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New regulations in the Brazilian private security industry: effects on turnover and human capital outcomes

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Abstract

Purpose – This paper aims to examine the effects on firms' outcomes of a new government regulation on the private security industry that aimed to enhance the selection and training processes for armed-private security officers.

Design/methodology/approach – By using human capital theory and using a data set built from various public sources, this study analyzes the effects of a new regulation implemented in 2013–2014 in Brazil mandating psychological assessments for hiring private security armed officers. Firm-level data and a Difference-in-Differences (DiD) identification strategy are used to investigate the effects on turnover and human capital outcomes.

Findings – The study identifies substantial changes resulting from the new government regulation in private security firms. While it has led to increased turnover rates, the regulation has also facilitated firms in enhancing the human capital composition of their workforce by enabling the recruitment of more experienced personnel.

Research limitations/implications – This research informs to current debates on the effects of policy interventions on firm's outcomes by showing how regulations aimed to improve the configuration of human capital can generate win-win situations for both firms and citizens, despite the short-term trade-offs between higher turnover rates and improved human capital outcomes.

Practical implications – Refining selection and training processes can enhance the workforce in private security firms by replacing less capable professionals with more experienced ones. Insights from this study offer guidance to policymakers and industry practitioners in shaping effective business and public policies.

Social implications – This study underscores the role of training and psychological assessments in enhancing the composition of human capital in the private security industry.

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Originality/value – By highlighting the role of policy interventions in establishing barriers to unskilled workers engaging in hazardous activities, this study contributes to the burgeoning literature in strategic management on the interaction between policy interventions and firm outcomes.

Keywords Government regulation, Private security industry, Human capital

Paper type Research paper

1. Introduction

Regulating private firms that provide public services or produce negative externalities, such as pollution, labor standard violations or mistreatment of marginalized groups, is a widespread practice in both developed and developing countries. More recently, government regulations have gained the attention of strategic management scholars who are interested in both value creation and value appropriation (Cabral, Mahoney, McGahan, & Potoski, 2019; Holburn & Zelner, 2010; Page, Stone, Bryson, & Crosby, 2015). However, this regulation often sparks debates between those who support government intervention in private activities and those who believe it should be restricted to maintain market features. Advocates for government intervention argue that governments must provide incentives, both in terms of rewards and sanctions, to align the interests of citizens and firms (Bernard, Capponi, & Stiglitz, 2022). Conversely, opponents of government intervention argue for minimal regulation to maintain market efficiency (Viscusi, Harrington, & Sappington, 2018). While the literature on the so-called non-market strategies have been highlighting the role of corporate political actions by firms in shaping polices that address business interest (Baron, 1995; Dorobantu, 2017; Gatignon, Gama, & DeMello, 2022), recent advances in both strategic management and public management literatures have been analyzed the role of organizational traits in activities that dialogue with the public interest and the correspondent implications on public service performance (Andrews, Beynon, & McDermott, 2016; Bruce, de Figueiredo, & Silverman, 2019; Mahoney, McGahan, & Pitelis, 2009; Quelin, Cabral, Lazzarini, & Kivleniece, 2019). In general, these studies suggest that the presence of factor such as resources, capabilities and human capital may reconcile policy and firm-level outcomes and enable value creation to both firms and the public (Alonso & Andrews, 2019; Cabral, 2017; Paik, Kang, & Seamans, 2019). Despite the growing emphasis on stakeholder management, there is limited research on the impact of government regulation on outsourced activities that have negative effects on citizen's welfare, social justice and firm-level outcomes (Boaventura, Bosse, Manuela Cunha de Mascena, & Sarturi, 2020; Lazzarini, 2020; McGahan, 2021).

In 2020, Carrefour, a leading French company in the retail industry, faced significant issues when private security officers employed by the company brutally killed a customer in Brazil (Vara, 2020). In another case, an immigrant died due to suffocation caused by private security guards in Portugal's immigration service (Demony, 2020). Similarly, in Denver, a private security guard from a journalism team shot and killed a participant of a patriotic protest in the USA (Coffman, 2020). These cases underscore the critical need for controlling and regulating the activities of private security firms, as their actions involve coercion and the use of force, which is typically seen as a monopoly of the state in modern societies (Lopes, 2012; Manning, 2006; Stenning & Shearing, 2015). In fact, ignoring activities that have the potential to generate negative externalities can be a costly mistake for strategists. Such oversight can result in the destruction of previously enhanced performance and may even lead to reputational damage for the organization.

Along these lines, the study aims to analyze the effects of government regulation on human capital outcomes of private security firms. It focuses on a specific regulation

implemented by the Brazilian federal government during the years 2013 and 2014. Normative Instructions 70 and 78 (IN 70 and IN 78) require biannual psychological assessments for private security officers carrying firearms. Accredited psychologists from the Brazilian Federal Police administer these assessments using validated tests to assess cognitive abilities and ensure fitness for duty.

