which have been used as a reference to track management practices and which were the basis for the publication of the OECD’s Guidelines on Corporate Governance of State-Owned Enterprises in 2005 (later updated in 2015; OECD, 2015).⁵ The World Bank, in turn, compiled a comprehensive “toolkit” for the corporate governance of SOEs (World Bank, 2014a), and IDB sponsored studies applied to specific regions and countries in Latin America and South Korea (IDB, 2019, 2016, 2015). The aforementioned agency problems are generally recognized in those reports as the main source of governance conflicts in SOEs. Departing from the assumption that governments will want to keep control over those SOEs, the reports suggest a series of practices, such as the creation of centralized units to monitor SOEs (IDB, 2016), improvements in accountability and transparency (OECD, 2015), and the attraction of external professionals to act as independent board members (OECD, 2015; World Bank, 2014b).

To illustrate, Table 1 shows a comparative analysis of selected countries and the types of initiatives that they have implemented to improve the governance of SOEs. The table lists the institutional framework applicable to state-owned companies in Brazil, South Korea, Peru, and Mexico. South Korea closely monitors public organizations and implements performance-contingent payments to their executives (OECD, 2016).⁶ Peru and Brazil have also introduced mechanisms to monitor federal SOEs. In Peru, the National Fund for Financing State Business Activity (Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado, FONAFE) is a public agency with a mandate to support corporate strategy by contributing to the added value of SOEs.⁷ In Brazil, SEST

⁵ The OECD principles refer to, respectively, (i) ensuring the basis for an effective corporate governance framework; (ii) the rights and equitable treatment of shareholders and key ownership functions; (iii) institutional investors, stock markets, and other intermediaries; (iv) the role of stakeholders; (v) disclosure and transparency; and (vi) the responsibilities of the board. Available from <https://www.oecd-ilibrary.org/governance/g20-oecd-principles-of-corporate-governance-2015_9789264236882-en>.

⁶ Established by South Korea’s Ministry of Economy and Finance in 2009, the Korea Institute of Public Finance (KIPF) SOE Research Center publishes annually the report *Public Institutions of Korea*. The paper provides an overview of public institutions and what practices of governance have been adopted. Available at <https://www.kipf.re.kr/soeeng/Publication/publication_SOE_Reports/kiPublish/CB7/Center/list.do#>.

⁷ In Peru, the FONAFE publishes its assessment of Peruvian SOEs annually. Available at <<https://www.fonafe.gob.pe/centrocorporativo>>.

regularly collects data on the performance of federal SOEs, reviews the criteria to compensate the executives of SOEs, and tracks adherence to corporate practices. Mexico, in contrast, delegates the monitoring of SOEs in a decentralized way, to different ministries according to the sector to which each SOE belongs.⁸

Table 1: Comparison of Select Countries' Corporate Governance Practices for SOEs

Country	Institutional framework	Monitoring organization		Centralized evaluation system		
		Name, Creation date	Main mandate	Evaluation system	OECD principles related	Management incentives
Brazil	Law on State-Owned Enterprises, 2016	Secretaria de Coordenação e Governança das Empresas Estatais (SEST), 1979	Monitor management, limit and supervise expenditures	<ul style="list-style-type: none"> • Yes, for parent federal SOEs • Do not consider most of the subsidiaries • Created in 2016 	I, III, IV, V, VI	No
South Korea	Public Entity Management Act, 2007	Committee for the Management of Public Institutions, 2007	Set management guidelines and evaluate performance	<ul style="list-style-type: none"> • Yes, for SOEs and other public organizations • Created in 2007 	I, III, IV, V, VI	Yes
Peru	FONAFE creation, 1999 and the Decree, 2009	Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado (FONAFE), 1999	Support corporate strategy to contribute to value generation	<ul style="list-style-type: none"> • Yes, for federal and state SOEs • Created in 2015 	I, II, III, IV, V, VI	No
Mexico	Law on State-Owned Enterprises, 1986	The ownership and monitoring is dispersed among several different ministries depending on the SOEs' sectors.	Coordinate the SOEs, establish development policies and budgets, and evaluate the results	<ul style="list-style-type: none"> • No • Each ministry could have mechanisms to assess the efficiency of their respective SOEs 	Not clear	No

Source: Compiled by the authors.

Notes: As noted earlier, the OECD principles refer to, respectively, (I) ensuring the basis for an effective corporate governance framework, (II) the rights and equitable treatment of shareholders and key ownership functions, (III) institutional investors, stock markets, and other intermediaries, (IV) the role of stakeholders, (V) disclosure and transparency and (VI) the responsibilities of the board. More information is available at <https://www.oecd-ilibrary.org/governance/g20-oecd-principles-of-corporate-governance-2015_9789264236882-en>. Peru's Decreto Supremo no. 072-2000-EF seeks to promote the efficiency of the state's business activity. See <<https://www.gob.pe/institucion/mef/normas-legales/224304-072-2000-ef>>

⁸ See Mexico's Ley Federal de Las Entidades Paraestatales (1986). Available at <<https://www.diputados.gob.mx/LeyesBiblio/pdf/LFEP.pdf>>.

Impact of Improved Governance Practices on Performance of SOEs

Despite the increased interest in disseminating and implementing improved governance practices in SOEs, there are still few studies assessing the effect of changes in legislation or voluntary adherence to those practices. Most of the empirical studies that investigate improvements in the performance of state-owned companies are based on measuring the effects of privatization and type of ownership (e.g., Estrin and Pelletier, 2018; Megginson, 2017; Radic, Ravasi, and Munir, 2021). There have been relatively very few robust evaluations of governance improvements on the performance of SOEs (for a review, see Daiser, Ysa, and Schmitt, 2017).

Table 2 summarizes the empirical studies that are closest to the main research objective of this paper. Some studies have found a positive association between improved governance practices and firm-level performance (Heo, 2018; Black and Khanna, 2007; Black, Jang, and Kim, 2006; Groves et al. 1994). For instance, Groves (1994) examined how enhanced autonomy may have improved productivity and profitability using a sample of 769 Chinese SOEs. In turn, Black, Jang, and Kim (2006) studied how corporate governance practices might have been correlated with firm value; the same study also found that Korean listed SOEs that are better governed do not appear to be more profitable even though they exhibit lower costs. In contrast, Heo (2018) showed a positive relationship between board size and transparency, and ROA and debt ratio. However, regarding corporatization, Heo only found a positive association with customer satisfaction and debt ratio, but showed negative correlations with other performance measures. Other studies were generally inconclusive. Cunha et al. (2021), for instance, examined the effect of IG-SEST on Brazilian SOEs and found no statistically significant results.

Table 2: Example Studies of Corporate Governance Reforms

Authors	Dependent variables	Variable of interest	Sample	Method	Results	Limitations
Groves et al. (1994)	Productivity, profitability	Corporate governance reforms (CGRs) toward autonomy	769 Chinese SOEs, 1980–1989	OLS, IV	Chinese SOE productivity improved significantly after 1978 as a result of the introduction of some basic incentives schemes.	<ul style="list-style-type: none"> No counterfactual group No evidence of causality
Black, Jang, and Kim (2006)	Firm value (Tobin's Q)	Korean Corporate Governance Index (KCGI)	540 Korean SOEs, 2000–2001	OLS, 2SLS, IV, 3SLS, FE	Corporate governance is an important factor in explaining the market value of Korean SOEs. Better-governed SOEs do not appear to be more profitable, but they show lower costs.	<ul style="list-style-type: none"> Only listed firms No counterfactual group No evidence of causality
Black and Khanna (2007)	Stock price	CGRs	791 listed Indian firms, December 1998–May 1999	Event study	CGRs can increase share prices in an emerging market such as India.	<ul style="list-style-type: none"> Only listed firms Does not specify SOEs
Lu and Shi (2012)	Firm value (Tobin's Q)	CGR	Listed Chinese firms, 1998–2003	PSM, IV, and DiD	Effects of CGRs are significantly weaker for firms with more state-owned shares.	<ul style="list-style-type: none"> Only listed firms
Heo (2018)	ROA, debt ratio, and customer satisfaction	CEO duality, board size, board independence, corporatization, disclosure	320 Korean SOEs, 2015	OLS	Board size and transparency practices have a positive effect on debt ratio and ROA, respectively.	<ul style="list-style-type: none"> No counterfactual group No evidence of causality Short period of time
Eforis (2018)	ROA	Corporate Governance Perception Index	Listed Indonesian SOEs, 2011–2015	OLS	Firms with a higher rating will achieve better firm performance.	<ul style="list-style-type: none"> Endogeneity not addressed Not enough evidence of causality
Cunha et al. (2021)	ROA, ROE, Index of dependence on Treasury	IG-SEST, Treasury dependence	46 Brazilian federal SOEs, 2013–2019	OLS, RE	IG-SEST suggests positive but not statistically significant results.	<ul style="list-style-type: none"> No counterfactual group No evidence of causality

Source: Compiled by the authors.

