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The signaling role of covenants and the speed of capital structure adjustment under poor creditor rights: Evidence from domestically and cross-listed firms in Brazil

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ABSTRACT

This paper studies how covenants affect the speed of capital structure adjustment in Brazil, an environment with poor creditor rights. Unlike previous evidence for developed countries, we find that the existence of debt covenants increases the speed of capital structure adjustment by more than 20% for firms that are only domestically listed. For firms that are cross-listed in the US, this effect is smaller (if any), possibly because these firms "bond" to the stricter regulation and creditor protection of the US market. Our results suggest that in emerging markets with poor creditor protection, covenants are an imperfect substitute for strong creditor rights and employed as a signaling device, permitting firms to adjust their leverage towards optimal levels quicker.

1. Introduction

Restrictive clauses such as covenants seek to reduce the credit risk of creditors by preventing shareholders from expropriating their wealth. Covenants limit the range of action of managers by restraining the issuance of new debt, payment of dividends, thereby affecting the firms' ability to adjust their debt ratios towards the target. Devos et al. (2017) find a negative relationship between the presence of covenants and the speed of capital structure adjustment for US firms. They argue that covenants impose an additional cost on firms' financing policies by reducing their flexibility to issue new debt, explaining why firms with stricter covenants tend to take longer to adjust their capital structure to the optimal level.

This paper examines how financial covenants in debt contracts affect the speed of adjustment to the target capital structure of publicly listed firms in an emerging market with a weak institutional environment and poor creditor protection, employing the framework of Devos et al. (2017). More specifically, we test how the presence of covenants in the debt contracts of Brazilian publicly listed firms relates to the speed of capital structure adjustment between 2007 and 2018. In addition, we also investigate whether the effect of covenants on the speed of adjustment is different between the firms that are only domestically-listed and those that are

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cross-listed in the US. To do this, we manually collect information on covenants from over 2,800 annual financial reports to detect the presence (as well as the intensity and type) of covenants in debt contracts.

We postulate that, contrarily to the results found by Devos et al. (2017) for US firms, covenants may be positively associated to the speed of adjustment of capital structure in emerging market countries. While covenants per se represent a cost of adjustment that slows down the speed at which the firm moves towards its optimal debt ratio, they are a signaling device that mitigates informational asymmetry. They allow firms to obtain more favorable contractual terms by creating ex-ante commitments that alleviate conflicts of interest between shareholders and creditors (Qi et al., 2011; Miller and Reisel, 2012). As such, covenants facilitate the adjustment of debt ratios, leading to a quicker speed of adjustment.

At the same time, covenants may be one of the signals used by firms to convey their commitment towards creditors. To send a credible signal, firms with covenants adjust their capital ratios faster (ex-post, i.e., after accepting covenants) as a means of conveying their ability to actually meet the commitment they have made. This is yet another manner of mitigating informational asymmetries. Because breaching covenants would be very costly under this environment (as they would convey a negative signal about the firm's ability), we expect firms with covenants to adjust quicker from any deviation, particularly when the covenants' terms refer to the firm's capital ratio directly.

The benefits of the signal are larger when creditor rights are weaker, such as in emerging markets. Therefore, we also claim that this signaling effect is weaker for firms that are cross-listed in the US, because these firms bond themselves to an environment of greater capital market scrutiny, stricter regulation and creditor protection (Karolyi, 1998, 2012) and improved information environment (Lee and Valero, 2010). Indeed, various studies, such as Qi et al. (2011), Miller and Reisel (2012), Reisel (2014) and Bradley and Roberts (2015), highlight the importance of covenants as a tool to protect creditors and find that the institutional environment affects the design of contracts. Specifically, Hong et al. (2016) finds a greater probability of debt contracts including covenants when laws protecting creditors are weak, as is the case of emerging markets.

We choose to focus on Brazil for a number of reasons. First, because of its representativeness among emerging economies in terms of the size of the country's economy. Second, because Brazil has a relatively large domestic capital market (and a particularly large debt market) among emerging economies (Brazil had the second largest market capitalization among emerging economies at the beginning of our sample period, according to the World Bank development indicators). Third, Brazil is second only to China, among emerging economies, with respect to the number of firms that are cross-listed in the US (Economatica, 2019), allowing us to measure how cross listing moderates the effects of covenants on the speed of adjustment. Fourth, Brazil's institutional characteristics are fairly comparable to other emerging economies (for example, it does not fare much better or worse than other countries in terms of institutional indicators such as the World Bank's creditor rights, control of corruption and rule of law indices). Fifth, the data on covenants may be collected from the notes to the firms' financial statements. Finally, by focusing on a single country, instead of cross-country comparisons, we are able to abstract from the effects of unobserved macro and microeconomic sources of country-level heterogeneity that might otherwise confound our analysis.

To test our hypotheses, we use partial adjustment models like those proposed by Hovakimian et al. (2001), Flannery and Rangan (2006), Byoun (2008), Hovakimian and Li (2011) and Devos et al. (2017).

Our results are consistent with our expectations. They show that firms in Brazil take approximately 1.7 years to close half the gap between current and target leverage, which is shorter than the 4-year period found by Devos et al. (2017) for US firms. Unlike Devos et al. (2017), we find that the presence of covenants increases the adjustment speed by slightly more than 20% for Brazilian firms that are listed only domestically. However, for Brazilian firms that are cross-listed in the US, the estimated marginal effect of covenants on the speed of adjustment is insignificant. The results suggest that, in an environment of poor creditor rights, the presence of covenants induces firms to adjust their capital structure faster in order to reinforce the quality signal provided by covenants. For firms that signal their quality through cross-listing, the marginal effect of signaling through faster adjustment speed is much smaller, if any.

Three additional findings corroborate our interpretation. First, we show that covenant intensity is also positively related to the speed of adjustment. Second, we show that the effect of covenants on the speed of adjustment is stronger when covenants are capital-specific (i.e., when covenants refer to leverage ratios and the like) than when covenants relate to performance indicators. Third, we show that covenant slack is negatively related to the speed of adjustment, reinforcing the idea that the proximity of breaching covenants (a small slack) induces the firm to adjust quicker.

Finally, a more qualitative observation is that, when analyzing covenant waivers in the sample of Brazilian firms, we find that their occurrence is much lower than found by Denis and Wang (2014) and Roberts (2015) for US firms. This is also in line with the rationale that, because covenants are seldom renegotiated or waived in emerging markets, firms tend to adjust their capital structure more dynamically because of the pressure exerted by these covenants.

Our paper speaks to several different streams of the literature. The first is the one referring to capital structure adjustment models in general (Leary and Roberts, 2005; Flannery and Rangan, 2006; Strebulaev, 2007; Hovakimian and Li, 2011), and in particular to Devos et al. (2017) that looks at the role of covenants on the speed of adjustment. We contribute to this stream of the literature by showing that the combination of institutional features and contract design (covenants) matter for firms' decisions regarding how fast they move to their target debt ratios, and that cross-listing is also an important determinant of the adjustment decision for emerging market firms.

Our paper also relates to the literature that investigates the effects of country institutional features on the optimal capital structure (or debt ratio), and particularly the speed of adjustment to the target level, such as Öztekin and Flannery (2012), Öztekin (2015) and An et al. (2015). These studies have found a strong relation between the speed of adjustment and the quality of institutions, to which we add by showing that covenants moderate these effects and partially replace poor institutional features. More tangentially, we also add to the vast literature on the effects of cross-listing for emerging market firms, by showing that the marginal effect of covenants on the speed of capital structure adjustment is smaller (if any) for these firms compared to their domestically-listed counterparts. We

claim that this is possibly due to the marginal signaling effects of covenants being smaller for cross-listed firms, because these firms are already subject to stricter regulation and enforcement.