The regulatory changes implemented by the Brazilian federal government may have affected private security outcomes, including turnover and the quality of the workforce. Employment termination of security officers who fail psychological assessments may result in absenteeism, health leaves, and turnover. The new regulation may influence officer hiring profiles, prioritizing experienced individuals and improving screening processes.

Therefore, studying regulation's effects on human capital outcomes is crucial for understanding the effects of policy interventions on firm's responses. This paper adopts a quasi-experimental approach using Differences-in-Differences (DiD) to analyze the regulation's impact on two firm-level outcomes: Turnover and human capital quality, measured by the experience of security officers that are fired and hired after the new regulation. Data from multiple sources, including the Annual Social Information Report (RAIS), Brazilian Federal Revenue agency, IBGE, and Brazilian Federal Police, cover 2008–2017 with 599 firm-year observations. The treatment group (TG) consists of firms that enlist armed guards, whereas the control group (CG) uses non-armed security guards (porters) in either a complementary or substitute capacity. Porters are selected for the control group based on their exemption from regulatory requirements, thereby ensuring the absence of any external influences on the treatment.

The findings indicate that government regulation has had an interesting effect on the private security sector in Brazil, resulting in a notable transformation of the qualifications required for armed guards and an overall improvement in workforce quality. This transformation is evident in the increased turnover rates and a strategic shift among companies towards recruiting more seasoned professionals. In response to escalating costs, post-hoc evidence suggests a trend of substituting armed guards with non-armed counterparts who are exempt from the regulatory measures.

The paper structures as follows. Theoretical stances are presented, formulating two testable hypotheses based on strategic human capital literature. Contextual information on the setting and a detailed description of variables and sources are provided. The estimation strategy (Differences-in-Differences) is explained. Results of the quasi-experimental approach are discussed. Finally, implications for theory and practice are drawn.

2. Theory and hypotheses

Firms' and governments can create value independently or via jointly action that change the structures of benefits and costs in a given society (Cabral et al., 2019). Private organizations, be they for-profit or non-profit, provide services with impacts beyond immediate stakeholders. A high-performing non-profit hospital attracts donations and improves community health outcomes. Similarly, a for-profit airport management company benefits shareholders while enhancing citizen satisfaction and regional economic activity. However, ensuring expected stakeholder benefits is challenging in contexts with prevalent contractual incompleteness (Luo & Kaul, 2019). In such settings, private efforts may not be observable to external stakeholders and contractual outcomes can be difficult to specify and measure accurately (Lazzarini, 2020). Moreover, the provision of services by non-governmental actors becomes even more concerning when it involves the use of lethal force, as it is typically regarded as a public monopoly in many countries (Cabral, Lazzarini, & de Azevedo, 2013). Private security services fall into this category.

Along these lines, private security services are considered complementary to public security efforts. However, this demands the development of control mechanisms to align the interests of both public and private sectors, ensuring that business objectives do not conflict with public policy goals (Stenning, 2009). Effective public regulation is essential to prevent opportunistic behavior by private security firms, curb abuse by their officers and safeguard the rights of citizens. Examples of misconduct and violence employed by private security guards are all too common worldwide, underscoring the need for robust oversight mechanisms (Steden & Sarre, 2010).

Private security firms often employ low-skilled officers, making effective selection and training crucial. Given the discretionary power of armed security guards, controlling their recruitment and ensuring ongoing training is vital to mitigate potential harm to individuals and protect private property. Therefore, there is an increased need for strict regulation of private security firms (Stenning, 2009; Wood & Cardia, 2006).

Studying government regulation of private security is crucial for understanding the impact on human capital and outcomes at both firm and government levels. Human capital theory provides a valuable framework for analyzing this relationship. Prior research has highlighted the positive effects of education and training investments on productivity, wages, economic growth and general welfare (Becker, 1993; Blundell, Dearden, Meghir, & Sianesi, 2005; Mincer, 1991). Extensive evidence supports the positive relationship between human capital traits, well-designed training initiatives and their impact on relevant outcomes (Gibbons, Katz, Lemieux, & Parent, 2005; Lemieux, 2006).

Understanding government regulation's impact on private security's human capital development is crucial for firms and the economy. In this matter, tensions often arise between different types of training programs. While firm-specific training initiatives can equip employees with specialized skills and knowledge that are highly valuable to the company, they may not offer much value to the employees who undergo the training and then leave the organization, thereby limiting their career mobility (Blundell et al., 2005). Employees are likely to show reduced engagement with firm-specific training programs if they believe that any gains in productivity will not be reflected in a corresponding increase in their salary, but instead be entirely captured by the organization providing the training (Kryscynski, Coff, & Campbell, 2020). Conversely, training initiatives that focus on developing employees' general human capital tend to enhance their future career mobility and can even benefit competitors who can leverage the skills acquired through initiatives sponsored by rival firms. This can make some organizations hesitant to invest in general skill development (Starr, Ganco, & Campbell, 2017). Yet recent advances in strategic human capital literature indicates that investments to attract qualified personnel and investments in general human capital training can be important even for firms with elevated churning rates (Teodorovicz, Lazzarini, Cabral, & McGahan, 2023).