Notes: CGR: corporate governance reforms; OLS; ordinary least squares regressions; IV; instrumental variable; Tobin's Q: ratio that compares a firm's market value to its replacement cost; KCGI; Korean Corporate Governance Index; 2SLS; two-stage least squares methodology; 3SLS; three-stage least squares methodology; FE; fixed effects specification; RE: random effects specification; PSM; statistical technique of propensity score matching; DiD; difference-in-differences methodology; CEO duality; situation where the roles of CEO and board chair are held by the same individual.

The aforementioned studies are essentially correlational, examining how changes in corporate governance are associated with firm-level outcomes. Lu and Shi (2012) and Black and Khanna (2007), in contrast, used methods that are better equipped to assess causality. The former combined DiD with matching and found that the effects of governance reforms were weaker for firms with greater state-owned participation in their shareholding structure. The authors, however, suggest that results should be interpreted with caution because of the very small number of SOEs in their analysis (33 out of 791). The latter, in turn, used the event study methodology and found that mandatory corporate governance reforms increased the market value of publicly listed companies in India, even though there is no direct examination of how this result varied in the specific context of SOEs.

A comprehensive search did not reveal any studies examining the causal effect of new legislation or regulatory provisions in tandem with changes in governance practices at the firm level. Yet there are reasons to believe that those institutional changes could complement corporate governance reforms at the firm level by requiring SOEs to adopt improved practices and introducing potential sanctions in cases where SOEs do not meet the expectations set out in law. Therefore, the next section explains the Brazilian experience of governance reform in more detail, with an emphasis on the new legislation focused on SOEs and an initiative to track the corporate governance practices of those SOEs as implemented by a federal public unit responsible for monitoring them. Subsequently, the impact of those changes is econometrically evaluated using a sample of Brazilian SOEs.

The Brazilian Experience of SOE Governance Reform

Brazil has a long history of corporate legislation and regulation. The Brazilian Corporate Law was passed in 1976⁹ at the same time the Brazilian Securities and Exchange Commission (Comissão de Valores Mobiliários, or CVM)¹⁰ was created; this established a general framework regarding the rights and duties of investors and shareholders. In particular, the Brazilian Corporate Law added clauses aimed at protecting minority

⁹ Brazil's Law n° 6.404/1976 regulates limited companies or "joint stock companies." See <http://www.planalto.gov.br/ccivil_03/leis/l6404consol.htm>.

¹⁰ Brazil's Law n° 6.385/1976 regarding the securities market created the Securities and Exchange Commission, or Comissão de Valores Mobiliários (CVM). See <http://www.planalto.gov.br/ccivil_03/leis/l6385.htm>.

shareholders, specifying that the controlling shareholder could be liable for damages if they abuse their power, such as if they make decisions to receive undue advantage at the expense of noncontrolling shareholders. Even though the Brazilian Corporate Law was also applicable to publicly traded SOEs, it did not establish specific criteria to guide the governance of state-controlled firms. To oversee the funding and performance of SOEs, SEST was established in 1979 as a public autarky.¹¹ Later on, in 2005, the OECD released its guidelines for SOE governance, and another public commission in Brazil (called the Comissão Interministerial de Governança Corporativa e de Administração de Participações Societárias da União or CGPAR) started proposing standards for the governance of federal SOEs in 2007, particularly in terms of economic and financial solvency, data transparency, personnel policies, and budgeting.¹² Over the years, SEST has had distinct mandates, but has maintained its role focusing on overseeing Brazilian SOEs.

Yet all of these advances were not sufficient to address conflicts rampant in Brazilian SOEs, as there is a temptation for governments to use state-owned companies for the benefit of the government through interventions, especially when governments are subject to external changes that require rapid adjustment or in situations that increase the temptation for governments to intervene, such as in economic recessions and election years (Musacchio and Lazzarini, 2014). Moreover, the presence of politically oriented managers in SOEs also creates principal-agent problems given that managers may deviate from the original policy objectives that motivated the creation of the SOEs.

Those considerations triggered broad policy discussions in Brazil, institutional advances in topics related to public governance and management, and eventually the passing of the Law on SOEs, in 2016. The Law on SOEs establishes mechanisms that ensure SOEs perform effectively in fulfilling their economic and social missions while preventing managerial misconduct. This law generally adheres to existing guidelines, such as those outlined by the OECD, by mandating timely and accurate disclosure of corporate information and setting clear criteria for appointing executives and director. According to the Law on SOEs, SOEs had a total of two years to adapt to the new

¹¹ SEST's history is available at <<https://www.gov.br/economia/pt-br/assuntos/empresas-estatais-federais/secretaria-de-coordenacao-e-governanca-das-empresas-estatais/view>>.

¹² Decree n° 6.021/2007 created the CGPAR (Comissão Interministerial de Governança Corporativa e de Administração de Participações Societárias da União). See <http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/decreto/d6021.htm>.

legislation and fully align with its mandatory practices and standards. In addition, the Law on SOEs required that all SOEs should have their own bylaws and procedures tied to their specific policy objectives and the legislation that supported their creation.

Right after the implementation of the Law on SOEs in 2017, SEST introduced IG-SEST, an index of governance practices initially designed to track firm-level alignment with the Law on SOEs, and later adapted to assess compliance with the directives of CGPAR,¹³ the OECD principles, and more recently, sustainability practices. The IG-SEST evaluation process begins with companies answering a questionnaire with 45 to 50 questions¹⁴ in three aggregate dimensions: (i) management, control, and auditing; (ii) information transparency; and (iii) composition of boards, committees, and executive bodies. SOEs must also provide documentation proving their compliance with the new rules or recommendations. Once completed, the questionnaires are then returned to SEST, which verifies the supporting documentation and forwards it to independent auditors. Finally, SEST and the auditors jointly decide on the evaluation of each company and “certify” the SOEs in each cycle of review. In the first four cycles, SEST started by certifying each SOE based on the level that they attained in their quantitative evaluation, ranging from 1 to 4. In the fifth cycle and on, SEST started using the scores to compute quartiles. SOEs in the first quartile were then certified as Level 1, SOEs between the first quartile and the median were certified as Level 2, and the others were considered not certified. Table 3 shows the evolution of IG-SEST based on its assessed standards, the number of participating SOEs, the average score per year, and the presence of an evaluation committee with independent members.¹⁵

¹³ As noted earlier, CGPAR was a public commission in Brazil, and the resolutions resulting from the commission are governance guidelines for federal state-owned companies that aim to ensure the entities’ economic and financial sustainability as well as the continuity of the delivery of goods and services of societal interest. The guidelines are available at <<https://www.gov.br/economia/pt-br/assuntos/empresas-estatais-federais/cgpar>>.

¹⁴ The number of questions on the questionnaire has varied slightly from evaluation cycle to cycle. SEST initially set (for the 2017 and 2018a cycles) that the frequency of evaluations would be quarterly. Later, in the documents for the third (2018b) and fourth cycles (2019), the organization determined there would be a round each term, which did not occur; the fifth cycle took place in 2020, and the sixth took place in 2022 (possibly due to the Covid-19 pandemic in 2021). In the regulations for the fifth (2020) and sixth (2022) cycles, there is no mention of the evaluation frequency by SEST through IG-SEST.

¹⁵ All information regarding the IG-SEST is available on the Brazilian Ministry of Economy website at <<https://www.gov.br/economia/pt-br/assuntos/empresas-estatais-federais/igsest>>.

Table 3: Timeline of the Implementation of IG-SEST

Cycle (year)	Number of SOEs evaluated		Evaluation committee: independent members	Average score	Governance standards evaluated				
	Parent SOE	Subsidiary			Law on SOEs compliance	CGPAR resolutions compliance	Governance effectiveness	OECD principles compliance	Sustainability compliance
1 st (2017)	47	0	No	4.1	Yes	No	No	No	No
2 nd (2018a)	47	0	No	6.9	Yes	Yes	No	No	No
3 rd (2018b)	47	7	Yes	7.2	Yes	Yes	Yes	No	No
4 th (2019)	46	15	Yes	8.5	Yes	Yes	Yes	No	No
5 th (2021)	45	15	Yes	8.1	Yes	Yes	Yes	Yes	No
6 th (2022)	44	18	Yes	-	Yes	Yes	Yes	Yes	Yes

Source: Compiled by the authors.

For more on the cycles of evaluation, see the earlier footnote. More information on the governance standards evaluation at <<https://www.gov.br/economia/pt-br/assuntos/empresas-estatais-federais/igsest/regulamentos%20IG-SEST/view>>

Firms' scores are available at <<https://www.gov.br/economia/pt-br/assuntos/empresas-estatais-federais/igsest/historico/evolucao-estatais-igsest>>

^a*Note:* The score ranges from 0 to 10. Results for 2022 were not yet available when this article was written.