2. Theoretical framework and hypotheses

The study of the effect of covenants on firms' capital structure remits to the tradeoff theory, originating from the seminal work of Modigliani and Miller (1958,1963) and various subsequent classical studies, such as Baxter (1967), Miller (1977) and Kim (1978), among others. The assumption is that firms frequently adjust their capital structure in search of an optimal debt ratio, periodically replacing debt with equity capital (and vice versa), seeking to minimize their cost of capital and maximize firm value (Myers, 2001). In its static version, the observed level of debt will reflect the optimal level (Myers, 1984) in the absence of adjustment costs. However, the presence of adjustment costs will result in gaps between the observed and optimal debt levels (Leary and Roberts, 2005; Flannery and Rangan, 2006), giving rise to the dynamic tradeoff models.

According to Devos et al. (2017), one of the adjustment costs is the presence of restrictive clauses in debt contracts, which constrain managers' actions, reducing their room for expropriation of debtholders (by investing in high-risk projects, adopting risky operational strategies or paying excessive dividends) after obtaining financing, as initially discussed by Jensen and Meckling (1976).

Seeking to mitigate expropriation, creditors write contracts that include covenants, which can limit the issuance of additional debt, the distribution of dividends, or require the anticipation of debt service payment under determined conditions. Creditors also incorporate the costs of these potential agency (shareholder-creditor) problems in the financial charges, thus increasing the firms' financing costs. According to Smith and Warner (1979), the establishment of restrictive debt clauses can reduce the costs associated with the conflict of interest between creditors and shareholders and increase firm value.

Reisel (2014) analyzed whether the mechanisms established in covenants are effective to mitigate agency problems and the magnitude of the presence of these clauses on the funding costs of American companies. They found that the presence of restrictive clauses reduces the cost of debt, bringing benefits to firms, although to a lesser extent to those with high growth and low probability of default. Corroborating these findings, Bradley and Roberts (2015) also found a negative relationship between the presence of covenants and the cost of debt, as well as a positive relationship between the inclusion of covenants and the maturity of bond debt. In this sense, various studies, such as Nini et al. (2009), Roberts and Sufi (2009), Nini et al. (2012), Denis and Wang (2014) and Roberts (2015), find that the presence of these restrictive clauses is important in determining firms' financing and investment policies.

In emerging markets, the empirical literature on the implications of covenants is relatively scarce, and we did not find any studies that have analyzed the relationship between covenants and the speed of capital structure adjustment. Due to these countries' generally weak institutional environment, lenders use covenants to improve the enforcement of contracts. Indeed, Qi et al. (2011) argue that stronger institutional protection of creditors reduces the need for covenants to lower the agency cost of debt, and find that companies located in countries with stronger creditor protection tend to have fewer restrictive clauses in loan agreements. Likewise, Miller and Reisel (2012) found a greater probability for debt contracts to include covenants when the laws on protection of creditors are weaker and that the use of restrictive clauses in countries with weak protection of lenders is associated with lower cost of debt. In the same strand, Hong et al. (2016) confirmed that the use of covenants varies according to the institutional environment, and that covenants prevail in countries with weak creditor rights.

Covenants work as a signal allowing firms to use more debt and fund at lower costs than otherwise. By accepting covenants, firms also benefit from signaling better financial management through a more dynamic management of debt ratios, particularly when covenants' terms refer to debt or capitalization ratios. Eventually breaching a covenant spoils the positive signal, and thus emerging market firms with debt covenants have incentives to adjust their capital structure faster, seeking to avoid the costly breaching of covenant clauses.

Therefore, the net effect of covenants on the speed of adjustment depends on the relative marginal costs and benefits of a quicker adjustment. On the one hand, covenants per se impose an adjustment cost, which makes their presence decrease the speed of adjustment (that is Devos et al.'s argument). On the other hand, by accepting covenants, firms fund at better terms than otherwise, which coupled with a greater necessity to signal their financial ability, induces a faster adjustment (the signaling effect). The latter effect is stronger in emerging economies compared to developed ones because the enforcement role of covenants is more important when creditor rights are weaker. We claim that the signaling effect dominates the direct adjustment cost effect in a low creditor rights environment.

In this context, we formulate the following hypotheses, which we test for a sample of Brazilian firms:

Hypothesis 1. The presence of covenants in debt contracts positively affects firms' speed of capital structure adjustment.

As we explain above, we expect this effect to be stronger for firms that are domestically-listed than for firms that are cross-listed in the US. Cross-listed firms "bond" to the US stronger regulation and investor protection (Karolyi, 1998, 2012), which makes the signaling value of covenants smaller for these firms compared to their domestically-listed counterparts.

Hypothesis 2. The greater the intensity of covenants in debt contracts, the faster is the speed of capital structure adjustment.

According to this rationale, the signaling effect should be even stronger when the firm's covenants relate directly to capital (or debt) ratios, as opposed to covenants that are more related to performance measures. Therefore, we expect this effect to be stronger when the firm has capital covenants in place, and weaker (if any) when it has other types of covenants.

According to Devos et al. (2017), greater covenant slack means it will be easier for firms to adjust their capital structure to a target level, leading to a positive relationship. However, it is also possible to expect that the closer a firm is to violating a covenant (i.e., the

Table 1
Frequency of covenants in debt contracts.

Type of Covenant	Obs.	Freq. (%)
Capital Covenants	**618**	**24.8%**
Current Assets / Current Liabilities	185	7.4%
Net Equity / Total Assets	132	5.3%
Net Debt / Net Equity	129	5.2%
Net Debt / (Net Debt + Net Equity)	59	2.4%
Total Liabilities / Total Assets	56	2.2%
Gross Debt / Net Equity	45	1.8%
Short-Term Debt / Long-Term Debt	12	0.5%
Performance Covenants	**1875**	**75.2%**
Net Debt / EBITDA	949	38.1%
EBITDA / Financial Result	418	16.8%
EBITDA / Financial Expense	172	6.9%
Debt Service Coverage Index	127	5.1%
EBITDA / Revenue	86	3.4%
Gross Debt / EBITDA	71	2.8%
EBIT / Financial Expense	17	0.7%
Net Short-Term Debt / EBITDA	16	0.6%
Investment / EBITDA	14	0.6%
EBIT / Financial Result	**5**	0.2%
Total	**2493**	**100.0%**

Notes: Net Debt is equal to Gross Debt minus Cash and Cash Equivalents; EBITDA denotes Earnings before Interest, Taxes, Depreciation and Amortization; EBIT denotes Earnings before Interest and Taxes; Debt Service Coverage Ratio (DSCR) is equal to EBITDA over Debt Service, the latter equal to Amortization of Principal Plus Interest; Financial Result is equal to Financial Income minus Financial Expense.

smaller the slack), the more concerned it will be about adjusting its debt levels, leading to a negative relation between covenant slack and speed of adjustment. Therefore, the relationship between covenant slack and the speed of adjustment depends on the relative strength of these two effects and remains an empirical question.

3. Research methods

3.1. Data and sample

The initial sample is composed of Brazilian nonfinancial companies (excluding banks, investment funds and insurers) listed on the B3 (Brasil, Bolsa, Balcão, the Brazilian exchange) in the period from 2007 to 2018, for a total of 324 companies. After operationalization of the variables, we drop from the sample firms that had zero leverage throughout the entire sample period, negative net equity or fewer than two consecutive years of data for analysis. We remain with 278 firms and 2,844 observations (firm-years).

The data on financial covenants were collected manually from the notes to the financial statements related to "loans and financing", obtained from the B3 website. Overall, we analyzed more than 4,000 notes in search of information on covenants. The accounting, financial and market data used to calculate the variables are described later in the paper, and were obtained from the Economatica database.

We find 17 covenant ratios in our inspection, as reported in Table 1, segregated into capital covenants and performance covenants. As in Christensen and Nikolaev (2012), capital covenants are those related to capital sources and use only balance sheet information. Performance covenants use both balance sheet and income statement information and are related to efficiency indicators. There are 2,493 observations, with the main ratios being Net Debt/EBITDA (38.1%) and EBITDA/Financial Result (16.8%). If the same ratio appears in more than one covenant clause of a firm in a given year, we use the following criteria, in this order: 1) we consider the clause attributed to the largest (greatest value) debt contract; and 2) if we are not able to identify the amount of a debt contract, we consider the most restrictive clause. These criteria are also used by Devos et al. (2017).

