Internal pay dispersion and state ownership in Brazilian listed firms

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Abstract We describe how internally compressed executive pay is in Brazilian listed firms with and without state ownership, using the ratio of the highest individual compensation to the mean compensation of the statutory executive board. The panel covers 4,155 firm-years and 594 firms between 2015 and 2025. Three descriptive facts stand out. Firms with a state stake have more compressed pay, and this difference is about six times larger inside the financial sector than outside it on proportional measures; that sector is excluded by construction from the only prior Brazilian study of this measure. Conditioning on sector by year widens the difference rather than absorbing it, so it is not accounted for by the distribution of state-linked firms across sectors. No within-firm association is detected: with firm fixed effects the coefficient is positive, small and statistically indistinguishable from zero.

Keywords: Executive compensation; Internal pay dispersion; State ownership; Top-earner pay slice; Brazil

JEL codes: G32, G34, J33

1. Introduction

Brazilian listed firms with state participation pay their executives less than private firms do. Ermel and do Monte (2018) establish this for the level of compensation. What nobody has established for Brazil is whether those firms also pay in a different *shape*, meaning whether the distance between the best paid executive and the rest of the board is different when the state holds a stake.

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Level and shape are distinct margins, and it is the shape that tournament theory and cohesion theory disagree about. Lazear and Rosen (1981) predict that a wider gap sharpens effort. Levine (1991) predicts that it damages cooperation. Kale et al. (2009) find performance gains from wider gaps in American firms, while Siegel and Hambrick (2005) find losses. This paper does not adjudicate that dispute. It establishes the fact that both accounts have to explain in a setting where the state is a common shareholder.

The measure is the ratio between the highest individual compensation of the statutory executive board and the mean compensation of that board. This measure is not new. It is constructed like the CEO pay slice of Bebchuk et al. (2011), multiplied by the number of board members, and Abdalla (2021) has already applied that construction to Brazilian listed firms and reported an association with state control. The top earner on a statutory executive board is plausibly the chief executive, but the mandatory disclosure records the amount without the office, so we name the variable for what the data measure and call it the top-earner pay slice. The earlier study draws on the same disclosure, so the same limit applies to its measure. Section 2 states this where the measure is defined, and the results below report the top-earner pay slice itself alongside the ratio.

What this study adds is coverage rather than measurement. The prior Brazilian panel runs from 2017 to 2019 and contains 458 observations, of which 26 correspond to firms under state control, and it excludes the financial sector by construction, as most of the Brazilian compensation literature does. The panel used here runs from 2015 to 2025 and contains 4,155 firm-years from 594 firms, of which 132 have a state stake at some point. The financial sector is retained, and that turns out to matter: the compression associated with state ownership is roughly six times larger inside it than outside it in proportional terms, between 5.5 and 6.5 depending on the measure. The earlier estimate was therefore obtained on the weak part of the distribution.

Two further results follow. Conditioning on the 55 activity sectors of the regulator's classification interacted with year widens the difference instead of absorbing it, so it is not accounted for by the distribution of state-linked

firms across those sectors. And no within-firm association is detected. Only 66 firms change state-ownership status during the period, so the within-firm comparison rests on little variation and is correspondingly imprecise: with firm fixed effects the coefficient is positive, small and statistically indistinguishable from zero, and the ninety-five percent interval runs from −0.065 to +0.193, which excludes a within-firm change as large as the between-firm difference of −0.265 but not smaller ones.

Evidence from outside Brazil points the same way. Chen et al. (2011) find a smaller pay gap where state ownership is higher in Chinese listed firms, and Connelly et al. (2016) treat ownership as an antecedent of dispersion rather than a control. Boubakri et al. (2013) document that state ownership is associated with less corporate risk-taking, and a flatter internal pay structure is consistent with that pattern, though this paper does not test the connection.

Nothing here is causal. The comparisons are conditional means across firms. The state ownership classification used is the nine-category scheme built and published in Bianchi and Castro (2025).

2. Data and measurement

All variables come from CVM Dados Abertos, the open-data service of the Brazilian securities commission, which publishes the Reference Form (*Formulário de Referência*) of every registered issuer. Item 13.11 reports, for each governance body, the highest, the lowest and the mean individual compensation, together with the number of members. Every compensation variable used here comes from that item. The number of members is reported as an average over the financial year rather than as a headcount, so it is not an integer in 26.2 percent of the firm-years we keep, and we use it as reported. Item 15 reports the shareholder position, including the shareholder through which a position is held.