This study's general hypothesis is that the implementation of the Law on SOEs and the adoption of IG-SEST had a positive effect on the performance of the targeted SOEs—both in terms of financial indicators and operational indicators related to service performance and labor productivity (which vary by sector and are therefore more difficult to examine for the whole group of SOEs). As discussed before, the Law on SOEs and the IG-SEST index targeted problems related to both principal-agent and principal-principal conflicts, with a positive impact on both profitability and productivity. Thus, the introduction of provisions to avoid the appointment of politically engaged executives and the monitoring of personnel had the potential to reduce principal-agent problems. Auditing and requirements to create specific bylaws tied to policy objectives could also have reduced the principal-principal problem—and its fiscal consequences—by curtailing (even if not eliminating) discretionary intervention on prices and investments by the government acting as a controlling shareholder.

There are several econometric challenges to assess the impact of the Law on SOEs and the IG-SEST. First, the Law on SOEs affected all SOEs, which therefore makes it difficult to assess a counterfactual scenario of what would have happened to those firms without it. Second, the set of SOEs treated with the IG-SEST was chosen by the federal government and therefore included only federal SOEs. Using other Brazilian SOEs at the state or municipal level as a comparison group is a possibility, but those SOEs would be expected to differ in a host of observable and unobservable traits. Third,

the Law on SOEs and IG-SEST were implemented more or less at the same time, which therefore creates additional challenges to sort out their separate effects. The next section explains the data and methods and how they try to address those identification challenges.

Data and Methods

This section outlines the dataset, covering the period from 2011 to 2020, and explains its application in assessing the impacts of the Law on SOEs and the IG-SEST on the profitability and productivity of SOEs.

Data

The econometric analysis of this paper is based on a unique dataset of 182 SOEs from 2011 to 2020 in Brazil, comprising 59 SOEs at the federal level, 92 at the state level, and 31 at the municipal level. This database was primarily based on information collected from Valor PRO,¹⁶ which tracks financial and firm-level data, which serve as key performance variables and controls in the empirical analyses. This database was complemented with a comprehensive search of the SOEs' financial statements in the cases where they were available online, usually in the websites of the SOEs. Furthermore, the Brazilian database on firm-level employment known as RAIS (Relação Anual de Informações Sociais) was utilized to calculate the number of employees per company from 2011 to 2018. Because RAIS only provided data up to 2018, data from the years following treatment (2016 to 2018) was used to estimate and extrapolate employment information for the years 2019 and 2020. An important feature of the database is that not only publicly listed SOEs are included (as is common in previous studies) but also SOEs that are privately held by the government.

Identification Strategy

The analysis essentially involves two interventions: the introduction of the Law on SOEs and the introduction of IG-SEST. As mentioned before, they were concurrently

¹⁶ Valor PRO is available by subscription at <<https://valorpro.globo.com/>>.

introduced¹⁷ and the Law on SOEs affected all state-controlled companies in Brazil, so distinguishing their effects is challenging.

Law on SOEs

To identify the effect of the more-stringent requirements of the Law on SOEs, the analysis benefits from the fact that only SOEs above a revenue cutoff (BRL 90 million) were subject to those rules. The rules required the creation of a code of ethics and integrity, as well as auditing and advisory bodies. The Law on SOEs also created new rules for the appointment of executives and board members; those individuals had to be chosen based on their professional experience, and individuals who recently worked for political parties and campaigns could not be appointed.

Although the regression discontinuity design methodology seems quite appropriate for this analysis, it was not possible to implement it due to the limited number of firms that are close to the BRL 90 million limit. As a result, DiD regressions were estimated to account for the variation in SOEs' performance before and after the introduction of the Law on SOEs, in 2016. Specifically, this methodology considers as a treatment group all SOEs subject to the more-stringent guidelines as the treatment group based on their revenue levels of 2015—in other words, SOEs with revenues above BRL 90 million in 2015. These high-revenue SOEs subject to the stringent guidelines are compared against SOEs with revenues below the BRL 90 million threshold in 2015, thus not subject to such guidelines in the year preceding the passing of the Law on SOEs. Acknowledging that those groups might not be directly comparable, in models without firm-level fixed effects, additional controls were included for the 2011–2015 average levels of $\ln(\text{Assets})_i$, Fixed Assets_i , Debt_i and $\ln(\text{Employees})_i$.¹⁸ Fixed-effect regressions were also conducted to control for fixed unobservable factors at the firm level. The DiD model applied to capture the effect of the more-stringent version of SOEs is as follows:

$$\text{Performance}_{it} = \beta_1 \cdot \text{Stringent law}_i \cdot \text{Post2016}_t + \gamma_i + \gamma_t + \varepsilon_{it}, \quad (1)$$

¹⁷ The Law on SOEs was enacted in June 2016, and the IG-SEST followed in November 2017. However, since the IG-SEST was created to complement the Law on SOEs, the treatment year for both policies has been established as 2016.

¹⁸ The terms are defined as follows: fixed assets = (non-current assets/total assets); debt = (current liabilities + non-current liabilities)/total assets.

In the equation, $Performance_{it}$ is the performance (profitability or productivity) of SOE i at t , and $Stringent\ law_i$ is a dummy variable coded 1 if SOE i is subject to the more-stringent requirements of the Law on SOEs (thus with revenues above BRL 90 million in 2015), and ε_{it} is the error term. The analysis also incorporates firm-level fixed effects γ_i and year fixed effects γ_t , and in some specifications (without firm fixed effects), it includes the aforementioned set of firm-specific control variables.

IG-SEST

In turn, to identify the effect of IG-SEST, the analysis considers all federal SOEs as treated after 2016,¹⁹ with state-level and municipal-level SOEs serving as a control group. Firm-level fixed effects are introduced as before. However, given the potential differences in the financial background of federal SOEs (e.g., larger revenues and assets), the analyses involve running the regressions on a matched sample of SOEs, first subject to the IG-SEST (federal SOEs), and then not subject to the IG-SEST, following the methodology proposed by Heckman, Ichimura, and Todd (1998). Propensity score matching (PSM) is utilized to generate inverse probability weights using the average of the 2011–2015 period of several financial characteristics of the SOEs within the sample. The observable traits considered for generating the propensity matching estimators were $\ln(Assets)_i$, $\ln(Gross\ Revenue)_i$, $\ln(Employees)_i$ as well as financial indicators $Fixed\ Assets_i$, $Debt_i$, and $Current\ liquidity_i$ of the SOEs. Secondly, a different PSM with exact matching based on the firms' sectors is also conducted.²⁰ The weights generated by the matching processes are then used to estimate the coefficients of the following DiD model:

$$Performance_{it} = \beta_1 \cdot IGSEST_i \cdot Post2016_t + \gamma_i + \gamma_t + \varepsilon_{it}, \quad (2)$$

where $IGSEST_i$ is a dummy variable coded 1 if SOE i is a federal SOE (thus subject to the IG-SEST) and the other variables are as explained before.

Variables and Treatments

This section unpacks the core components of this study: the performance variables and the treatments applied to assess the effects of governance reforms on SOEs.

²⁰ Industry matching was conducted using the national classification of economic activities (CNAE), a system that categorizes the primary activity of companies or establishments in Brazil. The matching process aligned to the first digit of the CNAE codes, ensuring a high degree of similarity between matched entities.

Additionally, it introduces the control variables that account for firm-level heterogeneity, setting the stage for a comprehensive understanding of the reforms' implications on SOE performance across different levels of government in Brazil.

Performance variables

This analysis examines the effect of the governance reforms on both firm-level profitability and productivity. Profitability is assessed using the variables *ROA* (return on assets) and *Net margin*²¹ (ratio of net income to gross revenues). As for productivity, the measure *Labor productivity* is computed by dividing the SOE's gross revenue (in BRL) by number of employees. *ROA* is widely used to indicate firms' performance as it captures efficiency in allocating capital (Lazzarini and Musacchio, 2018; Villalonga, 2004).²² *Net margin*, on the other hand, indicates how much profit a firm generates from its sales, and has been used to gauge the performance of business operations (Chan, Isobe, and Makino, 2008). Government interventions in SOEs that seek to keep prices low, for instance, should directly affect net margin. Finally, regarding *Labor productivity*, the goal was to verify whether changes in governance policies in Brazilian SOEs affected a company's efficiency in generating more revenue per worker. In the case of SOEs, for instance, increased labor productivity may reflect the ability of the firm to adjust the workforce and avoid political pressure to generally keep or increase employment (Datta, Guthrie, and Wright, 2005: 138-39).

Treatments

As mentioned before, the adherence to the stricter requirements of the Law on SOEs is coded by a dummy variable named *Stringent law*, which indicates if the SOE reported gross revenue above BRL 90 million in 2015. The effect of improved governance

²¹ Net margin is also known as return on sales (ROS) and it is obtained by dividing net income by gross revenue. The decision to use gross sales instead of net sales had to do with the different ways SOEs would report their results. However, using net sales instead of gross sales still leads to the same trends seen in the study.