Fig. 1 presents the number of firms that disclosed the existence of covenants in debt agreements, in each year, along with the number of firms that described the provisions of these covenants (e.g., the ratios used as thresholds). Approximately one-third of the firms stating they were subject to covenants did not disclose the content of the corresponding clauses.

Table 2 exhibits the intensity of the presence of covenants in debt contracts, measured by the number of observations (firm-years) containing 1, 2, 3 or more than 3 covenants. Most of the firms presented 2 covenants in debt agreements.

3.2. Leverage measures and explanatory variables

Table 3 presents the operational definition of the leverage and explanatory variables of covenants, besides the variables of firm characteristics used to estimate the target leverage, as is typical in capital structure studies (Rajan and Zingales, 1995; Fama and French, 2002; Frank and Goyal, 2003; Myers, 2001). The variables were winsorized at the 2.5% and 97.5% percentiles to mitigate the

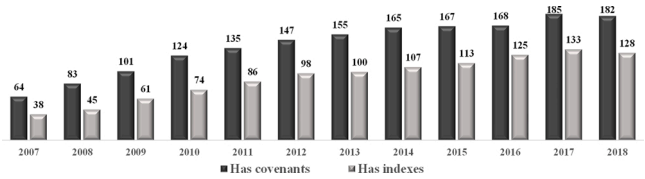

Fig. 1. Number of firms listed on the B3 that reported the existence of covenants each year and the number that described the content (ratios) of the covenants.
Notes: The figure shows the number of firms that revealed the existence of debt contracts with covenants and the number of firms that identified the ratio(s) used in the covenants. During the period studied, we analyzed a fixed panel of 278 companies listed on the B3.

Table 2
Intensity of covenants - firms listed on the B3.

Intensity of the Presence of Covenants			
	Firm-Years	Total	%
Only 1 Covenant	292	292	12%
2 Covenants	511	1022	41%
3 Covenants	185	555	22%
More than 3	139	624	25%
TOTAL	**1127**	**2493**	**100%**

Table 3
Variables definition.

Firm-level variables		
Leverage Variables	**Abbreviation**	**Proxy**
Total Leverage	*Lev_Total*	Gross Debt/Total Assets
Long-Term Leverage	*Lev_LT*	Long Term Debt/Total Assets
Firm Variables	**Abbreviation**	**Proxy**
Size	*Ln(Revenue)*	Ln(Revenue)
Tangibility	*Capex_Assets*	Capex/Assets
Profitability	*ROA*	Return on Assets = Net Profit/Assets
Market-to-book	*M/B*	Market Value of Assets/Book Value of Assets
Liquidity	*Liquidity*	Current Assets /Current Liabilities
Unlevered Beta	*Risk*	Equity Beta/(1+(Gross Debt/NE)*(1-Tax))
Dividends	*Dividends*	Dividends Paid/Total Assets
Tax Benefit	*Depreciation*	Depreciation/Total Assets
Explanatory Variables	**Abbreviation**	**Proxy**
Dummy for the presence of covenants	*CovDummy*	Dummy equal to 1 for firms with any covenant in a determined year, and zero otherwise
Index of Covenant Intensity	*CovIndex*	Ratio between the number of covenants of a given firm and the total possible number of covenants obtained, equal to 17.
Covenant Slack 1	*CovSlack1*	Slack 1 = (Covenant Threshold (-) Observed Accounting Indicator) / Covenant Threshold
Covenant Slack 2	*CovSlack2*	Slack 2 = Covenant Threshold (-) Observed Accounting Indicator

Notes: Gross Debt is equal to Loans, Bonds and Financial Leases (both short and long term); Long-Term Debt is equal to Loans, Bonds and Financial Leases (long term); Ln denotes the natural logarithm; Market Value of Assets is equal to Total Assets minus Net Equity plus Market Value of Shares (in the last case the closing value times the total number of shares outstanding, obtained from the Economatica database); NE denotes Net Equity; Tax is equal to marginal income tax rate of 34 % in Brazil; Dividends denotes the payment of dividends and interest on equity, and Depreciation is the depreciation expense. The last two metrics are scaled by Total Assets. Covenant Slack 1 and 2: indicators calculated considering the covenant Net Debt/EBITDA; Net Debt is equal to Gross Debt minus Cash and Cash Equivalents; EBITDA is equal to Earnings before Interest, Taxes, Depreciation and Amortization; Covenant Threshold is equal to the limit set by the creditor in the restrictive clause of the contract; and Accounting Indicator is equal to the actual value calculated for the firm in a determined year considering the contractual clause. The greater the value obtained for Slack 1 and 2, the greater the distance to breaching the covenant threshold.

effect of outliers.

3.3. Partial adjustment model and the presence of covenants

According to Hovakimian and Li (2011), the implementation of tests of the goodness of fit is difficult because the target level of leverage is not observable, so in the majority of cases it is obtained by means of regressing the observed leverage values against a set of variables representing firm characteristics. Subsequently, the estimated debt level is used in a second stage of the test, as the

independent variable (a proxy for the target debt level). Therefore, the model estimated in the first step is represented by:

$$LEV_{i,t} = \beta X_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Where: $LEV_{i,t}$ is the leverage of firm i in year t; and X is a vector of explanatory variables that characterize the firm, employed to predict the target leverage, including size, tangibility, profitability, market-to-book ratio (growth opportunities), liquidity, risk, payment of dividends and level of depreciation (tax benefit). These variables are traditionally used in the literature on capital structure (Rajan and Zingales, 1995; Myers, 2001; Fama and French, 2002; Frank and Goyal, 2003; Hovakimian et al., 2004). We also use year fixed effects to account for macroeconomic features that may change the target leverage of firms, such as variations in monetary policy and macroeconomic liquidity.[1] As in Devos et al. (2017), we use leverage indicators at book value, since covenants are established by lenders considering the firm's accounting numbers.

In the second step, the target leverage ($LEV^{*}_{i,t}$) estimated by Eq. (1) is employed in a partial adjustment model, represented by:

$$\Delta LEV_{i,t} = \lambda\, LevDev_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $\Delta LEV_{i,t}$ is the difference between the leverage of firm i in year t ($LEV_{i,t}$) and in the previous year. $LevDev_{i,t} = (LEV^{*}_{i,t} - LEV_{i,t-1})$, i.e., is the deviation from the target leverage, given by the difference between $LEV^{*}_{i,t}$ (the target leverage of firm i in year t estimated according to Eq. 1), and the firm's observed leverage in the previous year ($Lev_{i,t-1}$). λ is the adjustment parameter.

The partial adjustment model presented above in Eq. (2) is often found in the capital structure literature, such as in Hovakimian et al. (2001), Flannery and Rangan (2006), Byoun (2008), Hovakimian and Li (2011) and Devos et al. (2017), used to estimate the target leverage and the speed of adjustment to that target structure.

To analyze the relationship between covenants and the speed of capital structure adjustment, we insert interaction variables of covenants in the model described by Eq. (2), seeking to examine how the presence of this attribute would influence the speed of adjustment to the target level, i.e., its impact on the coefficient λ. For this purpose, besides the control variables (firm characteristics) described in Table 3, we insert a dummy variable indicating the presence of covenants. All our regressions use firm fixed effects, to account for firm-level heterogeneity, year fixed effects to control for macroeconomic features driving adjustment, and the standard errors are robust to heteroskedasticity and clustered at the firm level, to account for the possible serial correlation of the error terms.

3.4. Models to test the hypotheses

To test hypothesis 1, we inserted a dummy variable to represent the presence of covenants in a determined firm's debt contracts in a determined year in Eq. (3):

$$\Delta LEV_{i,t} = \alpha_0 + \beta_1 LevDev_{i,t} + \beta_2 CovDummy_{i,t} + \beta_3 LevDev_{i,t}\ x\ CovDummy_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where $\Delta Lev_{i,t}$ and $LevDev_{i,t}$ are defined as in Eq. (2) and *CovDummy* is equal to 1 if the firm-year observation presents any type of covenant, and zero otherwise. The coefficient of interest, β_3, measures the marginal effect of the presence of covenants on the speed of adjustment. Our hypothesis that the existence of covenants will be positively related to the speed of adjustment implies $\beta_3 > 0$. We run this regression for the entire sample of firms, as well as separately for firms that are domestically-listed and cross-listed in the US. As argued before, we expect the effect to be stronger for firms that are domestically listed than for firms that are cross-listed in the US, because the signaling effect is more valuable to firms that do not bond to the stronger creditor protection environment of the US.