Given the propensity of firms to prioritize cost savings over quality to meet their financial objectives, there is a compelling argument for the implementation of public regulations in services like private security. This regulatory oversight becomes crucial to safeguard public interests by ensuring the enhancement of selection and retention practices However, while adopting best practices can enhance productivity and mitigate adverse selection risks, public regulation in isolation cannot eliminate market frictions, especially with unionization narrowing wage dispersion (Acemoglu & Pischke, 1999; Ropponen, 2011). Furthermore, investing in human capital formation incurs costs, including selection, monitoring, and integrating new employees. When trained employees voluntarily quit, this can result in significant financial losses, especially for outsourced services like private security (Michele Kacmar et al., 2006).

Nevertheless, public regulations raising entry barriers for low-skilled workers can enhance efficiency and improve firm's outcomes. Improved screening in the selection process aids firms in identifying qualified candidates, reducing future turnover and retaining talented personnel in the long range (Huang & Cappelli, 2010). Improved selection processes can attract more committed employees and lead to reduced absenteeism (Ones, Viswesvaran, & Schmidt, 2003). Implementing an improved screening process during the selection of officers can not only reduce monitoring costs but also make it easier to terminate contracts of those who engage in misconduct, which is a major issue in activities involving the use of discretionary violence (Cabral et al., 2013). Additionally, it can enhance job stability for officers who comply with regulations and do not deviate (Ones, Viswesvaran, & Schmidt, 1993; Schmidt, Oh, & Shaffer, 2016).

Identifying potential deviant behavior may increase termination and turnover costs. However, government regulations supporting professional selection and screening can enhance firm productivity. By selecting compliant and capable officers, firms can maintain activity levels with fewer personnel. They can also replace regulated officers with non-regulated ones, like replacing armed with unarmed officers in the private security services industry. These regulations can drive firms to reposition and improve competitiveness, especially with enhanced managerial capabilities (Argyres, Mahoney, & Nickerson, 2019).

These advances allow us to draw our hypotheses:

H1. Government regulations encouraging enhanced personnel selection and retention processes have a positive impact on firm's turnover.

H2. Government regulations encouraging enhanced personnel selection and retention processes have a positive impact on firm's human capital outcomes.

3. Data and context

We analyzed the impact of Brazil's 2013–2014 government regulations, specifically Normative Instructions 70 and 78 (IN 70 and IN 78), which required biannual psychological evaluations of armed security guards to improve selection. These measures were motivated by the risks and situations inherent to their functions, such as the risk of death, constant pressure, dealing with confidential information, ensuring the physical integrity of people and the use of firearms, which leads to potential accidents. Common work-related illnesses, such as stress, depression and psychological problems, further justified these changes. The normative instructions aim to regulate psychologists who assess permissions for the use of firearms, ensuring complete assessments of armed security guards, ultimately reducing risks to the well-being of third parties and the security guards themselves.

Analyzing firm-level human capital data from 2008 to 2017, we assessed outcomes including turnover rates, age and experience of fired and hired employees. Our data sources included the Annual Social Information Report (RAIS) and CNPJ Open Data from the Ministry of Economy. We also incorporated macroeconomic data from the Brazilian Institute of Geography and Statistics (IBGE) as controls.

Our approach involved strict inclusion criteria, focusing solely on formal firms with regular registration in the Brazilian Federal Revenue during the observed year. This approach resulted in a high-quality database comprising 599 firm-year observations.

To bolster the credibility of our findings, we implemented a rigorous "Matching" strategy, creating statistically comparable matched groups in terms of relevant observable dimensions. Additionally, we conducted a placebo test, estimating the same models with a

fictitious treatment date preceding the actual treatment date, further confirming the strength and validity of our identification strategy. This comprehensive approach, combined with our carefully selected data set, ensures the reliability and robustness of our analysis.

3.1 Dependent variables

The literature review underscores the importance of selecting the most suitable and highly qualified individuals for a job to improve productivity and reduce errors and failures during task execution. Such selection and training practices can also lead to longer employment durations and decreased chances of termination with cause, further enhancing activities reliant on human capital.

To assess the effects of government regulation on human capital outcomes within private security firms, we employed three key dependent variables: turnover rates, as well as the average age and experience of both newly hired and terminated employees. This methodology allowed us to investigate *H1*, focusing on turnover rates, and to evaluate the influence of regulations on age and experience – both pertinent proxies in terms of human capital outcomes (*H2*).