²² Return on assets (ROA) is a more-reliable performance measure than return on equity (ROE) when comparing SOEs to similar private firms. SOEs are typically undercapitalized, resulting in higher ROE than what is normal for firms in any industry. Moreover, for firms heavily reliant on debt financing, ROE may not accurately reflect the efficiency of resource utilization. Another reason for using ROA is that, aside from productivity, no other performance indicator offers a fair comparison between SOEs and private firms. Metrics like gross or net margins can obscure the heavy reliance of SOEs on leverage, necessitating adjustments to account for leverage in any margin analysis (IDB, 2019).

monitoring, in turn, is captured by the dummy variable *IGSEST*, which codes whether the SOE was subject to the monitoring procedures of the IG-SEST.

Control variables

In specifications without firm-level fixed effects, the following firm-level observable traits are used as control variables: $\ln(\text{Assets})_i$, Fixed assets_i , Debt_i , and $\ln(\text{Employees})_i$. These are usual controls that capture firm-level heterogeneity in terms of size and financial traits potentially affecting performance. Only baseline levels of these variables are controlled for, considering the average of the 2011–2015 period. Table 4 includes descriptive statistics of the dependent and control variables, separated to show the full sample and three subgroups of firms from the database: federal SOEs, state SOEs, and municipal SOEs..

Table 4: Descriptive Statistics

	Full sample of SOEs		Federal SOEs		State SOEs		Municipal SOEs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Dependent variables</i>								
Return on assets (ROA)	-0.003	0.195	0.006	0.219	0.015	0.139	-0.071	0.262
Net margin	-0.001	0.040	-0.004	0.057	0.001	0.032	-0.002	0.008
Labor productivity	1949.7	5651.4	2505.2	7009.2	2150.2	5553.4	326.3	374.0
<i>Control variables</i>								
$\ln(\text{Assets})$	13.700	2.223	14.729	2.389	13.709	1.889	11.731	1.301
Debt	0.667	0.598	0.679	0.541	0.553	0.469	0.979	0.871
Fixed assets	0.652	0.260	0.636	0.265	0.689	0.249	0.577	0.266
$\ln(\text{Employees})$	6.631	1.885	7.320	1.936	6.266	1.888	6.421	1.352
Number of SOEs		182		59		92		31
Observations		1815		590		916		309

Source: Compiled by the authors.

Note: This table presents descriptive statistics for a unique dataset of 182 SOEs from 2011 to 2020 in Brazil, comprising 59 SOEs at the federal level, 92 at the state level, and 31 at the municipal level. In this analysis, select variables have been winsorized to mitigate the impact of extreme values. Winsorization was performed at the 1st and 99th percentiles, meaning that values below the 1st percentile and above the 99th percentile have been replaced with the closest value within these thresholds. Specifically, the variables ROA, labor productivity, $\ln(\text{Assets})$, Debt, and fixed assets were adjusted. This process enhances the robustness of the statistical analysis by reducing the influence of outliers. SD stands for standard deviation.

Results

This session is organized to present the effects identified for each treatment (Law on SOEs and IG-SEST) in terms of both financial performance and labor productivity.

Effects of the More-Stringent Requirements of the Law on SOEs

The analysis reveals no significant impact of the Law on SOEs' stricter requirements on the financial performance of affected firms, but suggests a potential positive effect on labor productivity. However, this latter finding is complicated by pre-existing trends, which might be explained by SOEs anticipation of subsequent governance reforms.

Financial performance

Table 5 presents the (static) DiD results for the application of the more-stringent version of the Law on SOEs on ROA, net margin, and labor productivity (equation 1). Columns 1, 3, and 5 report models that do not add firm-level fixed effects, but control for baseline financial variables. Columns 2, 4, and 6 report the results of models that control for firm-level fixed effects. Results in columns 1 through 4 show that there is no significant effect of the Law on SOEs on the financial performance of firms that were subject to its most-stringent requirements (in comparison to firms that were only subject to weaker requirements of the Law on SOEs).

To assess whether there could be dynamic effects on financial performance, which could ultimately lead to an average zero estimate on performance, dynamic DiD models are estimated. In these models, each coefficient compares the differences between treated and untreated units with respect to their differences in the year that immediately preceded the Law on SOEs (i.e., 2015). The results of these analyses for financial performance are reported in Figures 1 and 2. Although the treated and untreated SOEs performed similarly prior to the Law on SOEs, this study failed to detect consistently significant differences after the Law on SOEs came into effect for the subset of larger SOEs with more-stringent requirements.

Table 5: Static Difference-in-Differences Model: More-Stringent Requirements of the Law on SOEs and Performance

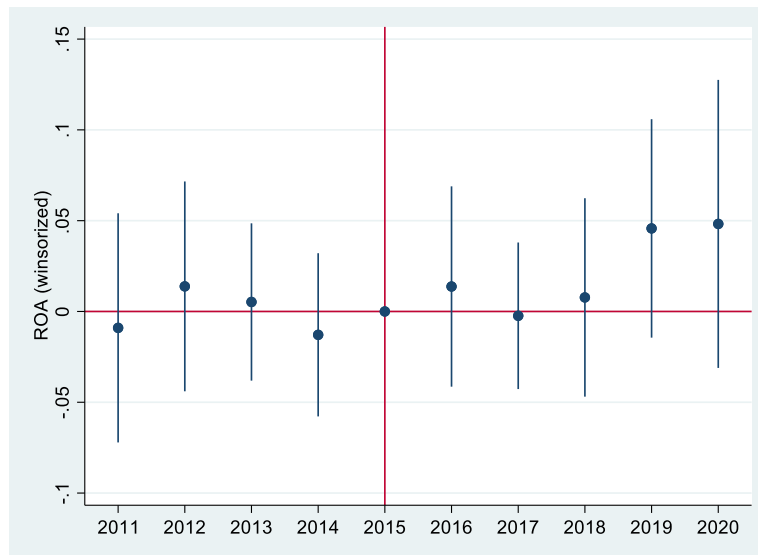
	Return on assets		Net margins		Labor productivity	
	(1)	(2)	(3)	(4)	(5)	(6)
Stringent law x post-2016	0.02 [0.301]	0.023 [0.230]	-0.001 [0.820]	-0.001 [0.842]	608.021 [0.033]	422.009 [0.057]
Stringent law	0.021 [0.640]		0.004 [0.547]		1151.31 [0.155]	
Observations	1802	1812	1762	1772	1787	1787
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No	Yes	No
Baseline control variables	Yes	No	Yes	No	Yes	No
Firm-level fixed effects	No	Yes	No	Yes	No	Yes

Source: Created by the authors.

Note: p-values are shown in brackets. Standard errors are clustered at the firm level. Baseline control variables represent the 2011–2015 average of the financial control variables described in the main text.

Winsorization was performed on ROA (return on assets), net margins, and labor productivity at the 1st and 99th percentiles, meaning that values below the 1st percentile and above the 99th percentile have been replaced with the closest value within these thresholds.

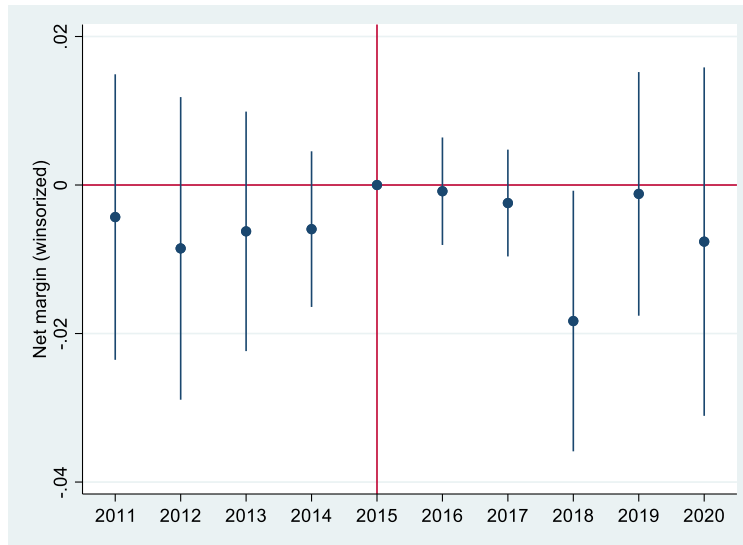
Figure 1. Dynamic Difference-in-Differences Specification: Law on SOEs and Return on Assets



Source: Created by the authors.

Notes: Winsorization was applied to ROA at the 1st and 99th percentiles. Dots represent point-estimates of each coefficient of the dynamic difference-in-differences (DiD) specification, and the error bars represent 95 percent confidence intervals. Standard errors are clustered at the firm level. The model controls for year-level and for firm-level fixed effects. The year 2015, the year before the passing of the Law on SOEs, is used as the benchmark year. The treatment group contains SOEs with 2015 gross revenue above the cutoff of BRL 90 million. The control group contains SOEs with 2015 gross revenue below that threshold.