We also estimate regressions adding firm-level control variables and year fixed effects, which are our preferred specifications, as they allow us to control for firm-level and macroeconomic features that may affect their speed of adjustment. We note that the use of firm fixed effects in all regressions mitigates concerns that the presence of covenants could be capturing some sort of unobserved firm feature (e.g., managerial quality) that makes the firm adjust its debt ratio quicker. In the robustness section, we address the remaining concern that the omitted firm feature could vary over time.

To test the second hypothesis, we replace the covenant dummy with a variable that measures the intensity of the presence of covenants in debt contracts, as proposed by Gompers et al. (2003) and also used by Bradley and Roberts (2015) and Devos et al. (2017), called *CovIndex*. In each year, we count the number of covenant categories found in analyzing the notes to the financial statements of the firms (among 17 different possible categories). Hence, this index attributes the same weight to all the categories of covenants. To facilitate the interpretation of our coefficients, we standardize this index to have a mean zero and standard deviation of 1. Replacing the covenant dummy with the covenant intensity index in Eq. (3) yields:

$$\Delta LEV_{i,t} = \alpha_0 + \beta_1 LevDev_{i,t} + \beta_2 CovIndex_{i,t} + \beta_3 LevDev_{i,t}\ x\ CovIndex_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where: $CovIndex_{i,t}$ and the other variables are defined above. The coefficient of interest, β_3, measures the marginal effect of the intensity of covenants on the speed of adjustment, and once again we expect a positive β_3.

[1] In unreported robustness checks, we also estimate the target leverage regressions including a dummy for cross-listing and a covenant dummy, as these might be determinants of the target leverage. Our target leverage estimates are essentially the same, and the results of the second-step regressions using these estimates are remarkably similar to the ones reported on the Table 6 onwards.

Table 4
Descriptive statistics of the firms with and without the presence of covenants.

	Mean	St. Dev.	Obs.	Mean	St. Dev.	Obs.	Difference (t-value)	Mean	St. Dev.
	Panel A - Domestically-listed firms								
	Firms Without Covenants			**Firms With Covenants**				**All domestic**	
Lev_Total	0.218	0.160	1006	0.340	0.148	1253	−18.686***	0.284	0.165
Lev_LT	0.131	0.122	928	0.243	0.128	1241	−20.469***	0.194	0.137
Ln(revenue)	5.875	1.689	1082	7.310	1.303	1258	−23.163***	6.635	1.657
Capex_assets	0.053	0.067	1016	0.067	0.063	1240	−5.258***	0.061	0.065
ROA	0.033	0.082	1147	0.032	0.063	1266	0.488	0.033	0.073
M/B	1.350	0.731	985	1.358	0.624	1113	−0.259	1.355	0.676
Liquidity	2.403	2.016	1143	1.712	1.041	1266	10.705***	2.057	1.641
Risk	0.539	0.367	823	0.471	0.318	999	4.231***	0.502	0.342
Dividends	0.021	0.033	1016	0.022	0.030	1243	−0.408	0.022	0.032
Depreciation	0.026	0.022	982	0.033	0.021	1231	−7.537***	0.030	0.021
Kd_Net	0.295	0.417	1010	0.146	0.181	1229	11.335***	0.213	0.320
	Panel B - Cross-listed firms								
	Firms Without Covenants			**Firms With Covenants**				**All cross-listed**	
Lev_Total	0.317	0.138	86	0.338	0.141	344	−1.275	0.334	0.141
Lev_LT	0.252	0.123	85	0.257	0.126	343	−0.354	0.256	0.125
Ln(revenue)	9.580	1.259	87	8.966	1.378	344	3.775***	9.090	1.376
Capex_assets	0.065	0.052	87	0.056	0.047	341	1.520	0.058	0.048
ROA	0.044	0.064	87	0.031	0.063	344	1.723*	0.033	0.064
M/B	1.481	0.763	87	1.340	0.637	344	1.771*	1.368	0.666
Liquidity	1.749	0.707	87	1.664	0.697	344	1.009	1.681	0.699
Risk	0.558	0.278	76	0.502	0.313	334	1.430	0.513	0.307
Dividends	0.027	0.035	86	0.024	0.030	342	0.842	0.024	0.031
Depreciation	0.032	0.018	87	0.032	0.019	343	−0.008	0.032	0.019
Kd_Net	0.116	0.076	76	0.153	0.208	327	−1.562***	0.146	0.190
	Panel C - All firms (domestically- and cross-listed)								
	Firms Without Covenants			**Firms With Covenants**				**Entire sample**	
Lev_Total	0.226	0.161	1092	0.339	0.147	1597	−18.949***	0.293	0.162
Lev_LT	0.141	0.126	1013	0.246	0.128	1584	−20.417***	0.205	0.137
Ln(revenue)	6.151	1.924	1169	7.666	1.485	1602	−23.383***	7.027	1.842
Capex_assets	0.054	0.066	1103	0.065	0.060	1581	−4.511***	0.060	0.063
ROA	0.034	0.081	1234	0.032	0.063	1610	0.908	0.033	0.072
M/B	1.361	0.734	1072	1.353	0.627	1457	0.266	1.357	0.674
Liquidity	2.356	1.959	1230	1.702	0.978	1610	11.636***	1.985	1.519
Risk	0.540	0.360	899	0.479	0.317	1333	4.261***	0.503	0.336
Dividends	0.022	0.033	1102	0.022	0.030	1585	−0.392	0.022	0.031
Depreciation	0.026	0.021	1069	0.033	0.020	1574	−7.498***	0.030	0.021
Kd_Net	0.283	0.406	1086	0.147	0.187	1556	11.531***	0.203	0.304

Notes: Lev_Total is equal to the ratio between gross debt and total assets; Lev_LT is equal to the ratio between long-term debt and total assets; Ln (Revenue) is equal to the natural logarithm of total revenue; Capex_assets is equal to the ratio between fixed capital investment and total assets; ROA is equal to return on assets; M/B is the market-to-book ratio (assets at market value over assets at accounting value, where assets at market value is equal to the total assets minus book value of equity plus market value of equity); Liquidity is equal to the ratio between current assets and current liabilities; Risk is equal to the unlevered beta; Dividends is equal to payment of dividends and interest on equity; and Depreciation is equal to the depreciation expense. The last two are scaled by total assets; Kd_Net is the Cost of Debt Net of Taxes, equal to the ratio between Financial Expense*(1-Tax) and Gross Debt. Tax is equal to the marginal income tax rate of 34% in Brazil.

*** $p < 0.01$.

* $p < 0.1$.

Finally, we investigate the relationship between the cost of adjustment and the covenant slack. To compute the covenant slack, it is necessary to know the threshold set in the relevant contract and the firm's actual ratio. Due to the small number of observations where firms disclosed the threshold set by the creditor, we calculated the covenant slack only for the Net Debt/EBITDA ratio, the one with more observations in our sample. Insertion of this variable in Eq. (3) yields:

$$\Delta LEV_{i,t} = \alpha_0 + \beta_1 LevDev_{i,t} + \beta_2 CovSlack_{i,t} + \beta_3 LevDev_{i,t}\ x\ CovSlack_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where $CovSlack_{i,t}$ represents the gap between the covenant threshold and the accounting indicator observed for a given firm-year, measured either in absolute or relative terms, as shown in Table 3, and the other variables are defined above. The coefficient of interest, β_3, measures the marginal effect of the covenant slack on the speed of adjustment. The sign of β_3 is an empirical question as we argue in section 2.

Table 5
Results of the model to estimate the target leverage.