The unit of observation is the firm-year, and the body is the statutory executive board, which item 13.11 separates from the board of directors and from the fiscal council. For firm i in year t, let Max_{it} be the highest individual

compensation, $Mean_{it}$ the mean, and N_{it} the number of members. The measure is

$$R_{it} = \frac{Max_{it}}{Mean_{it}}, \qquad TPS_{it} = \frac{Max_{it}}{Mean_{it}\, N_{it}} = \frac{R_{it}}{N_{it}},$$

so that R_{it} is the top-earner pay slice scaled by board size. Both are reported. Item 13.11 reports the highest individual compensation on the board but not the office held by the person who received it. That person is plausibly the chief executive; since the data do not record it, TPS_{it} is defined as the share captured by the highest-paid member. R_{it} equals one when every member is paid the same and rises with the share captured by the top earner. Because R_{it} also rises mechanically with N_{it}, every specification below controls for board size, and comparisons across groups whose boards differ in size are reported for $\ln R_{it}$ as well, since a coefficient on a logarithm is a proportional change and is therefore comparable across groups whose levels differ.

State ownership is coded from item 15 by a mechanical rule, without judgment about control. Two closed lists of taxpayer identifiers are used: 49 direct public entities, including the Union and the National Treasury, BNDES and BNDESPar, Caixa and CaixaPar, the states, the Federal District and state-owned banks; and 23 entities through which the state participates indirectly, essentially the pension funds of state-owned enterprises, of which Previ, Petros and Funcef are the largest. State ownership in a firm-year is *direct* when an entity from the first list holds a position in its own name, meaning the field recording the intermediate shareholder is empty. It is *indirect* when a listed entity appears instead as a link in the control chain of another shareholder. The rule records the presence of a stake of any size, not control, which is broader than the definition in Abdalla (2021), who requires the state to be the largest shareholder.

Item 13.11 yields 4,724 candidate firm-years. Requiring a positive maximum, mean and member count leaves 4,407. Requiring $R_{it} \geq 1$ and $0 < TPS_{it} \leq 1$ leaves 4,200; of those 207 discards, 170 come from the floor at one and 37 from the slice ceiling, so the discards are reporting errors rather than

extreme firms, since a maximum cannot fall below a mean of the same values. Matching to item 15 and to the CVM registry that supplies the sector leaves the 4,155 firm-years used throughout. The overall reduction is 12.0 percent, and it falls on firm-years whose figures are mutually inconsistent rather than on any identified class of firm.

Five propositions organize the results. **P1**: R_{it} is lower in firms with a state stake, and we call this difference between the two groups the *state differential*. **P2**: the differential widens when sector is controlled for. **P3**: it is larger under direct than under indirect state ownership. **P4**: it concentrates in the financial sector. **P5**, stated in advance: no within-firm differential will be detected, so the estimate does not survive firm fixed effects. All five are descriptive. The coefficient below is a difference in conditional means and carries no causal interpretation.

3. Results

Table 1 reports the groups. Firms with no state stake average 1.750 on the ratio, firms with a direct stake 1.426, and firms where the state appears only indirectly 1.529. The ordering is consistent with P1 and P3. The financial sector stands apart on board size, averaging 13.02 members against 5.04 outside it, which is why the sector is treated separately below rather than pooled. The first three rows form a mutually exclusive ownership partition, and the final two a separate sector partition; each partition spans the full sample.

Figure 1 shows the same ordering without imposing a functional form. Panel A plots the densities. The state distributions sit to the left and have a much thinner right tail: 8.7 percent of directly held firm-years exceed a ratio of two, against 26.3 percent of firm-years with no stake. Panel B plots annual medians, and the state median is the lower one in all eleven years. It stays between 1.27 and 1.38 throughout, while the median for firms with no stake rises from 1.46 to 1.67, so the gap is wider at the end of the panel than at the start, and the movement comes from firms without state ownership.

Table 2 reports the specification ladder. The raw difference is −0.294. Adding year effects moves it to −0.276, and adding sector by year effects moves it to −0.310. That is P2: conditioning on the 55 CVM activity sectors interacted with year widens the differential rather than absorbing it, so it is not accounted for by the distribution of state-linked firms across those sectors. Heterogeneity within a sector category, or any sectoral dimension the CVM classification does not capture, is not addressed. Controlling for board size gives −0.265, which is the preferred specification. Excluding the financial sector gives −0.163.

Column (6) adds firm fixed effects and the coefficient becomes +0.064, with a standard error of 0.066. This is P5, and it was declared in advance for a reason. Only 66 firms change state-ownership status in the panel, accounting for 579 observations. No within-firm association is detected: the ninety-five percent interval runs from −0.065 to +0.193, which rules out a within-firm change as large as the between-firm difference of −0.265 but leaves smaller ones open.