Figure 2. Dynamic Difference-in-Differences Specification: Law on SOEs and Net Margin



Source: Created by the authors.

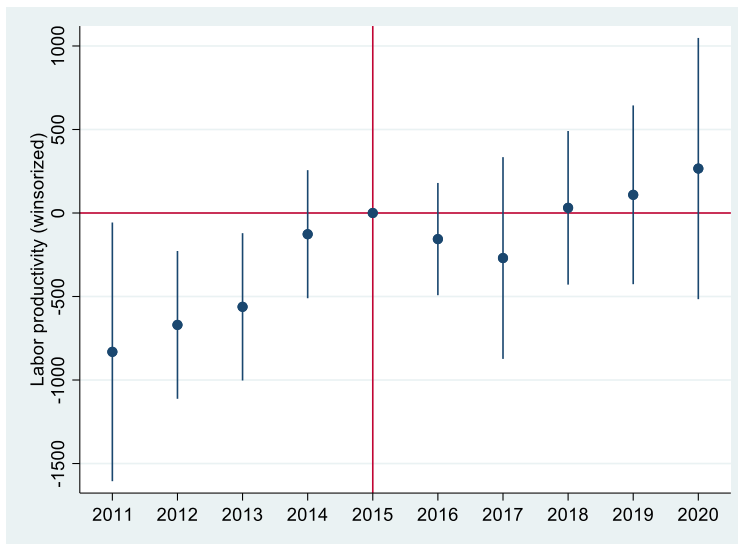
Notes: Winsorization was applied to net margin at the 1st and 99th percentiles. Dots represent point-estimates of each coefficient of the dynamic difference-in-differences (DiD) specification, and the error bars represent 95 percent confidence intervals. Standard errors are clustered at the firm level. The model controls for year-level and for firm-level fixed effects. The year 2015, the year before the passing of the Law on SOEs, is used as the benchmark year. The treatment group contains SOEs with 2015 gross revenue above BRL 90 million. The control group contains SOEs with 2015 gross revenue below such threshold.

Labor productivity

In contrast to the results regarding financial performance (columns 1 to 4 of Table 5), columns 5 and 6 of Table 5 report a positive and significant effect of the more-stringent Law on SOEs on labor productivity. However, when evaluating this effect using the dynamic DiD model (Figure 3), it is observed that the labor productivity of companies that were subject to the more-stringent requirements of the Law on SOEs was already increasing compared to the other SOEs even before the passing of the Law on SOEs, indicating that the basic assumption of parallel trends was violated. In other words, the analysis does not support the claim that the stricter requirements of the Law on SOEs would have improved the labor productivity of the larger SOEs subject to more-stringent requirements. A possible explanation for this result is that, before the Law on SOEs was passed, SOEs were subject to government interventions that could have affected their ability to adjust their workforce, especially around 2012 (Musacchio and

Lazzarini, 2014). After this initial shock, SOEs could have adjusted their internal practices in anticipation of subsequent governance reforms.

Figure 3. Dynamic Difference-in-Differences Specification: Law on SOEs and Labor Productivity



Source: Created by the authors.

Notes: Winsorization was applied to labor productivity at the 1st and 99th percentiles. Dots represent point-estimates of each coefficient of the dynamic difference-in-differences (DiD) specification, and the error bars represent 95 percent confidence intervals. Standard errors are clustered at the firm level. The model controls for year-level and for firm-level fixed effects. The year 2015, before the passing of the Law on SOEs, is used as the benchmark year. The treatment group contains SOEs with 2015 gross revenue above BRL 90 million. The control group contains SOEs with 2015 gross revenue below such threshold.

Effect of the IG-SEST

The results show that the implementation of IG-SEST improved the financial performance of federal SOEs in Brazil, enhancing profitability without affecting labor productivity. These findings suggest a positive impact of improved governance practices, though their benefits did not uniformly extend across all performance areas.

Balancing check of matched sample

As mentioned before, the analysis of the impact of IG-SEST aims to create a comparable control group of municipal-level and state-level SOEs, given that the monitoring mechanism was only applied to federal SOEs. Table 6 reports the post-2016 matching balancing of the financial characteristics of federal SOEs and non-federal SOEs (i.e.,

respectively, those subject to and not subject to the IG-SEST). For each baseline financial variable reported in Table 6, ordinary least squares (OLS) regressions were run using the estimated matching weight against a dummy variable reporting if the SOE was subject to the IG-SEST. Matching by industry was done by using the National Classification of Economic Activities (Classificação Nacional de Atividades Econômicas, or CNAE), which identifies the main activity of a company or establishment in Brazil; the matches were made to one digit, which indicates a close match. The results show that, after the matching procedure and its associated weights, treated and untreated units have similar financial characteristics.

Table 6: Balancing Analysis of the Matched Samples of SOEs Subject to IG-SEST

Financial characteristics (average of 2011–2015 period)	Debt	Fixed assets %	Liquidity	Ln(Assets)	Ln(Revenue)	Ln(Employment)
	Panel A: Propensity Score Matching (PSM)					
IG-SEST	-0.061	0.027	-0.217	0.229	0.295	0.096
	[0.620]	[0.640]	[0.699]	[0.597]	[0.696]	[0.783]
Observations (weighted)	119	119	119	119	119	119
	Panel B: PSM with exact industry matching (CNAE 1-digit)					
IG-SEST	0.069	0.016	-0.689	0.138	-0.131	0.108
	[0.435]	[0.802]	[0.372]	[0.720]	[0.839]	[0.748]
Observations (weighted)	111	111	111	111	111	111

Source: Compiled by the authors.

Notes: Observations are in the pre-treatment years (average of 2011–2015). Estimates represent the coefficient of the dummy variable of a simple ordinary least squares (OLS) model that regresses the respective financial variable on a dummy variable indicating whether the SOE was subject to the IG-SEST (i.e., a federal SOE). Regressions are weighted by the weights generated by the corresponding matching algorithm (as indicated in the panel and explained in the main text). Standard errors are clustered at the firm level.

Financial performance

Table 7 presents the results of the basic (static) DiD model (equation 2), which assesses the potential impact on SOEs' financial and operational performance of being evaluated by IG-SEST. IG-SEST seems to have a positive effect on both financial outcomes (with a p-value of less than 0.05). Specifically, IG-SEST was associated with an average increase of 4 percentage points in ROA and 1 percentage point in net margin. These results are consistent across Panels A and B, which report separately the results associated with using the two types of matching algorithm to compute the propensity score weights.

Table 7: Static Difference-in-Differences Model: IG-SEST and the Performance of Federal SOEs

	Return on assets		Net margin		Labor productivity	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Propensity Score Matching (PSM)						
IG-SEST x post-2016	0.045	0.044	0.017	0.016	103.167	248.267
	[0.029]	[0.025]	[0.019]	[0.019]	[0.762]	[0.426]
IG-SEST	-0.054		-0.031		152.541	
	[0.055]		[0.002]		[0.793]	
Observations	1183	1183	1143	1143	1173	1173
Panel B: PSM with exact industry matching (CNAE 1-digit)						
IG-SEST x post-2016	0.049	0.048	0.013	0.012	-194.277	-45.773
	[0.017]	[0.016]	[0.034]	[0.039]	[0.556]	[0.867]
IG-SEST	-0.011		-0.024		-17.344	
	[0.784]		[0.004]		[0.980]	
Observations	1103	1103	1063	1063	1092	1092
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No	Yes	No
Baseline control variables	Yes	No	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes	No	Yes

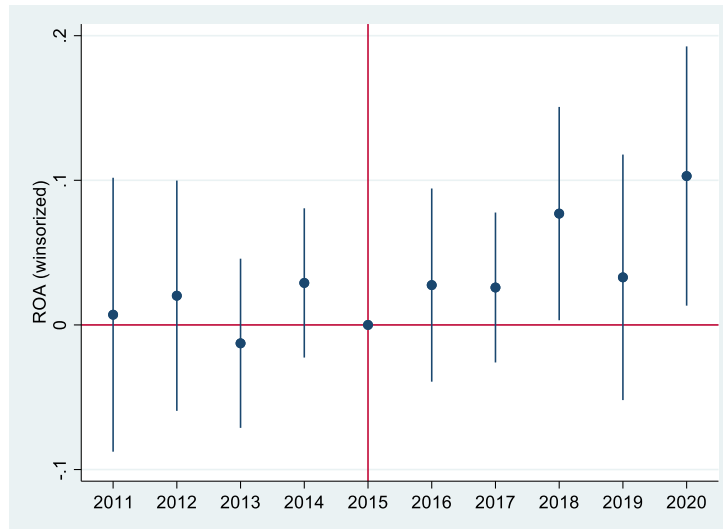
Source: Compiled by the authors.