Panel A: Coefficients of the model with fixed effects to estimate the total and long-term target leverage

	Total Leverage	Long-Term Leverage
Independent Variables	Coefficients	Coefficients
Ln(revenue)	0.028***	0.019**
	(0.009)	(0.008)
Capex_assets	0.089	0.145**
	(0.068)	(0.064)
ROA	−0.402***	−0.178***
	(0.074)	(0.066)
M/B	−0.007	−0.004
	(0.008)	(0.007)
Liquidity	−0.007	0.025***
	(0.005)	(0.005)
Risk	−0.125***	−0.089***
	(0.015)	(0.014)
Dividends	−0.209	−0.272**
	(0.136)	(0.127)
Depreciation	0.330	0.378
	(0.324)	(0.289)
Observations	1992	1944
R-squared	0.271	0.187
Number of firms	241	238
Firm Fixed Effects	YES	YES
Year Fixed Effects	YES	YES

Panel B: Estimated leverage statistics

	Entire Sample			Firms Without Covenants			Firms With Covenants		
	Obs.	Lev*	LevDev	Obs.	Lev*	LevDev	Obs.	Lev*	LevDev
Total Leverage	1828	0.302	0.006	603	0.277	0.047	1225	0.314	−0.014
Long-Term Leverage	1774	0.209	0.003	563	0.199	0.056	1211	0.214	−0.021

Notes: In Panel A, the dependent variable is equal to total leverage (model 1) and long-term leverage (model 2); Total leverage is equal to the ratio between total debt and total assets; long-term leverage is equal to the ratio between long-term debt and total assets. The coefficients were estimated by fixed effects with robust standard errors clustered by firms. Panel B contains the averages of the estimated values of target leverage (Lev*) and deviation of leverage (LevDev) considering the total sample and the sample without and with covenants. The deviation of leverage (LevDev) is equal to the difference between the target leverage and the observed leverage of the firm. The target leverage (Lev*) was estimated according to the models presented in Panel A.
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.

We choose models without any lags in the vector of explanatory variables because we were working with annual data, naturally more stable, and because the variable *LevDev* already contains a lag in its operationalization. For robustness analysis, we also tested models with different forms of lags of the explanatory variables and we did not find qualitative changes in the results (results unreported). Finally, because the presence of covenants is not exogenous, we run propensity score matching regressions to compare firms with and without covenants that are similar in observable dimensions, as well as Blundell and Bond (1998) GMM-Sys regressions.

4. Analysis of the results

4.1. Descriptive statistics

Table 4 presents the descriptive statistics of the sample, segregated between firms that disclosed financial covenants (dummy for covenants = 1) and those that did not (dummy for covenants = 0). We also segregate the analysis by domestically-listed firms and cross-listed firms.

The results in Table 4 show that the groups present significant differences. The firms with covenants are those with the highest total and long-term leverage, and have a lower cost of debt, which is consistent with the notion that covenants allow firms to obtain more favorable financing terms and take on more debt, as verified by Miller and Reisel (2012) and Bradley and Roberts (2015). Interestingly, the difference in the cost of debt for companies without covenants but listed in the US capital markets is much smaller, corroborating the idea that the marginal signaling effect provided by covenants is smaller for cross-listed firms. Firms with covenants also tend to be larger, considering sales revenue, and invest more, considering fixed capital investment, leading to a higher depreciation rate. Devos et al. (2017) find similar results for US companies.

In turn, the liquidity indicator is smaller for the group of companies with covenants, as is the risk indicator, possibly because of the greater financial sophistication in these firms' liquidity and risk management.

Table 6
Impact of the presence of covenants on the speed of adjustment of leverage.

	Panel A: Total Debt over Total Assets								
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LevDev	0.411***	0.360***	0.301***	0.420***	0.366***	0.311***	0.407***	0.370***	0.290***
	(0.024)	(0.037)	(0.033)	(0.028)	(0.041)	(0.035)	(0.041)	(0.119)	(0.100)
CovDummy		0.003	0.006		0.007	0.011*		−0.012	−0.011
		(0.005)	(0.005)		(0.006)	(0.006)		(0.013)	(0.013)
LevDev* × *CovDummy		**0.082****	**0.073****		**0.093****	**0.082****		**0.040**	**0.070**
		(0.038)	**(0.034)**		**(0.041)**	**(0.036)**		**(0.138)**	**(0.113)**
Observations	1828	1828	1828	1451	1451	1451	377	377	377
R-squared	0.291	0.296	0.361	0.297	0.305	0.374	0.312	0.315	0.404
Number of firms	232	232	232	203	203	203	47	47	47
Controls	NO	NO	YES	NO	NO	YES	NO	NO	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	NO	NO	YES	NO	NO	YES
Listing status	All	All	All	Domestic	Domestic	Domestic	Crosslisted	Crosslisted	Crosslisted
	Panel B: Long-Term Debt over Total Assets								
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LevDev	0.498***	0.437***	0.398***	0.500***	0.449***	0.419***	0.518***	0.404***	0.385***
	(0.029)	(0.042)	(0.039)	(0.033)	(0.048)	(0.044)	(0.055)	(0.119)	(0.102)
CovDummy		0.007	0.009		0.009	0.015**		−0.003	−0.002
		(0.006)	(0.006)		(0.007)	(0.007)		(0.014)	(0.013)
LevDev* × *CovDummy		**0.093****	**0.080***		**0.084***	**0.065**		**0.132**	**0.093**
		(0.043)	**(0.042)**		**(0.047)**	**(0.046)**		**(0.133)**	**(0.121)**
Observations	1774	1774	1774	1399	1399	1399	375	375	375
R-squared	0.312	0.318	0.361	0.314	0.321	0.365	0.339	0.344	0.423
Number of firms	230	230	230	201	201	201	47	47	47
Controls	NO	NO	YES	NO	NO	YES	NO	NO	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	NO	NO	YES	NO	NO	YES
Listing status	All	All	All	Domestic	Domestic	Domestic	Crosslisted	Crosslisted	Crosslisted

Notes: The dependent variable is equal to the first difference of total leverage (Panel A) and long-term leverage (Panel B). *LevDev* is the difference between the estimated target leverage and observed leverage of the firm. *CovDummy* is equal to 1 if the firm-year observation presents any type of covenant, and zero otherwise; columns (1), (4) and (7) shows the speed of adjustment of the basic model, columns (2), (5) and (8) shows the effect of covenants as an interaction variable, and columns (3), (6) and (9) includes additional control variables. The control variables are not presented for simplification and are those used to estimate the target leverage (reported in Table 5). The coefficients were estimated by fixed effects with robust standard errors clustered by firm.
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

4.2. Main regression results

Panel A of Table 5 reports the estimated coefficients of the target leverage models for total debt and long-term debt. The variables size (natural logarithm of sales), tangibility (capex over assets) and tax benefit (depreciation over assets) have positive signs in both models. The other variables have a negative sign in both models, except for liquidity, which is positive with significant coefficient only in the long-term leverage model. The within R-squared is approximately 27% in the total leverage model and 19% in the long-term leverage model.

Panel B of Table 5 presents the average of the estimated values of the target leverage and deviation from leverage (total and long-term), considering the entire sample and the subsamples of observations without and with covenants. The average forecast target leverage turned out to be 30.2% for total debt and 20.9% for long-term debt. The subsample of firms with covenants presented larger target leverages than the observations without covenants. The average values of *LevDev* indicated a small distance from actual leverage to target leverage (0.6 percentage point for total leverage and 0.3 pp for long-term leverage), and was even smaller for firms with covenants for both leverage metrics (-1.4 pp and -2.1 pp respectively) compared to the firms without covenants (4.7 pp ad 5.6 pp, respectively). The orders of magnitude are similar to those obtained by Devos et al. (2017).

Table 6 presents the set of estimates of Eq. (3). According to Hypothesis 1, we expect a positive sign for the coefficient of the interaction variable *LevDev x CovDummy*. Panel A contains the results for the regressions that use total debt as the dependent variable, and Panel B the results for long-term debt. Columns (1), (4) and (7) report the results of the unconditional model (i.e., the model

Table 7
Impact of the intensity of covenants on the capital structure adjustment speed.