3.2 Independent and control variables

Our primary independent variable captures the impact of the new regulation by combining a dummy variable that assesses regulated firms with a dummy variable that corresponds to the post-regulation period (after 2013 and 2014). We also employed various control variables, including firm-level information, such as wages [1] (Table 1), and fixed effects for year, municipality, and economic group. Furthermore, Table 2 presents the results of a correlation analysis, which indicates a low risk of multicollinearity among the variables. Finally, Table 3 presents the statistics for the dependent variables in both the pre- and post-regulation periods. To mitigate differences between the treated and untreated groups, we employed a matching strategy, pairing them according to individual characteristics (age, gender, experience, race, and education) in the pre-treatment period (2008–2012). This method enabled the creation of matched groups, ensuring comparability and allowing for estimates within a common support zone (Table 4).

Type of variable	Variable	Unit	Level	Description	Source
Dependent	Age	Years	Firm	Average age of workers per company	RAIS
Dependent	Experience	Months	Firm	Average function experience of workers per company	RAIS
Dependent	Turnover	Percentage	Firm	Turnover by company	RAIS
Independent	Effect	Unit	Firm	Dummy of treatment period * dummy of treatment group	Federal revenue
Control	State GDP	Unit	State	Log nominal change in state GDP	IBGE
Control	Hourly wage	Hour	Firm	Log average hourly wage	RAIS
Control	Gender	Class	Firm	Proportion of male employees	RAIS
Control	Race	Class	Firm	Proportion of employees self-identified as white	RAIS
Control	Employees per year	Unit	Sample	Log number of employees per year	RAIS

Source: Table by authors

Table 1. Description of variables

Table 2.
Correlation analysis

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Turnover	1												
2	Experience hired	0.0058	1											
3	Experience fired	0.0142	0.1865	1										
4	Age	0.0113	0.2743	0.4511	1									
5	Age hired	0.0206	0.9647	0.1691	0.2420	1								
6	Age fired	0.0420	0.1672	0.9710	0.3982	0.1718	1							
7	Hourly wage	0.1456	−0.0483	−0.0316	−0.1948	0.0138	0.0030	1						
8	Hourly wage fired	0.0770	−0.0539	−0.0856	−0.0367	−0.0313	−0.0749	0.5252	1					
9	Hourly wage hired	0.0296	−0.0308	0.0138	−0.0766	0.0166	0.0452	0.5812	0.4593	1				
10	Gender	0.0462	−0.0619	−0.0625	−0.0644	0.0094	−0.0348	0.2936	0.1161	0.1492	1			
11	Race	0.0723	0.1559	0.1413	0.2198	0.1053	0.1081	−0.0446	−0.0178	0.1037	−0.1689	1		
12	State GDP	−0.0657	0.0594	0.0806	0.0967	0.0987	0.0756	0.0255	0.1084	0.2019	−0.0447	0.2551	1	
13	Employees per year	−0.0448	0.0198	−0.2015	−0.3205	0.0028	−0.2232	−0.1341	0.1089	−0.1451	−0.0534	0.0501	0.0689	1

Source: Table by authors

Variables	Total - 2008–2017					Ex ante - 2008–12					Ex post - 2015–17				
	Treated (Obs = 18,647)		Untreted (Obs = 678,042)			Treated (obs = 9,050)		Untreted (Obs = 334,653)			Treated (Obs = 5,742)		Untreted (Obs = 205,358)		
	Mean	SD	Mean	SD	t	Mean	SD	Mean	SD	t	Mean	SD	Mean	SD	t
Age	37,78	5,23	43,80	8,76	151.43***	36,48	4,85	42,20	8,51	107.74***	39,71	5,33	46,02	8,73	86.64***
Experience	63,46	46,81	102,12	70,44	109.40***	50,64	43,40	86,91	64,18	77.26***	82,81	46,57	124,36	74,36	65.32***
Turnover	0,39	1,10	0,20	0,42	−23.71***	0,40	0,49	0,23	0,42	−33.58***	0,37	1,15	0,16	0,40	−13.65***
State GDP	12,71	1,31	12,96	1,17	25.02***	12,49	1,31	12,74	1,17	18.20***	12,98	1,26	13,21	1,13	13.55***
Hourly wage	1,87	0,67	1,75	0,54	−24.25***	1,55	0,66	1,46	0,50	−12.22***	2,24	0,53	2,10	0,41	−20.14***
Gender	0,94	0,10	0,95	0,14	18.82***	0,95	0,09	0,96	0,13	11.99***	0,93	0,11	0,95	0,16	10.70***
Race	0,49	0,35	0,47	0,41	−10.94***	0,46	0,35	0,44	0,41	−5.78***	0,53	0,00	0,50	0,42	−6.70***

Notes: ***$p < 0.01$; ** $p < 0.05$; * $p < 0.1$
Source: Table by authors

Table 3.
Summary statistics – before matching

3.3 Estimation methods

To establish a treatment group (TG) and control group (CG), we defined firms with armed security officers, which are subject to the new government regulation, as part of the TG, while firms with unarmed officers were selected as the CG. The CG was chosen due to their activities being complementary and/or a substitute for armed security and having observable variables with similar behavior in the pre-treatment period. This selection ensured the internal validity of the analysis.