Notes: Winsorization was performed on return on assets (ROA), net margins, and labor productivity at the 1st and 99th percentiles, meaning that values below the 1st percentile and above the 99th percentile have been replaced with the closest value within these thresholds. Regressions are weighted by the respective weights generated by the matching algorithm. P-values are given in brackets. Standard errors clustered at the firm level. Baseline control variables represent the 2011–2015 average of the financial control variables described in the main text. Panel A weights the observations by weights created using a propensity score matching (PSM) using only financial baseline variables, as reported in the text. Panel B weights the observations based on weights generated by a second matching algorithm, which creates exact matching at the industry level (matching using the CNAE classifications to 1 digit) before matching on financial characteristics.

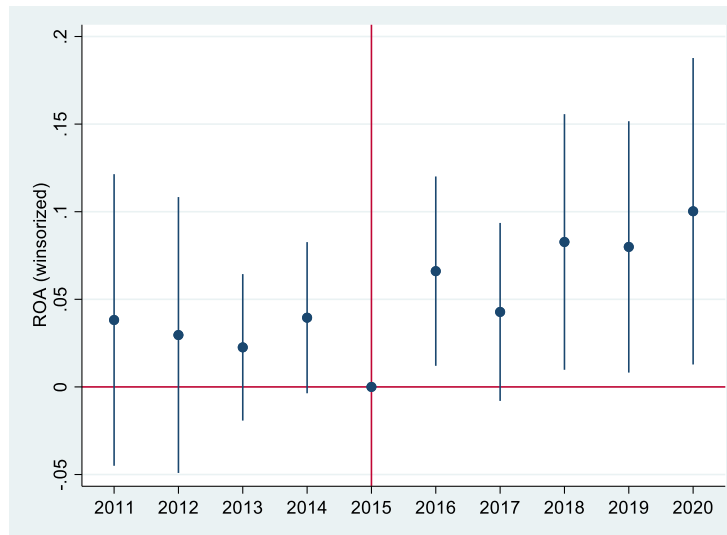
The static analysis is only partially corroborated by the dynamic DiD results shown in Figures 4 and 5. For both ROA and net margin, federal SOEs showed similar performance compared to the other SOEs. Regarding the effects on ROA (Figure 4), the results are positive and statistically significant for at least two post-IG-SEST years and considering both matching procedures. However, regarding net margin (as shown in Figure 5), a significant effect post-treatment emerges exclusively in 2019, following the application of exact industry matching. As a result, the effect of IG-SEST on ROA seems to be more robust than the effect of IG-SEST on net margin across the static and dynamic DiD specifications.

Figure 4. Dynamic Difference-in-Differences Specification: IG-SEST and Return on Assets

Panel A: Propensity Score Matching (PSM)



Panel B: PSM with exact industry matching (CNAE 1-digit)

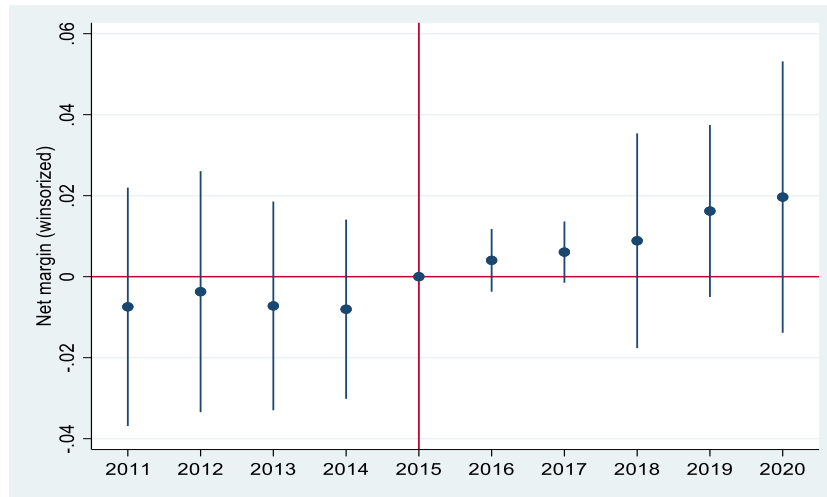


Source: Created by the authors.

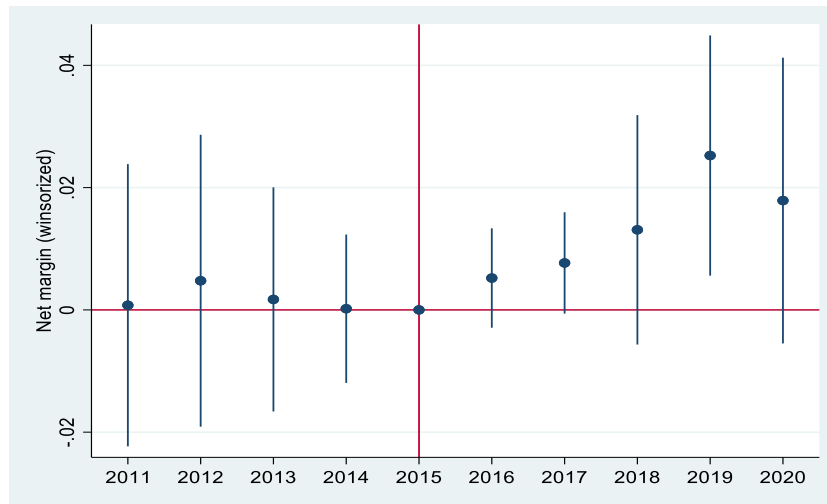
Notes: Winsorization was performed on ROA (return on assets) at the 1st and 99th percentiles. Regressions are weighted by the respective weights generated by the matching algorithm. Dots represent point-estimates of each coefficient of the dynamic difference-in-differences (DiD) specification, and the error bars represent 95 percent confidence intervals. Standard errors are clustered at the firm level. The model controls for year-level and for firm-level fixed effects. The year 2015, which is before the passing of the Law on SOEs, is used as the benchmark year. Panel A weights the observations by weights created using a propensity score matching model (PSM) using only financial baseline variables, as reported in the text. Panel B weights the observations based on weights generated by a second matching algorithm that creates exact matching at the industry level (matching using the CNAE classifications to 1 digit) before matching on financial characteristics.

Figure 5. Dynamic Difference-in-Differences Specification: IG-SEST and Net Margin

Panel A: Propensity Score Matching (PSM)



Panel B: PSM with exact industry matching (CNAE 1-digit)

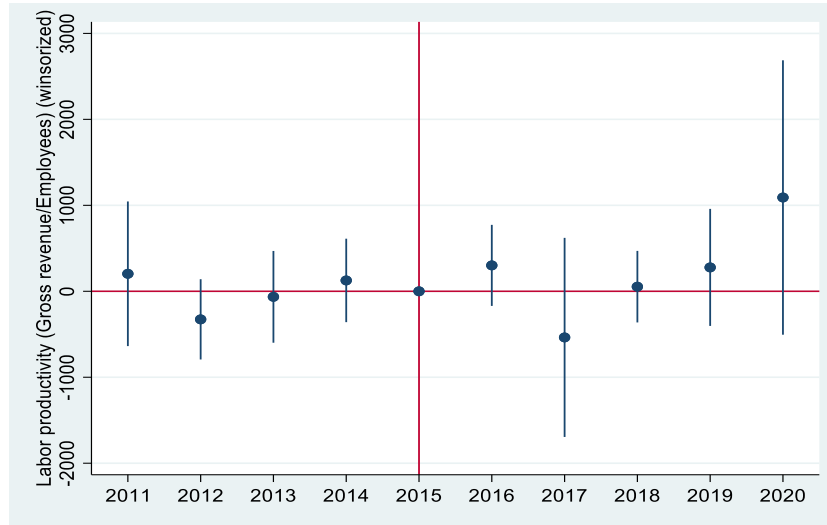


Source: Created by the authors.

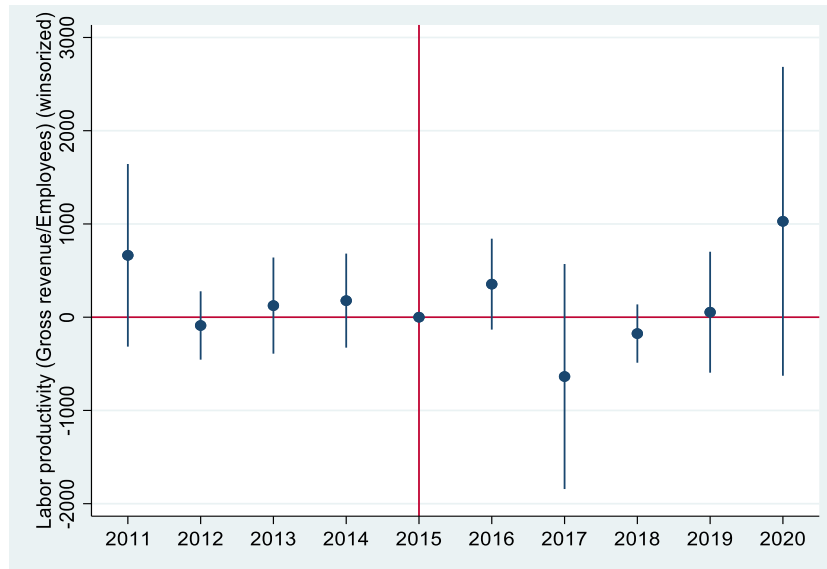
Notes: Winsorization was performed on net margin at the 1st and 99th percentiles. Regressions are weighted by the respective weights generated by the matching algorithm. Dots represent point-estimates of each coefficient of the dynamic difference-in-differences (DiD) specification, and the error bars represent 95 percent confidence intervals. Standard errors are clustered at the firm level. The model controls for year-level and for firm-level fixed effects. The year 2015, which was before the passing of the Law on SOEs, is used as the benchmark year. Panel A weights the observations by weights created using a propensity score match (PSM) using only financial baseline variables, as reported in the text. Panel B weights the observations based on weights generated by a second matching algorithm that creates exact matching at the industry level (matching using the CNAE classifications to 1 digit) before matching on financial characteristics.