	Panel A: Total Debt over Total Assets					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
LevDev	0.415***	0.351***	0.427***	0.364***	0.402***	0.348***
	(0.023)	(0.022)	(0.027)	(0.025)	(0.042)	(0.042)
Cov-index	0.005*	0.006**	0.008**	0.010***	−0.001	0.000
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
LevDev* × *CovIndex	**0.041****	**0.038****	**0.044***	**0.040***	**0.031**	**0.028**
	(0.020)	**(0.018)**	**(0.023)**	**(0.022)**	**(0.039)**	**(0.030)**
Observations	1826	1826	1449	1449	377	377
R-squared	0.296	0.361	0.305	0.375	0.314	0.403
Number of firms	232	232	203	203	47	47
Controls	NO	YES	NO	YES	NO	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	NO	YES	NO	YES	NO	YES
Listing status	All	All	Domestic	Domestic	Crosslisted	Crosslisted
	Panel B: Long-Term Debt over Total Assets					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
LevDev	0.501***	0.452***	0.505***	0.460***	0.506***	0.455***
	(0.029)	(0.027)	(0.033)	(0.031)	(0.059)	(0.052)
Cov-index	0.006*	0.007**	0.010**	0.012***	−0.002	−0.000
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
LevDev* × *CovIndex	**0.037**	**0.041***	**0.029**	**0.029**	**0.050**	**0.042**
	(0.024)	**(0.023)**	**(0.029)**	**(0.028)**	**(0.042)**	**(0.033)**
Observations	1772	1772	1397	1397	375	375
R-squared	0.316	0.361	0.322	0.368	0.345	0.424
Number of firms	230	230	201	201	47	47
Controls	NO	YES	NO	YES	NO	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	NO	YES	NO	YES	NO	YES
Listing status	All	All	Domestic	Domestic	Crosslisted	Crosslisted

Notes: The dependent variable is equal to the variation of total leverage (Panel A) and long-term leverage (Panel B); *LevDev* is the difference between the estimated target leverage and observed leverage of the firm; *CovIndex* is equal to the number of types covenants of the firm-year (among 17 possible types), standardized to mean 0 and standard deviation equal to 1; columns (1) (3) and (5) shows the effect of covenants as an interaction variable, and columns (2), (4) and (6) includes additional control variables. The control variables are not presented for simplification and are those used to estimate the target leverage (reported in Table 5). The coefficients were estimated by fixed effects with robust standard errors clustered by firm.
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

without the covenant dummy and the interaction term) for the entire sample, domestically-listed firms, and cross-listed firms, respectively. In this model, the coefficient of *LevDev* of 0.411 for total debt in column (1), meaning that the firms in the sample take approximately 1.7 year to close half the gap between current and target leverage.[2]

When including the interaction variable *LevDev x CovDumy*, we obtain significant and positive coefficients of 0.082 in column (2) and 0.073 in column (3), both statistically significant at 5%, for the entire sample. This implies that the presence of covenants increases the speed of adjustment to the target level by 23% (0.082/0.360) and 24% (0.073/0.301), respectively. In terms of adjustment time, the estimates of column 2 show that the time to close half the gap towards the target leverage is approximately 1.92 for firms without covenants and 1.56 for firms with covenants. These results confirm Hypothesis 1, and are significantly different than those obtained by Devos et al. (2017), who estimate a longer adjustment time, and find that the impact of the presence of covenants is negative, reducing the speed of adjustment to the target level by around 10% for US firms.

As we compare the results of columns 5 and 6 of Panel A (domestically-listed firms only) to those of columns 8 and 9 (cross-listed firms), we find that the marginal effect of covenants on the speed of adjustment for firms that are cross-listed in the US capital markets is smaller than for domestically-listed firms, and statistically insignificant. This result supports the idea that the signaling effect of covenants is less important for cross-listed firms, which are able to "bond" to the strict regulations and greater creditor protection of the US environment.

Moving to Panel B of Table 6, where the dependent variable is the long-term debt, the results are qualitatively similar to those of Panel A. The coefficient of 0.498 for the model without the interaction variable (column 1) indicates that firms take approximately 1.4

[2] The computation is as follows: $\ln(2)/0.411 \approx 1.7$.

Table 8
Impact of covenant slack on the speed of adjustment of leverage.

	Panel A: Total Debt over Total Assets					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables	*Slack 1*	*Slack 2*	*Slack 1*	*Slack 2*	*Slack 1*	*Slack 2*
LevDev	0.508***	0.509***	0.503***	0.505***	0.612***	0.598***
	(0.045)	(0.043)	(0.053)	(0.052)	(0.063)	(0.063)
Cov-slack	−0.028***	−0.008***	−0.025**	−0.007**	−0.042***	−0.011**
	(0.009)	(0.003)	(0.010)	(0.003)	(0.014)	(0.004)
LevDev* × *CovSlack	**−0.097****	**−0.030****	**−0.048**	**−0.015**	**−0.142****	**−0.039****
	(0.044)	**(0.013)**	**(0.045)**	**(0.014)**	**(0.057)**	**(0.017)**
Observations	568	568	426	426	142	142
R-squared	0.526	0.525	0.506	0.505	0.701	0.694
Number of firms	109	109	89	89	28	28
Controls	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Listing status	All	All	Domestic	Domestic	Crosslisted	Crosslisted
	Panel B: Long-Term Debt over Total Assets					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables	*Slack 1*	*Slack 2*	*Slack 1*	*Slack 2*	*Slack 1*	*Slack 2*
LevDev	0.601***	0.601***	0.574***	0.577***	0.825***	0.818***
	(0.057)	(0.056)	(0.068)	(0.067)	(0.084)	(0.082)
Cov-slack	−0.014	−0.004	−0.016	−0.005	−0.014	−0.003
	(0.010)	(0.003)	(0.011)	(0.003)	(0.017)	(0.005)
LevDev* × *CovSlack	**−0.075**	**−0.022**	**−0.048**	**−0.015**	**−0.024**	**−0.004**
	(0.048)	**(0.015)**	**(0.052)**	**(0.016)**	**(0.087)**	**(0.025)**
Observations	567	567	425	425	142	142
R-squared	0.495	0.495	0.485	0.485	0.681	0.679
Number of firms	109	109	89	89	28	28
Controls	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Listing status	All	All	Domestic	Domestic	Crosslisted	Crosslisted

Notes: The dependent variable is equal to the variation of total leverage (Panel A) and long-term leverage (Panel B); *LevDev* is the difference between the firm's estimated leverage and observed leverage; *CovSlack* was measured in two ways for the indicator Net Debt/EBITDA: i) *Slack* 1 (columns 1, 3 and 5) is equal to the difference between the covenant threshold and the observed accounting indicator of the firm-year divided by the covenant threshold (as in Devos et al., 2017) and ii) *Slack* 2 (columns 2, 4 and 6) is equal to difference in absolute value between the covenant threshold and the observed accounting indicator for the firm-year. The control variables are not presented for simplification and are those used to estimate the target leverage (reported in Table 5). The coefficients were estimated by fixed effects with robust standard errors clustered by firm.
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.

year on average to close half the deviation from target leverage. The presence of covenants increases the speed of adjustment by 21% (0.093/0.437) and 20% (0.080/0.398) for the estimations reported in columns 2 (without controls) and 3 (with controls and year fixed effects), respectively. When we move to the comparison between domestically-listed firms (columns 5 and 6) and cross-listed firms (columns 8 and 9), the difference is not as clear cut as those of Panel A (total leverage), as the coefficients of the interaction term are positive in all specifications, but only one of them (column 5) is statistically significant at the usual levels.

The results of Table 7 show the estimations of Eq. 4, used to test the second hypothesis, according to which we expect a greater intensity of covenants to be associated with faster capital structure adjustment (i.e., we expected a positive coefficient for the interaction term *LevDev* × *CovIndex*).

Columns (1) and (2) of Panel A of Table 7 show that the interaction variable *LevDev* × *CovIndex* has a positive and statistically significant coefficient for both models of total debt, without and with the control variables, respectively. The result is also economically relevant. Using the estimates of column 2, a one standard deviation increase in *CovIndex* increases the speed of adjustment by 11% (0.038/0.351). We highlight that the coefficients remain positive and significant for domestically-listed firms (columns 3 and 4), but are smaller and statistically insignificant for cross-listed firms (columns 5 and 6), consistent with our expectations and corroborating with the results of Table 6.