To evaluate the impact of government regulation (an exogenous shock) on firm outcomes, we used the non-experimental method of Differences-in-Differences (DID). DID is a commonly employed impact assessment technique in the social sciences that does not necessitate the use of random selection from control and treatment groups (Gertler, Martínez, Premand, Rawlings, & Vermeersch, 2018).

To test *H1* and *H2*, we used multiple linear regressions to estimate the mean effect of the government regulation on firms with armed security officers (Wooldridge, 2017). In both cases, we validated all regressions using the Breusch-Pagan Chow and LM tests, which rejected the pooled panel data model. Subsequently, we conducted the Hausman test, which indicated that using the fixed effects model was preferable (Wooldridge, 2012).

Below, we provide the corresponding mathematical equations and explanations for the "Turnover" and "Experience of Hired Employees" variables for improving the clarity of our research, particularly in defining variables and identifying linear regression equations:

- Turnover_{it}: Turnover rate in firm i in year t.
- Experience of fired_{it}: Average experience of terminated employees in firm i in year t.
- Experience of hired_{it}: Average experience of hired employees in firm i in year t.
- Age of fired_{it}: Average age of terminated employees in firm i in year t.
- Age of hired_{it}: Average age of hired employees in firm i in year t.
- eg_i: Fixed effect of the Economic Group of firm i.
- munic_i: Fixed effect of municipality in which firm i is located.
- $year_t$: Year fixed effect.

		Ex ante - 2008–12					
Variables	Sample	Treated	Controls	Difference	S.E.	T-stat	*p*-value
Age	Unmatched	40.73	45.93	−5.20	0.14	−35.91	0.00
	ATT	40.73	38.73	2.00	1.23	1.63	0.10
Education	Unmatched	16.38	15.82	0.55	0.04	15.00	0.00
	ATT	16.38	16.33	0.05	0.30	0.15	0.88
Experience	Unmatched	24.36	30.11	−5.75	0.16	−36.03	0.00
	ATT	24.36	22.40	1.96	1.31	1.50	0.13
Gender	Unmatched	0.96	0.75	0.21	0.00	62.42	0.00
	ATT	0.96	0.96	0.00	0.04	−0.01	0.99
Race	Unmatched	0.51	0.52	−0.02	0.01	−2.12	0.03
	ATT	0.51	0.52	−0.01	0.04	−0.33	0.74

Source: Table by authors

Table 4. Matching on observables

Here are the equations for the linear regression models:

(1) Turnover model:

$$Turnover_{it} = \beta_0 + \beta_1 Effect_{it} + \beta_2 For\text{-}profit_{it} + \beta_3 LGDP + \beta_4 HourlyWage_{it} + \beta_5 HourlyWage_{fired-it} + \beta_6 HourlyWage_{hired-it} + \beta_7 Gender_{it} + \beta_8 Race_{it} + \beta_9 Employees\,per\,year_{it} + \beta_{10}\, eg_i + \beta_{11}\text{munic}_i + \beta_{12} year_t + u_{it}$$

(2) Age of Fired Employees Model:

$$Age\_fired_{it} = \gamma_0 + \gamma_1 Effect_{it} + \gamma_2 For - profit_{it} + \gamma_3 LGDP + \gamma_4 HourlyWage_{it} + \gamma_5 HourlyWage_{fired-it} + \gamma_6 HourlyWage_{hired-it} + \gamma_7 Gender_{it} + \gamma_8 Race_{it} + \gamma_9 Employees\,per\,year_{it} + \gamma_{10} eg_i + \gamma_{11}\text{munic}_i + \gamma_{12} year_t + \gamma_{it}$$

(3) Age of Hired Employees Model:

$$Age\_hired_{it} = \delta_0 + \delta_1 Effect_{it} + \delta_2 For\text{-}profit_{it} + \delta_3 LGDP + \delta_4 HourlyWage_{it} + \delta_5 HourlyWage_{fired-it} + \delta_6 HourlyWage_{hired-it} + \delta_7 Gender_{it} + \delta_8 Race_{it} + \delta_9 Employees\,per\,year_{it} + \delta_{10} eg_i + \delta_{11}\text{munic}_i + \delta_{12} year_t + \vartheta_{it}$$