Figure 6. Dynamic Difference-in-Differences Specification: IG-SEST and Labor Productivity

Panel A: Propensity Score Matching (PSM)



Panel B: PSM with exact industry matching (CNAE 1-digit)



Source: Created by the authors.

Notes: Winsorization was performed on labor productivity at the 1st and 99th percentiles. Regressions are weighted by the respective weights generated by the matching algorithm. Dots represent point-estimates of each coefficient of the dynamic difference-in-differences (DiD) specification, and the error bars represent 95 percent confidence intervals. Standard errors are clustered at the firm level. The model controls for year-level and for firm-level fixed effects. The year 2015, which was the year before the passing of the Law on SOEs, is used as the benchmark year. Panel A weights the observations by weights created using a propensity score matching model (PSM) using only financial baseline variables, as reported in the text. Panel B weights the observations based on weights generated by a second matching algorithm that creates exact matching at the industry level (matching using the CNAE classifications to 1 digit) before matching on financial characteristics.

Labor productivity

Columns 5 and 6 of Table 7 show that the start of the IG-SEST was not associated with a significant increase in the labor productivity of federal SOEs vis-à-vis the matched set of state and local SOEs. The dynamic analysis in Figure 6 above also suggests that IG-SEST had no effect on the variable of labor productivity. Therefore, the findings partially support the general hypothesis that implementing governance improvements causes a positive effect on the performance of targeted SOEs, with more consistent effects found in the case of profitability indicators. This partial support is consistent with the hypothesis that the IG-SEST monitoring mechanism, following the new guidelines set by the Law on SOEs, increased the compliance of SOEs to improved governance practices, thereby constraining inefficient pricing and any resource allocation decisions that could have otherwise undermined firm-level profitability.

Robustness

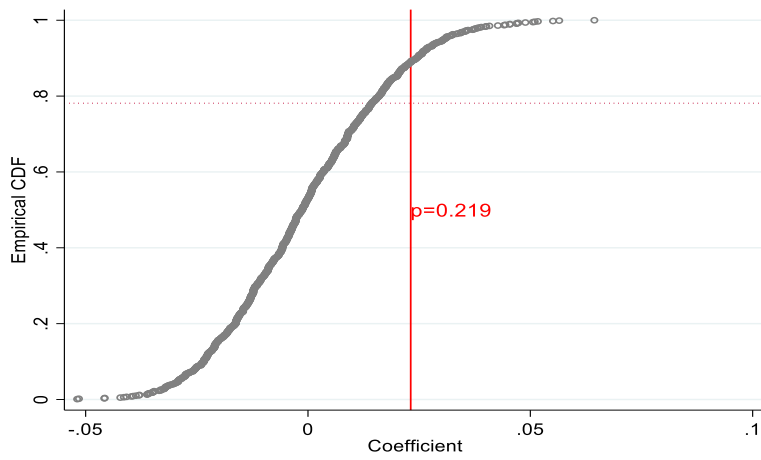
This section presents two types of robustness analysis performed to check the internal validity of the results: placebo and leave-one-out tests.

Placebo tests

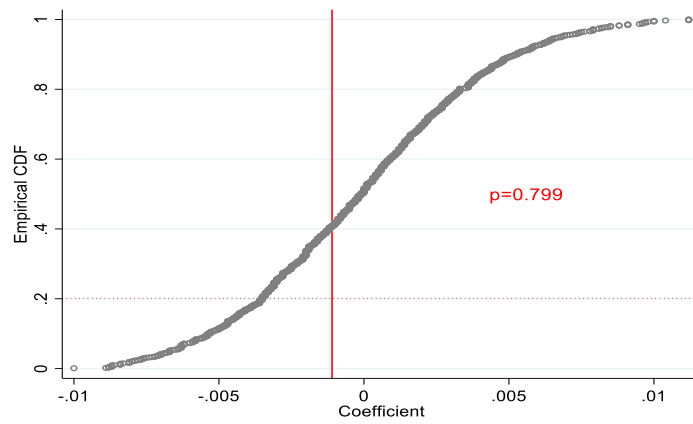
First, placebo tests were conducted to check for random reproducibility. False treated and non-treated statuses were randomly assigned to each firm in the sample, and subsequently, static and dynamic DiD models using the inferred placebo treatment probability. This iterative procedure, referred to as a “permutation test,” was repeated 1,000 times, following the methodology outlined by Araujo et al. (2020: 250). When applying it to assess the effect of the Law on SOEs, it is found that in 21.9 percent of the simulations a more-extreme effect of the Law would occur on ROA than observed in the original analysis. Meanwhile, the probability of finding stronger effects of the Law on net margin and labor productivity would be, respectively, 79.9 percent and 22.5 percent (Figure 7). Given that the primary focus of the analysis of the Law on SOEs is its effect on labor productivity—especially considering its null impact on financial performance in both static and dynamic DiD analyses—this variable warrants particular attention. Thus, the placebo test for labor productivity suggests that the probability of the result being driven by the Law on SOEs is greater than the probability it is driven by coincidence.

Figure 7. Placebo Tests: Law on SOEs

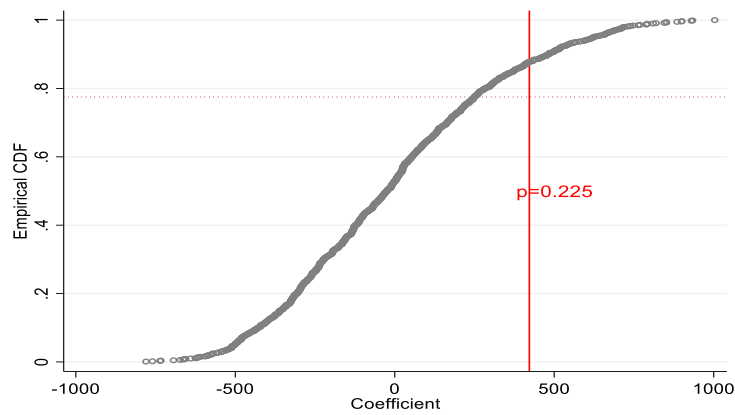
Panel A: Return on Assets



Panel B: Net Margin



Panel C: Labor Productivity



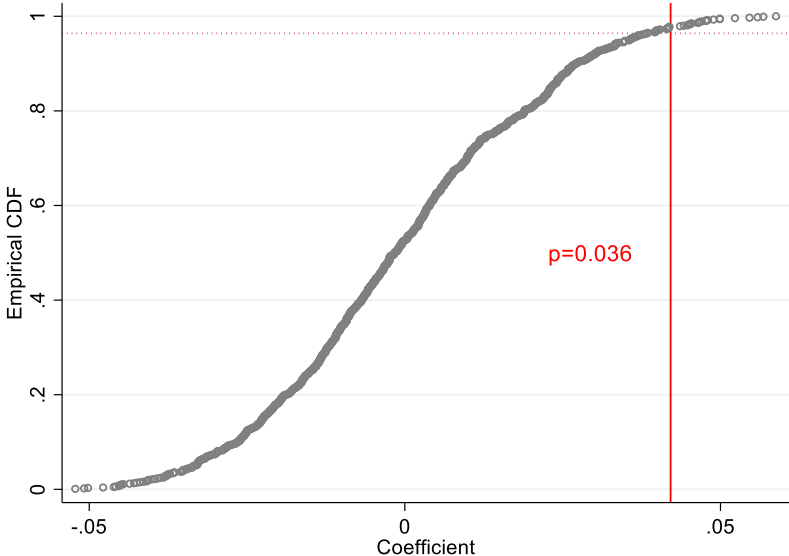
Source: Compiled by the authors.

Notes: CDF refers to cumulative distribution function.