In the estimations of the long-term debt model, reported in the analogous columns of Panel B, the coefficient of the interaction term remains positive across all specifications, but is only statistically significant at the 10% level, in the model with control variables (column 2). Despite the smaller statistical significance in the results of Panel B, we claim that the results are mostly consistent with Hypothesis 2, and once again are contrary to those obtained by Devos et al. (2017), who found a negative sign for this interaction variable.

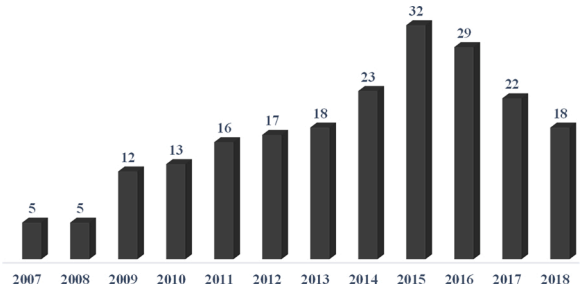

Fig. 2. Number of firms that obtained covenant waivers in the 2007-2018 period.
Notes: The figure shows the number of firms that disclosed the obtainment of waivers for any covenant in a given year. Over the study period, we analyzed a fixed panel of 278 companies listed on the B3.

4.3. Covenant slack and speed of adjustment

As we explain in section 2, the relationship between the adjustment speed and the covenant slack is an open empirical question, as there are theoretical arguments for either a positive or a negative relationship. To measure the firm's covenant slack, we use the ratio with the most observations in our sample, *Net Debt / EBITDA*. We use two proxies for covenant slack, as described in Table 3. The larger the value of CovSlack1 and CovSlack2, the larger the distance to breaching the covenant threshold.

The results of the estimations of Eq. (5) using total leverage as the dependent variable are presented in Panel A of Table 8. Unlike Devos et al. (2017), who found a positive relationship between covenant slack and the speed of adjustment, our results indicate that the impact of covenant slack on the adjustment speed of listed Brazilian firms is negative. The economic impacts of the coefficients of the interaction variable on the adjustment speed of total leverage are economically meaningful. Using the results of column 1, a one standard deviation increase in our measure of covenant slack decreases the speed of adjustment by approximately 11%.[3] We note that the magnitude of the coefficients is larger and statistically significant for cross-listed firms (columns 5 and 6) than for domestically listed firms, for which the coefficients are also negative, but statistically insignificant.

In the long-term debt models (Panel B of Table 8), the coefficients have the same signs as those of Panel A, but their statistical significance range from 15 to 18%. Although the results are statistically weaker in Panel B, they are consistent with the idea that greater distance from covenant violation would be associated with a smaller need to adjust leverage, leading to a reduction of the adjustment speed.

In light of the evidence presented so far, we analyze the frequency of debt renegotiation (waivers) of our sample of firms. Fig. 2 shows that the number of firms that renegotiated their debts to obtain waivers was low in the period studied (below 10% of the sample on average in each year) in relation to the sample size (278 firms). The proportions of renegotiated clauses are much smaller than those reported by Denis and Wang (2014) and Roberts (2015) for US firms, and suggest that Brazilian firms tend to adjust their debt level before approaching the point of violating covenants. We claim that this evidence is consistent with the rationale that covenants increase the speed of capital structure adjustment for Brazilian firms because firms need to signal their creditworthiness, as a request to renegotiate covenants could be seen by lenders as a signal of poorer financial management or lower creditworthiness.

Taken together, our results indicate that the presence of covenants in debt contracts increases the speed of capital structure adjustment of firms, contrary to the finding of Devos et al. (2017). We believe this result can be explained by Brazil's weak institutional environment, where the low level of protection of creditors causes covenants to assume a more important role in the enforcement of contracts than is the case of countries with strong creditor protection, incentivizing firms to signal their quality by adjusting their debt levels more quickly. Consistent with this assumption, we found that the impact of the presence of covenants is much smaller (if any) for firms cross-listed in the US market compared to their domestically-listed counterparts, showing that the signaling effect of covenants is less important for these firms.

4.4. Robustness tests

In this section we address possible concerns about the inferences provided by our previous analyses. A valid concern is that, because the presence of covenants is endogenous (in the sense that firms self select to accept covenants imposed by creditors), covenants could be reflecting some sort of time-variant omitted firm feature that makes the firm adjust its debt ratios faster than other firms.

If the signaling story holds, firms will adjust their capital ratios quicker when covenants relate specifically to capital (or leverage) ratios. Indeed, Christensen and Nikolaev (2012) and Devos et al. (2017) point out the different impacts of capital covenants and performance covenants on the capital structure decisions of firms. For the authors, capital covenants would have a greater impact on the speed of adjustment of the capital structure, since they require firms to maintain a proportion of equity capital, affecting long-term decisions. Therefore, it is possible to expect that the signaling effect will be stronger for capital covenants than for performance covenants. To examine this, we build a dummy (*C_CovDummy*) that equals 1 if the firm has capital covenants and 0 otherwise (a capital

[3] The standard deviation of Slack 1 is 0.558. Therefore, the estimated increase is given by 0.558*(0.097/0.508) ≈ 11%.

Table 9
Impact of capital and performance covenants on the speed of adjustment of leverage.

	Panel A: Total Debt over Total Assets			Panel B: Long-Term Debt over Total Assets		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
LevDev	0.314***	0.322***	0.347***	0.176***	0.170***	0.283***
	(0.027)	(0.031)	(0.060)	(0.027)	(0.029)	(0.065)
C_CovDummy	−0.005	0.001	−0.007	−0.008	0.000	−0.027
	(0.010)	(0.012)	(0.021)	(0.010)	(0.012)	(0.021)
P_CovDummy	0.013**	0.021***	−0.015	0.015**	0.023***	−0.015
	(0.006)	(0.007)	(0.011)	(0.006)	(0.007)	(0.013)
Both_CovDummy	0.011	0.018*	0.001	0.003	0.009	−0.007
	(0.007)	(0.009)	(0.013)	(0.007)	(0.009)	(0.012)
LevDev* × *C_CovDummy	0.190***	0.181***	0.266*	0.343***	0.339***	0.621*
	(0.067)	(0.065)	(0.138)	(0.069)	(0.068)	(0.329)
LevDev* × *P_CovDummy	0.094***	0.118***	0.005	0.225***	0.262***	0.095*
	(0.035)	(0.038)	(0.060)	(0.033)	(0.036)	(0.050)
LevDev × *Both_CovDummy*	0.070	0.067	0.039	0.069	0.078	−0.029
	(0.048)	(0.057)	(0.083)	(0.057)	(0.073)	(0.106)
Observations	1828	1451	377	1774	1399	375
R-squared	0.367	0.383	0.413	0.280	0.295	0.339
Number of firms	232	203	47	230	201	47
Controls	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Listing status	All	Domestic	Crosslisted	All	Domestic	Crosslisted

Notes: The dependent variable is equal to the variation of total leverage (Panel A) and long-term leverage (Panel B); *LevDev* is the difference between the firm's estimated leverage and observed leverage; *C_CovDummy* is equal to 1 if the firm-year observation presents Capital Covenants, and zero otherwise; *P_CovDummy* is equal to 1 if the firm-year observation presents Performance Covenants, and zero otherwise; *Both_CovDummy* is equal to 1 if the firm-year observation presents any type of covenant, and zero otherwise; The control variables are not presented for simplification and are those used to estimate the target leverage (reported in Table 5). The coefficients were estimated by fixed effects with robust standard errors clustered by firm.
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

covenant is defined as in Table 1). Analogously, *P_CovDummy* is a variable that assumes 1 if the firm has performance covenants in place and 0 otherwise. Finally, we also build *Both_CovDummy* to equal 1 if the firm has both types of covenants and 0 otherwise.