(4) Experience of Fired Employees Model:

$$Experience\_fired_{it} = \theta_0 + \theta_1 Effect_{it} + \theta_2 For\text{-}profit_{it} + \theta_3 LGDP + \theta_4 HourlyWage_{it} + \theta_5 Hourly\,Wage_{fired-it} + \theta_6 HourlyWage_{hired-it} + \theta_7 Gender_{it} + \theta_8 Race_{it} + \theta_9 Employees\,per\,year_{it} + \theta_{10} eg_i + \theta_{11}\text{munic}_i + \theta_{12} year_t + \xi_{it}$$

(5) Experience of Hired Employees Model:

$$Experience\_hired_{it} = \alpha_0 + \alpha_1 Effect_{it} + \alpha_2 For\text{-}profit_{it} + \alpha_3 LGDP + \alpha_4 HourlyWage_{it} + \alpha_5 HourlyWage_{fired-it} + \alpha_6 HourlyWage_{hired-it} + \alpha_7 Gender_{it} + \alpha_8 Race_{it} + \alpha_9 Employees\,per\,year_{it} + \alpha_{10} eg_i + \alpha_{11}\text{munic}_i + \alpha_{12} year_t + \varsigma_{it}$$

4. Results

Table 5 presents the results of our analysis, aiming to identify the effects of public regulations on various human capital outcomes. Model 1 tested *H1*, allowing us to evaluate how this regulation has affected firms' turnover as hypothesized. Specifically, Models 2 to 5 test *H2* by examining the impacts of these regulations on age and experience. By splitting our samples into firms that hired and fired employees in the observed year, we were able to

Table 5.
Effects on the development of the human capital

Analysis group		Characteristics of the companies' fired workforce		Characteristics of the companies' hired workforce	
Models	(1)	(2)	(3)	(4)	(5)
Variables	Turnover	Age fired	Experience fired	Age hired	Experience hired
Effect	0.1441** [0.071]	2.6664 [2.259]	2.4557 [2.378]	6.3868*** [1.936]	6.5753*** [1.963]
State GDP	−0.4847 [0.630]	1.2764 [6.880]	3.2383 [7.385]	−0.0737 [6.554]	1.3664 [7.136]
Hourly wage	−0.0775 [0.256]	−2.2406 [2.874]	−2.0832 [2.927]	1.6887 [1.901]	1.3359 [2.171]
Hourly wage fired	0.0617 [0.046]	0.8394 [0.545]	0.8068 [0.584]	0.1525 [0.385]	0.1829 [0.411]
Hourly wage hired	−0.1539 [0.168]	0.3453 [0.666]	0.4445 [0.701]	0.0568 [0.840]	0.1242 [0.941]
Gender	0.1275 [2.425]	−58.1062 [37.055]	−69.6272* [40.341]	7.0568 [64.726]	10.8008 [69.678]
Race	−0.2148 [0.150]	1.2417 [1.733]	1.6233 [1.700]	1.3496 [1.209]	1.4602 [1.371]
Employees per year	2.0654 [8.493]	158.1720 [154.850]	170.7299 [149.414]	449.4462* [259.377]	513.5317** [231.016]
Constant	−20.9299 [110.003]	−2,048.1339 [2,083.498]	−2,248.6037 [2,010.497]	−6,031.9287* [3,498.175]	−6,933.7335** [3,114.586]
Observations	599	599	599	599	599
R-squared	0.387	0.602	0.593	0.593	0.566

Notes: Robust standard errors in brackets; ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

conduct a more detailed analysis of the dynamics of human capital development following the exogenous shock created by the new regulation.

The analysis indicates that following the implementation of more stringent public regulations, private security firms experienced increased turnover (Model 1, $p < 0.05$). The new regulations increased the likelihood of firms firing unfit officers and replace them by new security officers who are compliant with the expected quality goals aimed by the Brazilian Government. The increased qualification standards have significant implications for market stability, as they expose professionals who may be less suitable for the activity, thereby increasing the need for replacements and ultimately driving up industry turnover. Along these lines, the findings of Model 1 ($p < 0.05$) support *H1*, as they demonstrate that government regulations aimed at improving personnel selection and training for armed officers affect firm's turnover. While an increase in turnover can certainly have advantages, such as allowing firms to retain more qualified personnel, it can also have significant drawbacks. For instance, it can lead to higher costs for the firm and potentially impact the relative prices of regulated firms. However, the short-term costs from turnover can be compensated by enhanced stability resulted from hiring more experienced (and qualified) employees.

As presented in Table 5, impacts of the new regulation vary. For workers who were fired (Models 2 and 3), the new legislation had no effects on human capital outcomes. However, for hired workers (Models 4 and 5), the new regulation significantly changed the patterns by enabling the selection of more experienced officers ($p < 0.01$). In terms of the age of the hired employees, the regulation significantly increases the average between 2.6 and 10.2 years. For experience *t*, the new regulation allowed firms hiring officers between 2.7 and 10.5 months of additional experience. Both effects calculated considering 95% confidence intervals.