Panel B splits the log ratio into its parts. The coefficient on the logarithm of the maximum is −0.409 and on the logarithm of the mean is −0.274. The maximum falls more than the mean, so the compression comes from the ceiling rather than from the floor. The third row reports their difference, −0.136, which is distinguishable from zero. It is possible that this reflects visibility, in the sense that the single largest figure in the disclosure is the one that attracts attention, but the data here cannot separate that from alternatives.

Panel C of Table 2 reports the decomposition. Direct state ownership gives −0.313 and indirect-only state ownership −0.153, both distinguishable from zero, which supports P3. A continuous specification gives −0.617 for a move from no stake to full state ownership. The financial sector alone gives −1.089 against −0.163 outside it, which is P4 and the result the earlier Brazilian panel could not have obtained. Coarsened exact matching on sector, year and board size gives −0.331, and the indirect-only coefficient under matching is −0.268. Replacing the ratio by the top-earner pay slice gives −0.044, which speaks to

the pooled coefficient and not to the sectoral split, where board size differs most.

Panel D takes up that split directly. Since R_{it} rises with board size, and financial boards average 13.02 members against 5.04 elsewhere, part of any sectoral comparison in R_{it} is scale rather than compression. The panel reports the comparison on three measures in a single regression, with the slope on board size free to differ across sectors; so specified, the interaction reproduces the two separate estimates exactly. On R_{it} the financial coefficient is 6.7 times the other. On $\ln R_{it}$ the factor is 6.5, and it is between 6.2 and 6.5 whether board size enters linearly, in logs, as a cubic, or as bands. On TPS_{it} it is 3.6. These are not three estimates of one quantity. The figures for R_{it} and TPS_{it} are ratios of absolute changes, and they diverge because the two bases move in opposite directions across sectors: mean R_{it} is higher inside the financial sector, 1.985 against 1.667, while mean TPS_{it} is lower, 0.257 against 0.389, both reported in Table 1. Expressed as a share of its own group mean, each absolute coefficient gives a ratio of 5.6 and 5.5 respectively, and $\ln TPS_{it}$, which is fully normalized by board size, gives 6.1. On any proportional footing the factor is therefore between about 5.5 and 6.5. The 3.6 is the one figure that understates it, and it does so because firms in the financial sector start from a lower slice, not because the comparison there is weaker. The difference between sectors is distinguishable from zero on all three measures, at $p < 0.001$, $p < 0.001$, and $p = 0.020$.

One robustness check deserves its own statement because it fails on one measure. Restricting attention to firms with no direct state position, and comparing those where the state appears only through a pension fund of a state-owned enterprise against firms with no stake at all, gives -0.128 on the ratio with a p-value of 0.054, and -0.020 on the top-earner pay slice with a p-value of 0.492. Those pension funds are not subject to the federal salary ceiling, so the comparison speaks to whether the pattern is merely an artifact of pay regulation. It is suggestive on one measure and silent on the other, and we report both rather than the more favorable one.

Figure 2 reports the coefficient year by year and by board size, estimated on $\ln R_{it}$ so that both panels are read as proportional changes. All eleven annual coefficients are negative, ranging from −0.051 to −0.219, with no trend and no reversal. Across board-size bands the coefficients are negative throughout, and three of the four intervals exclude zero. In the band of one to three members R_{it} equals one exactly in 20.3 percent of firm-years, against 2.7 percent in the rest of the sample, so the ratio has little room to vary and the null there is expected rather than contrary evidence. Part of the gradient across the remaining bands is scale: on R_{it} the band of eight or more members is 3.5 times the two middle bands, and on $\ln R_{it}$ it is 3.1 times. The gradient shrinks on the proportional measure but does not disappear, so board size is not the whole of it.

4. Discussion and conclusion

Firms with a state stake in Brazil run flatter executive pay structures than firms without one, and the difference is concentrated in the financial sector, where pay is highest. The magnitude is not small. A ratio of 1.43 against 1.75 means that the top earner captures noticeably less of the board's pay when the state is present.