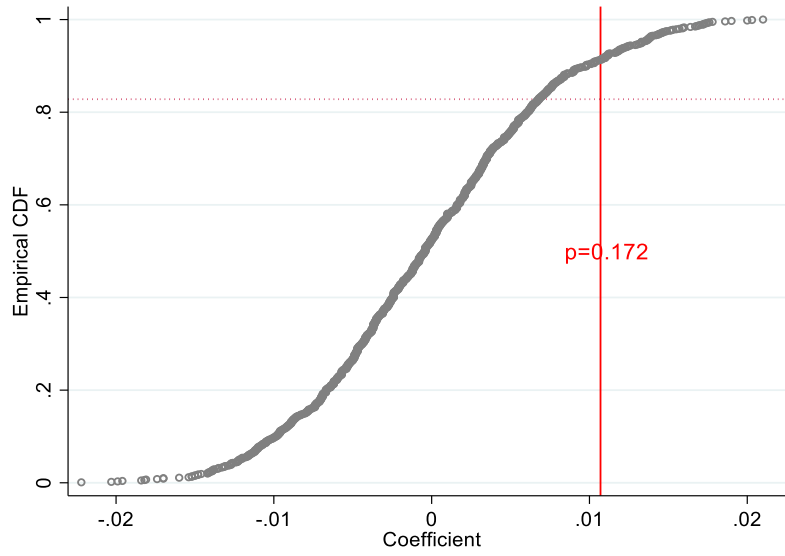
Winsorization was performed on Return on assets (ROA), net margins, and labor productivity at the 1st and 99th percentiles.

Regarding the effect of IG-SEST, the result appears to be more robust in the case of the effect on the ROA of federal SOEs, as for this variable, in only 3.6 percent of the simulated cases more-extreme results than those of the original analysis would be found (Figure 8). In contrast, in the case of net margin, stronger results have a 17.2 percent probability of occurrence, whereas for labor productivity, this probability is above 75 percent (Figure 8, panel C). Thus, those tests lend consistent support for the effect of IG-SEST on ROA, with moderate support when considering net margin as an outcome variable and, as before, provide no support for an impact on labor productivity.

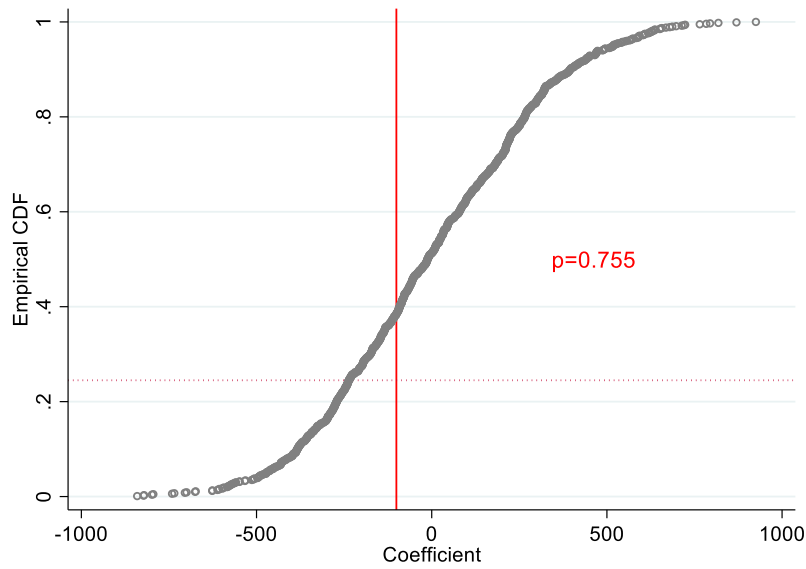
Figure 8. Placebo Tests: IG-SEST
Panel A: Return on Assets



Panel B: Net Margin



Panel C: Labor Productivity



Source: Compiled by the authors.

Notes: CDF refers to cumulative distribution function. Winsorization was performed on Return on assets (ROA), net margins, and labor productivity at the 1st and 99th percentiles.

Leave-one-out tests

The second set of tests aim to address any influence that outliers may have had on the results, particularly considering that the sample size is relatively small. These leave-one-out procedures followed the intuitive logic of running the same DiD model 182 times—since there are 182 SOEs in the sample—while removing one unit at a time (either treated or control).²³

In assessing the effect of the Law on SOEs with the leave-one-out procedures, no significant variations in the results were found compared to the model that considered the entire sample. This result suggests that no individual unit is exerting a notable influence on the findings regarding the Law on SOEs.

When the same procedure was applied to the IG-SEST, although some rounds yielded slightly different coefficients for the financial outcomes, the significance of the results remained the same—that is, in those cases, the dynamic DiD analysis also exhibits the same pattern as before. Additionally, in terms of labor productivity, it was observed that the estimated beta varies considerably when certain units are removed. However, this does not affect the previous conclusion of a null effect of the IG-SEST on labor productivity.

Discussion and Conclusions

There has been an ongoing debate about how to increase the governance and performance of SOEs (Bruton et al., 2015; Musacchio and Lazzarini, 2014; Wright et al., 2022). Because of the political opposition and bureaucratic hurdles that might accompany divestiture programs to address agency conflicts in SOEs (Durant and Legge Jr., 2002; Lazzarini, 2022; Ramamurti, 2000), governments have tried instead to keep their control of SOEs and at the same time promote improved governance practices that increase transparency, accountability, and adherence to well-defined efficiency and policy objectives instead of discretionary political intervention (IDB, 2019). However, in contrast with the large empirical literature examining the effect of divestitures and privatizations (e.g., Radic, Ravasi, and Munir, 2021), there is still scant work examining the effect of policies to improve the governance of SOEs, especially with an emphasis on identifying whether those interventions caused any impact on SOEs' performance.

²³ These leave-one-out tests are also known as leave-one-out cross-validation (LOOCV).

This paper benefits from the recent experience in Brazil involving the implementation of a novel legal framework to discipline SOEs (the Law on SOEs) and a mechanism to measure and track governance improvements (IG-SEST, a governance index managed by SEST, the Brazilian public entity in charge of monitoring state investments in companies).

The DiD results do not support the hypothesis that SOEs subject to the more-stringent auditing requirements of the Law on SOEs improved their ROA, net margin, and labor productivity. However, there is evidence that some of those firms were already improving before the Law on SOEs was passed, adjusting their processes to attenuate the negative impact of previous government interventions (e.g., interventions to keep their prices low or keep employment high) and possibly anticipating calls for governance reforms in response to those problems.

Yet evidence is indeed found that federal SOEs (which were subject to IG-SEST) increased their profitability compared to state-level and municipal-level SOEs. Although the IG-SEST affected all federal SOEs, and hence the detected effect can also be a result of those SOEs changing their practices differently from the other state-owned firms, these findings are consistent with the hypothesis that firm-level monitoring might be important to complement and enforce legal or regulatory clauses mandating improvements in governance practices. Also controlling for a host of fixed effects (thus accommodating potential differences in the propensity to adopt those practices across firms) and, according to robustness analyses, the results do not appear to be random. Thus, the results are interpreted as suggestive of a potential complementarity between country-level institutional reforms and firm-level monitoring mechanisms to increase adherence and compliance with the new governance requirements.

The results shed light on the extent of the impact of governance reforms on SOEs. Besides the agency problems that can be addressed by improved corporate governance and disclosure, there is also a fiscal governance problem that requires broader policy changes beyond changes in corporate governance (IDB, 2019, 2022). Given the focus of this paper on the firm-level effects of governance reforms, a remaining issue is the potential role of fiscal governance reforms and their complementary effect on the performance of SOEs. Both the Law on SOEs and the IG-SEST were directly aimed at creating rules and improving monitoring of SOEs, but neither eliminated the discretion that the Brazilian government has to extract resources from SOEs and/or use them to

implement discretionary policies even if these policies lead to financial losses and insolvency, eventually even requiring financial bailouts. Overall, this work suggests that corporate governance reforms combining rules and monitoring may be a way to improve the performance of SOEs, but it also opens the possibility to assess how other reforms, including changes in fiscal governance reforms might generate stronger and more persistent results.

There are also many ways in which this analysis can be expanded in future studies. The emphasis on performance indicators linked with productivity and profitability follows prior work arguing that principal-agent and principal-principal governance conflicts in SOEs tend to cause inefficiency and misallocation at the firm level as well as financial distress at the country level. However, future work could also examine other mediating factors that could be more directly affected by those reforms. For instance, the Law on SOEs or IG-SEST could have promoted internal compliance mechanisms and reduced internal deviations and misconduct, which it is not directly observed here.

In addition, profitability and productivity are aggregate measures that might not capture process improvements within SOEs and their internal subunits. Therefore, future work could also consider a broader set of intermediate outcome variables and management practices that might be directly affected by changes in governance (see, e.g., Teodorovicz, Lazzarini, Cabral, and Nardi, 2022). Finally, SOEs pursue public objectives that vary by firm and are more difficult to observe and measure. It is also possible that the interventions helped increase the performance of SOEs on those policy dimensions, an effect that was not possible to assess due to lack of standardized data across SOEs and the sectors in which they operate.

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