In other words, the findings indicate that new regulation has driven firms to mitigate the risk of adverse selection. It allowed firms to select more experienced officers who have undergone the newly mandated psychological evaluation. Specifically, following the implementation of more stringent public regulations, firms appear to have replaced experienced officers without prior training or rigorous assessment with other experienced professionals who have been properly selected and screened. These results provide support for *H2*, which asserts that government regulations targeting the improvement of personnel selection and retention processes positively influence firm's human capital outcomes. Implemented regulations have improved the outcomes for firms by identifying professionals at risk of deviant behavior and supporting those with more suitable profiles. In essence, after the initial process of "shaking the tree" and terminating non-compliant employees, firms may reap the benefits of the new regulation by attracting and retaining more qualified personnel.

One may claim that the results are not a direct effect of the new regulations, but from other non-observable factors not accounted in our regressions. To assure the validity of our estimates, we run a placebo analysis with data between 2008 and 2012, when the regulations were not in place. Therefore, we simulate what would be the implications of a fictional regulation on our variables of interest in 2010. In this case, the presence of a statistical significance in the placebo variable of interest (Effect) would suggest that the observed effects after the implementation of the new regulation are driven by other factors, thus challenging our main results. Nevertheless, our placebo analysis (Table 6) is not able to show any association between the fictional regulation and human capital outcomes, thus assuring the robustness of our findings.

Finally, a post hoc analysis, we have made efforts to understand the intricacies of human capital composition in private security companies. Through interactions with private

Table 6
Robustness - Placebo (2008–2012) – with treatment in 2010

Analysis group		Characteristics of the companies' fired workforce		Characteristics of the companies' hired workforce	
Models	(1)	(2)	(3)	(4)	(5)
Variables	Turnover	Age fired	Experience fired	Age hired	Experience hired
Effect	−0.1447 [0.123]	−6.0884 [8.928]	−5.1457 [11.019]	−3,7169 [3.225]	−2,1855 [2.312]
State GDP	−0.5430 [0.635]	4.6500 [5.792]	2.4998 [7.159]	−2.9151 [6.647]	−1.7152 [7.241]
Hourly wage	−0.0737 [0.258]	−2.7788 [2.512]	−2.1257 [2.908]	1.9665 [1.930]	1.6879 [2.203]
Hourly wage fired	0.0611 [0.046]	1.1203** [0.546]	0.8009 [0.585]	0.1206 [0.383]	0.1472 [0.409]
Hourly wage hired	−0.1493 [0.167]	0.9299 [0.687]	0.5060 [0.707]	0.2728 [0.846]	0.3562 [0.939]
Gender	0.1462 [2.414]	−30.6403 [37.125]	−69.5068* [39.838]	8.0818 [63.531]	11.9769 [68.137]
Race	−0.2058 [0.145]	1.0947 [1.672]	1.7792 [1.796]	1.7461 [1.343]	1.8669 [1.442]
Employees per year	2.6484 [8.494]	130.5840 [170.526]	178.0017 [145.819]	477.9705* [263.734]	544.5298** [234.732]
Constant	−28.0408 [109.899]	−1,749.6323 [2,304.692]	−2,336.2257 [1,965.646]	−6,380.9200* [3,556.932]	−7,313.5868** [3,165.032]
Observations	599	744	599	599	599
R-squared	0.387	0.567	0.593	0.586	0.559

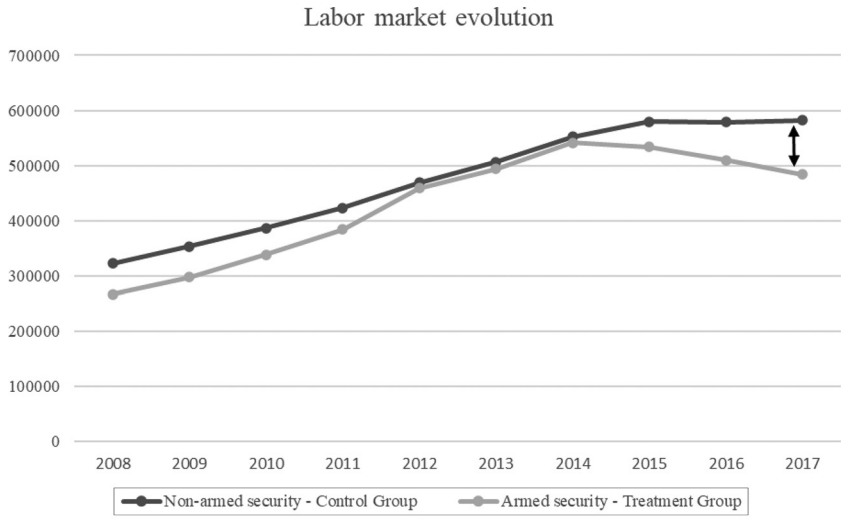
Notes: Robust standard errors in brackets; ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

security managers, we discovered that approximately 80% of expenses in private security firms are linked to payroll. Within this percentage, 15% represents provisions based on the history of dismissals and absenteeism, while an additional 5% is allocated to mandatory inputs such as training and psychological assessments. Even though even seasoned professionals may be deemed unqualified or exhibit potentially problematic behavior, implementing more rigorous assessments could lead to increased costs associated with employee dismissals for firms that have not previously employed such comprehensive evaluation processes. Therefore, if public regulation were to mandate heightened training and improved psychological selection processes for armed security officers, it would likely result in increased costs for firms.

