

Debt Covenants and Corporate Investment^{*}

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Preliminary

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Abstract

In this paper we analyze the effect of covenants in corporate investment. We argue that when lenders fix excessive stringent covenants this may generate inefficient underinvestment when a firm is close to a covenant violation, particularly for good quality firms. However, when a covenant violation does occur, these firms increase investment and this has a positive effect in performance. This paper warns of the negative impact of covenant tightness as a way to control borrowers and remarks on some positive aspects of covenant violations particularly for good quality firms.

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1. Introduction

Covenants that are introduced in debt contracts can control managers in two different ways. First, they reduce managerial discretion as complying with covenants often means that managers have to ensure that the firm accomplishes certain financial ratios. In this way, such constraints might prevent the implementation of inefficient overinvestment policies. Second, the possibility that these covenants are violated in the future allows debtholders to gain control rights over a firm and to use these control rights to implement changes inside the firm (e.g. Aghion and Bolton, 1992 or Dewatripont and Tirole, 1994). An example of such changes is the replacement of the firm's manager (Nini *et al.*, 2009). When this happens covenant violation is an opportunity for debtholders to exert power over managers and to punish shareholders for not acting according to their best interest. A different strand of the literature presents covenants as tripwires for the renegotiation of debt contractual terms which might be excessively harsh or restrictive (e.g. Garleanu and Zwiebel, 2009 and Gorton and Kahn, 2000).

We borrow from this literature and conduct a contingency analysis on firm characteristics of the ex-ante consequence of covenant tightness in corporate investment and of the ex-post consequences in corporate investment when such covenant tightness leads to a covenant violation. One of the consequences seems to be that debtholders act to restrain firms from investing once a covenant is violated (e.g. Chava and Roberts, 2008). In this paper, we extend the results already existing in the literature and check whether differences in firms investment policy prior to a covenant violation have an effect on firm's investment policy following a covenant violation and to what extent this depends on firm's characteristics. In particular, we differentiate between firms that are investing above or below the sector median. We identify the group that is investing above the sector median as the most profitable firms which simultaneously rely most heavily on debt financing. For this reason we are going to refer to this group as the group of good and levered firms, i.e. profitable firms with high liquidity needs. For these firms, we propose a complete sequence of events that can be summarized in the following stages: First, "good" firms use covenant tightness a mechanism to signal their quality. Second, consistent with such tightness, these firms follow an investment policy that is "too" conservative, to ensure a reduction in the likelihood of a covenant violation (at least in the short term). Third, if there is a covenant violation by these "good" firms,

the outcome is a correction in the initial underinvestment and firms increase their investment to a more optimal level. Last, the consequence of this change in the investment pattern is an increase in performance. With such sequence of event we check whether covenants condition firms' behavior ex-ante and ex-post taking into account their characteristics and whether lenders recognize the firm's effort to avoid covenant violation.

Many corporate debt contracts include covenants. The most common ones involve restrictions on issuing debt, paying dividends or investing, or even accelerating debt payments if for example, the firm's net worth, working capital, leverage or interest coverage is below a specified level. For a paper which examines empirically the determinants of covenants in corporate loan agreements see for example Bradley and Roberts (2004). A theory paper which also covers this topic is Rajan and Winton (1995) which present covenants as a way to increase debtholders' incentives to monitor. The focus of our paper is on the technical violations of covenants, which correspond to violations of any covenant other than the one requiring the payment of interest or principal. Dichev and Skinner (2002) find that debt covenants in private lending arrangements are set relatively tight and that debt covenant violations are common. In this setting, we connect both features: covenant tightness and covenant violation, in a unified framework that explores the signaling role of covenant tightness and its ex-ante effect on investment (prior to an eventual covenant violation), as well as its effects after such violation contingent on the initial covenant tightness.

The way we test our conjecture is by conducting a longitudinal study for the period 1996-2006 sample of loans that results after crossing the information of two databases: COMPUSTAT and DealScan. After introducing different filters, we focus on the loans for which we have information on different types of covenants (net worth, tangible net worth, current ratio, interest coverage, fixed charge, debt service, debt to equity, etc). We restrict covenant violations to violations of the net worth (and tangible net worth) and current ratio covenants as in previous studies (e.g. Chava and Roberts, 2008). In order to make sure that reverse causality between debt covenants violations and changes in investment is not an issue we follow a regression discontinuity design in which we perform the analysis to these firms that are either violating or "almost violating" a covenant as well as presenting the results for the full sample. In this way, we eliminate the influence of other factors that have an effect on the covenant binding distance and we focus exclusively on the shock from a covenant violation.