Four qualifications bound the reading. First, no within-firm association is detected, so nothing here says that a firm which gains or loses a state shareholder changes its internal pay structure. With 66 switching firms the data would struggle to detect such a change even if it existed, and we report the null rather than omitting the specification. Second, the classification records the presence of a stake and not control, so the treated group mixes firms where the state is dominant with firms where it holds a minor position. Third, the comparisons are conditional means. It could be argued that unobserved differences between state-linked and other firms drive the differential, and the design here cannot rule that out. Fourth, this panel cannot separate the sector from board size. Restricted to boards of eight or more members, the two groups remain far apart in size, at 21.5 members against 9.6, and the sectoral difference holds on $\ln R_{it}$ ($p = 0.001$) but not on TPS_{it} ($p = 0.258$). Restricted instead to boards between eight and twelve members, the sizes match almost exactly, at 9.17

against 9.18, and the difference holds on all three measures; but only four financial firms with a state stake identify it there, and with four treated clusters a wild cluster bootstrap and randomization inference place the p-value between 0.019 and 0.054 without resolving it. No cut available here does both jobs at once.

What this paper contributes is a finding and the place where it lives. The finding is that state ownership is associated with flatter executive pay in Brazil. The place is more informative than the finding itself. The association is concentrated in the financial sector, which the only prior Brazilian study excluded by construction, and it is not detected within firms over time.

Where an association sits carries information about what produces it. If flatter pay reflected the design of incentives, there would be no particular reason for it to concentrate in banking. If it reflects political exposure, the concentration is what one would expect, since the firms in question are large, closely regulated and among the highest paying in the market. However, this is an interpretation and not a test. Separating the two would require something that changes how exposed a firm is without changing anything else, and this panel contains no such variation.

Table 1
Descriptive statistics by state ownership group

	Sample size		Ratio R_{it}			
	Obs.	Firms	Mean	S.D.	TPS	Members
No state ownership	3,311	528	1.750	0.748	0.394	5.57
Direct state ownership	601	93	1.426	0.560	0.303	6.06
Indirect only	243	46	1.529	0.479	0.378	5.22
Financial sector	304	42	1.985	1.174	0.257	13.02
Excluding financial sector	3,851	552	1.667	0.666	0.389	5.04

Notes. Firm-year observations of Brazilian listed firms, 2015–2025. *Ratio* is R_{it}, the highest individual compensation of the statutory executive board divided by the mean compensation of that board; *TPS*, the top-earner pay slice, is R_{it} divided by the number of members; *Members* is the mean number of members, reported as an annual average. *Direct* covers firms in which a state entity appears in its own name in the shareholder register, *Indirect only* those in which it appears solely inside another shareholder's control chain. The first three rows form a mutually exclusive ownership partition, and the final two a separate sector partition; each partition spans the full 4,155 firm-year sample. Source: CVM Dados Abertos, Reference Form items 13.11 and 15; activity sector from the CVM registry of listed companies.

Table 2
State ownership and internal pay dispersion

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: maximum-to-mean ratio						
State ownership	−0.294***	−0.276***	−0.310***	−0.265***	−0.163***	0.064
	(0.047)	(0.048)	(0.063)	(0.055)	(0.045)	(0.066)
Year fixed effects	No	Yes	–	–	–	Yes
Sector×year fixed effects	No	No	Yes	Yes	Yes	No
Number of members	No	No	No	Yes	Yes	Yes
Excludes financial sector	No	No	No	No	Yes	No
Firm fixed effects	No	No	No	No	No	Yes
Observations	4,155	4,155	4,155	4,155	3,851	4,155

Panel B: numerator and denominator

	Coef.	S.E.	Obs.
ln(maximum compensation)	−0.409**	(0.178)	4,155
ln(mean compensation)	−0.274*	(0.165)	4,155
ln ratio (their difference)	−0.136***	(0.030)	4,155

Panel C: decomposition and robustness

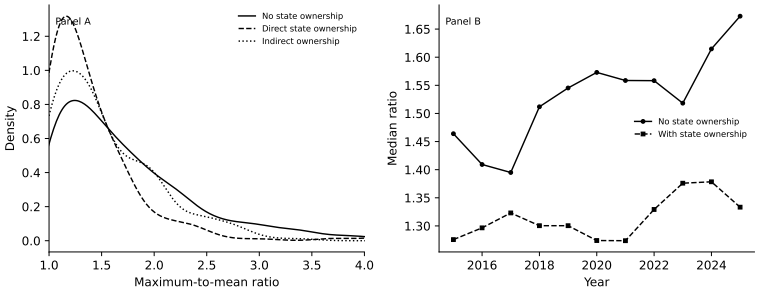
	Coef.	S.E.	Obs.
Direct state ownership	−0.313***	(0.068)	4,155
Indirect only	−0.153**	(0.070)	4,155
Continuous stake (0–1)	−0.617***	(0.114)	4,155
Financial sector only	−1.089***	(0.225)	304
Excluding financial sector	−0.163***	(0.045)	3,851
Coarsened exact matching	−0.331***	(0.066)	1,888
CEM, indirect only	−0.268***	(0.084)	1,888
Alternative measure: TPS	−0.044***	(0.015)	4,155