Considering this, it is not surprising that private firms may strategically maneuver to avoid elevated costs stemming from public regulation on armed officers. Descriptive data presented in Figure 1 illustrates the number of armed and non-armed security officers employed between 2008 and 2017. Firms responded to regulations by transitioning armed officers to non-armed positions that were not subject to government oversight, presumably to sidestep the heightened costs associated with increased regulation. Further exploration in future studies can advance our understanding of these dynamics and the eventual collateral effects.

5. Discussion and conclusion

In recent years, strategy scholars have increasingly focused on the interactions between government interventions and firm outcomes (Cabral et al., 2019; Gatignon et al., 2022; Mahoney et al., 2009). This paper investigates the impact of government regulation on private security firms in Brazil using a recent federal regulation. We employ a quasi-experimental approach to establish causal evidence on the relationship between increased regulation and firm-level outcomes. Our findings indicate an increase in turnover rates and improvements in human capital quality for firms due to the



Source: Figure by authors

Figure 1. Evolution of employment contracts for treatment and control groups between 2008 and 2017

regulation. Unintended consequences may also include potential replacements of regulated armed officers with non-regulated unarmed officers.

By highlining the incentives set by government regulations and their intendent and unintended consequences, our nuanced results contribute to the strategy literature in several ways. First, this study contributes to the existing literature on the managerial implications of government interventions in the public interest, as discussed in prior works such as Mahoney et al. (2009), Page et al. (2015), Cabral (2017), Alonso & Andrews (2019), and Paik et al. (2019). Specifically, this study highlights how policy regulations that impact human capital structures can influence firm-level outcomes in areas with the potential of both value creation and value destruction (Cabral et al., 2019; Dorobantu, Kaul, & Zelner, 2017). This study also contributes to the existing literature in strategy by exploring the impacts of government regulation on private firms, a topic that has received some attention in previous studies in developed countries (Holburn & Zelner, 2010; Oh, Shapiro, Ho, & Shin, 2020), but scant attention in developing countries. We add to this debate by adding evidence on the interactions between regulation and performance on a sensitive sector that of private security services. Furthermore, this work engages with recent advances in the human capital literature by examining the role of government interventions in human capital structures of firms with low-skilled workers (Burbano & Chiles, 2022; Campbell, Coff, & Kryscynski, 2012; Coff & Kryscynski, 2011; Teodorovicz et al., 2023).

The findings of this study have important implications for both firm managers and policymakers. Our results can help firm managers better understand the impact of regulation on human capital traits and help them to make more informed decisions. Policymakers can also benefit from our study by using these results to adjust regulations that better serve the public interest while minimizing adverse effects on firms. We also believe that this study can serve as a model for causal-based impact assessment of business activities. Given the widespread availability of impact assessment techniques and public data sets like those used in this study, not only private security firms, but also other firms subject to government regulation can use our approach to evaluate their strategies, reinforce positions or even promote changes in their courses of action.

Future studies can delve into whether customers of private security firms are actively seeking non-trained officers. This inquiry is crucial because the deployment of non-certified professionals may carry adverse consequences for both customers and the public, including the potential for abuse and violence. Recent scandals involving private security contractors underscore the importance of a close look in this perspective. Additionally, forthcoming research can conduct a more thorough analysis of performance metrics, encompassing aspects such as profitability, productivity and efficiency. This broader examination is necessary to gain a comprehensive understanding of the regulatory impact on financial outcomes. Moreover, future studies can engage in a detailed cost-benefit analysis to precisely gauge the potential value created for firms' post-regulation, considering existing trade-offs between short-term turnover and the long-term benefits derived from hiring more experienced and capable personnel. This longitudinal approach would help determine if the observed effects persist in the long range and elucidate how firms dynamically adapt and evolve following the introduction of new regulations. Finally, this study could serve as a catalyst for cross-country comparisons, exploring the private security industry in diverse contexts.

Note

1. Controlling for wages in our context is crucial due to the existing variations between armed officers employed by private security firms and those working directly for the end customers as insourced employees. We express our gratitude to one of the anonymous referees for bringing up this point and for engaging in insightful discussions throughout two rounds of revisions

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