Table 9 shows the results of the estimation of a variation of Eq. (3), which replaces the covenant dummy by the three covenant-type dummies (capital, performance or both). Panels A and B contain using total debt and long-term debt, respectively, as the dependent variable. Each panel contains three regressions (one for the entire sample, other for domestically-listed firms and another for cross-listed firms). In all six regressions, the coefficient of *LevDev* × *C_CovDummy* is positive and statistically significant and, more importantly, they are larger than the coefficients of *LevDev* × *P_CovDummy*. These results show that the presence of capital covenants induces the firms to adjust their leverage ratios quicker than the presence of performance (which also have a positive, but smaller, effect on the speed of capital structure adjustment), which is consistent with the rationale that firms adjust their capital ratios quicker to avoid breaching covenants.

To further deal with a potential selection concern, we also run a propensity score matching regression, accounting for the fact that firms with covenants are inherently different from firms without covenants. We estimate the propensity to use covenants based on firm industry, year, and firm-level covariates, using a Logit regression and re-estimate our regressions of Table 6, controlling for the propensity score. The results (reported on Table A1 of the appendix) are essentially the same as those obtained from the panel regressions. We also estimate Blundell-Bond GMM-Sys type regressions separately for firms with and without covenants. We show that the SOA is larger for firms with covenants than it is for those firms without covenants, as reported on Table A2 of the appendix.

We also run a battery of robustness checks that we do not report to save space. First, we analyze different models to estimate the target leverage, along with different proxies for the firm variables, to examine the sensitivity of the results to these variations. In particular, we test cross-sectional models to estimate leverage, and perform regression for each year of the sample. We also include the covenant dummy and the cross-listing dummy in the estimation of the target leverage, as these could account for the fact that firms with covenants and cross-listed firms might have a different target leverage per se. Second, we also test models with different types of lags (all explanatory variables lagged or only the control variables lagged, since *LevDev* already contains a certain lag). Third, with respect to the firm-level variables, we replace our size variable with the natural logarithm of assets, we use the ratio between property,

plant and equipment and assets as a proxy for tangibility, and we adopt other profitability indicators, such as the return on equity (ROE), the return on investment (ROI) and EBTI over assets. Fourth, we test the variation of sales and the variation of assets as proxies for investment opportunities instead of the M/B ratio, a proxy for taxes (effective rate), market beta as a measure of risk, proxies for ownership concentration, dividend yield and price/earnings. Finally, we re-estimate Eq. 2 without the covenant dummy (leaving only *LevDev* and the interaction term). Our previous inferences stand up to all these checks.

5. Final remarks

This study aims at investigating if the presence of covenants in debt contracts in emerging economies is positively related to the speed of adjustment of financial leverage, using a sample of Brazilian firms from 2007 to 2018. We also investigate whether the effect of covenants is different between domestically-listed firms and firms that are cross-listed in the US, conjecturing that the signaling effect is less important for the later, because they are already subject to stricter regulation and enforcement.

As main results, we find that firms in Brazil take on average 1.7 years to adjust half their leverage gap, a quicker adjustment time than found by Devos et al. (2017) for US firms. In addition, unlike Devos et al. (2017), we find a positive relationship between covenants and the speed of adjustment of leverage. The presence of covenants increases this speed by slightly more than 20%.

According to our results, covenants seem to represent a signaling device in an environment of poor creditor rights. Firms that have covenants are able to use more debt and finance at more favorable terms. To be able to do so, they must perform the adjustment faster in order not to miss the positive signaling of covenants and avoid penalties for breaching the restrictive clauses, which could harm their favorable financing conditions.

Corroborating this conjecture, we find that the marginal effect of covenants on the speed of adjustment for firms cross-listed in the US is much smaller than for their domestically-listed counterparts, probably because cross-listing already signals that the firm bonds to the stronger creditor rights provided by the US environment. In addition, we find that the average distance between the actual and target leverage is smaller for the firms with covenants, demonstrating that these companies adjust the leverage gaps faster than those without covenants.

Therefore, covenants seem to increase the enforcement of debt agreements in Brazil, providing incentives for firms to have a more dynamic management of their capital structure. As covenants *per se* represent a cost of adjustment, our results strongly suggest that firms weigh the pros and cons of covenants and choose to accept them when the benefits outweigh the costs. Therefore, firms impose a cost on themselves to overcome institutional defects that are typical from emerging markets with poor creditor protection.

This evidence exposes the need to investigate the impact of the presence of covenants in other emerging markets, where the weaker institutional environment and less efficient legal system with lower protection of investors and creditors compared to developed markets exerts a strong influence on the financial decisions of the various agents. Authors such as Öztekin and Flannery (2012), Öztekin (2015) and An et al. (2015) have found a strong influence of macroeconomic and institutional factors on firms' financial decisions and speed of capital structure adjustment.

One limitation of the current study is that we did not investigate directly how principal-agent conflicts could affect the relationship between covenants and the speed of adjustment directly, which is an interesting avenue for further research. It is thus important to analyze the influence of the presence of covenants in debt contracts on the speed of capital structure adjustment of firms considering different settings, including firm-level features such as corporate governance, as well as other institutional features. Finally, covenants are possibly coupled with other signaling devices, and the interplay between these several different signaling tools on the speed of capital structure adjustment is another avenue for future research.

Author's contribution

Tatiana Albanez: Definition of research problem, Development of hypotheses or research questions (empirical studies), Theoretical foundation / Literature review, Definition of methodological procedures, Data collection, Statistical analysis, Analysis and interpretation of data, Critical revision of the manuscript, Manuscript writing.

Rafael Schiozer: Definition of research problem, Development of hypotheses or research questions (empirical studies), Theoretical foundation / Literature review, Definition of methodological procedures, Data collection, Statistical analysis, Analysis and interpretation of data, Critical revision of the manuscript, Manuscript writing.

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Appendix A

Table A1
PSM Regressions.

	Panel A: Total Debt over Total Assets			Panel B: Long-Term Debt over Total Assets		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
CovDummy	0.004	0.010*	−0.010	0.007	0.014*	−0.000
	(0.005)	(0.006)	(0.013)	(0.006)	(0.007)	(0.015)
LevDev	0.337***	0.335***	0.399***			
	(0.036)	(0.038)	(0.120)			
LevDevxCovDummy	0.090**	0.085**	0.026			
	(0.036)	(0.039)	(0.149)			
LevDevLT				0.433***	0.440***	0.444***
				(0.043)	(0.048)	(0.115)
LevDevLTxCovDummy				0.105**	0.076	0.130
				(0.044)	(0.048)	(0.141)
_pscore	0.116***	0.064	0.021	−0.013	−0.027	0.008
	(0.036)	(0.039)	(0.086)	(0.037)	(0.041)	(0.085)
Observations	1703	1356	302	1650	1304	301
R-squared	0.350	0.338	0.394	0.339	0.332	0.434
Number of firms	228	200	38	226	198	38
Controls	NO	NO	NO	NO	NO	NO
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Listing status	All	Domestic	Crosslisted	All	Domestic	Crosslisted

Notes: The dependent variable is equal to the variation of total leverage (Panel A) and long-term leverage (Panel B); *LevDev* is the difference between the firm's estimated leverage and observed leverage.
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

Table A2
GMM Regressions.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
L.Lev_Total	0.611***	0.561***	0.569***	0.529***	0.502***	0.422***
	(0.083)	(0.045)	(0.089)	(0.048)	(0.118)	(0.071)
Constant	−0.013	0.090*	0.002	0.125**	−0.301	0.088
	(0.090)	(0.052)	(0.090)	(0.055)	(0.422)	(0.112)
Controls	YES	YES	YES	YES	YES	Y
Observations	457	1088	398	807	59	260
Number of firms	119	179	107	145	15	43
Listing status	All	All	Domestic	Domestic	Crosslisted	Crosslisted
Sample	Covenant = NO	Covenant = YES	Covenant = NO	Covenant = YES	Covenant = NO	Covenant = YES

Notes: The dependent variable is equal to the variation of total leverage (Gross Debt/Total Assets).
Robust standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.mulfin.2021.100704.

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