Panel D: the sectoral gap on three measures

	Financial	Ex-fin.	|Financial/ Ex-fin.|	Difference	S.E.	p
Ratio R_{it}	−1.089	−0.163	6.7	−0.927***	(0.227)	< 0.001
$\ln R_{it}$	−0.564	−0.087	6.5	−0.477***	(0.102)	< 0.001
TPS_{it}	−0.112	−0.031	3.6	−0.081**	(0.035)	0.020

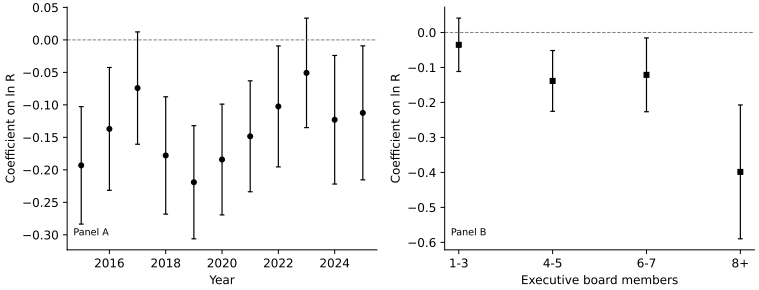
Notes. Dependent variable is R_{it} except where stated. Panel A: column (4) is the preferred specification, and the null in column (6) is declared ex ante as Proposition P5. Panel B replaces the dependent variable by the logarithm of the highest and of the mean board compensation, keeping the specification of column (4); both logarithms are winsorized at the first and ninety-ninth percentiles, while R_{it} itself is not. The third row is their difference, so the panel decomposes the winsorized log ratio exactly. Elsewhere $\ln R_{it}$ is unwinsorized. Panel C: the first two rows are two coefficients from one regression, the direct and indirect-only indicators entering together so that each is read net of the other; the remaining rows are one regression each. The first five rows and the last use sector by year fixed effects and control for board size; *Continuous stake* replaces the indicator by the total state position; the last row uses TPS_{it} as the dependent variable. The CEM rows are weighted bivariate regressions, the matching strata of sector, year and board-size band absorbing the controls. Panel D compares the financial sector against the rest on three dependent variables, each from a single regression of the form $y \sim State + State \times Financial + N + N \times Financial +$ sector by year effects. The slope on N is left free to differ across sectors because imposing a common one on boards of 13 and of 5 members would extrapolate the very scale the panel is meant to neutralize. *Financial* and *Ex-fin.* are the implied sector coefficients, their absolute ratio is reported in $|Financial/Ex\text{-}fin.|$, and *Difference* is the interaction term. Standard errors clustered by firm in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. These are descriptive conditional means and carry no causal interpretation. Source: CVM Dados Abertos, Reference Form items 13.11 and 15; sector from the CVM registry.

Figure 1
Distribution of the max-to-mean ratio and its median over time



Notes. Panel A plots kernel densities of R_{it} for firms with no state stake, with a direct stake, and with an indirect stake only, displayed over the range one to four. Panel B plots the median of R_{it} by year for firms with and without a state stake. The vertical axis of Panel A is *Density* and of Panel B *Median ratio*. Source: CVM Dados Abertos, Reference Form items 13.11 and 15.

Figure 2
Coefficient on state ownership, by year and by board size



Notes. The dependent variable in both panels is $\ln R_{it}$, so that the coefficients are read as proportional changes; on R_{it} they would grow with board size by construction, which would make Panel B partly mechanical. Both panels condition on board size. Panel A reports the coefficient on the state-ownership indicator estimated separately for each year, controlling for board size and sector. Panel B reports it separately by band of board size, controlling for board size and sector by year. Bars are 95 percent confidence intervals and the dashed line marks zero. The vertical axis of both panels is *Coefficient on* $\ln R$; the horizontal axes are *Year* in Panel A and *Executive board members* in Panel B. In the band of one to three members R_{it} equals one exactly in 20.3 percent of firm-years, against 2.7 percent in the rest of the sample. Board size is reported as an annual average rather than a headcount, so the bands are not integer counts. Source: CVM Dados Abertos, Reference Form items 13.11 and 15; sector from the CVM registry.

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Data availability All data used in this study are available from the corresponding author upon reasonable request.

Code availability Replication code is available from the corresponding author upon reasonable request.

Artificial intelligence During the preparation of this work the authors used Anthropic's Claude in order to write the script that downloads the data from CVM Dados Abertos, and to review and improve the language and readability of the manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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