Our results are consistent with our theoretical assertions. In particular, we find that best-performance firms, measured in terms of return on assets, are more likely to accept tight covenants in their loans. Such firms that have tighter covenants reduce their investment intensity (i.e. follow a more conservative policy). This behavior reduces the probability of covenant violation. The ex-post analysis reveals that although it is true that covenant violations lead, in general, to less investment this does not happen for firms the group of good and levered firms that accepted tighter covenants. These firms increase investment after a covenant violation to the extent that they even invest more, and grow faster, than similar firms that do not violate covenants but that are very close to covenant violation. This cannot be a problem of overinvestment for the violating firms and in fact it is more likely to be a correction to a previous problem of underinvestment by non-violating firms which follow an excessively conservative investment policy. This is so because we have found an increase in performance two periods after such increase in investment following a covenant violation.

It is remarkable that the results on changes in investment pattern also hold for the good and levered firms when compared to the overall sample and not only with the sample of firms that are close to violation. This is relevant because these latter non-violating firms that are close to violation seem to be investing less than a comparable firm in the overall sample and in the sample of non-violating firms, which expectedly indicates that these firms are in trouble. Moreover, the results from the overall sample provide further robustness to our empirical analysis. Firms close to covenant violation become more conservative either voluntarily or because they need to comply with explicit restrictions in debt contracts. But once a violation occurs, debtholders are able to differentiate between firms and act harshly towards the worse firms but allow the best firms to invest and to grow, which results in an increase in performance.

This paper is related to a recent stream of papers that look at the consequences of covenant violations. Chava and Roberts (2008) show how investment declines sharply following a financial covenant violation and Roberts and Sufi (2008) conclude that net debt issuing activity experiences a sharp and persistent decline following debt covenant violations. Other papers are Nini, Smith and Sufi (2009) which show that violations are followed by a decline in acquisitions and capital expenditures and a reduction in debt usage and shareholder payouts. In contrast to these papers, we perform both an ex-ante and ex-post analysis of the effects of covenants on a firm's investment behavior. Ex-ante, covenant tightness may be used by good firms as a signal. The consequence is a

(too) conservative investment policy. Ex-post, under a scenario of covenant violation and contingent on covenant tightness, we identify different investment patterns. For those firms which were not following a conservative policy due to covenant tightness (“bad” firms), the effect is a decrease in investment. This is consistent to the results of Chava and Roberts (2008). However, we have identified that for those “good” firms that ex-ante follow a conservative policy in a covenant-tight framework for signaling purposes, the reaction to a covenant violation is an increase in investment. We explain this behavior as a correction to an excessively conservative investment policy and the return to an efficient investment level given because the effect on performance is positive. In this way we are able to provide a more complete and richer view of the dynamics that connect covenants and firm’s investment behavior.

The remainder of the paper is organized as follows. Section 2 develops further the hypothesis at stake in the paper, section 3 discusses the data and the variables, section 4 presents the econometric methodology and the results and section 5 concludes.

2. Theoretical Predictions and Tests

Different papers (e.g. Chava and Roberts, 2008; Nini et al., 2009) study the effect of debt covenant violations on firm's decisions such as investment decisions, shareholder payout or CEO turnover. However, not many studies have looked at the ex-ante incentives of firms to use different covenants characteristics as a way to signal. . A firm may use covenant distance as a signaling mechanism to differentiate itself from other firms which might be of a lower quality and that cannot afford tight financial conditions. In particular, the obvious candidates for this signaling use of covenants are good firms that rely on debt financing and have some flexibility in their investment decisions. This leads us to the first hypothesis:

Hypothesis 1: Good-quality firms use covenant tightness as a signaling mechanism.

The implementation of a signaling strategy by good-quality firms only works if these firms avoid implementing empire building investment policies that can damage their reputation. One example of such policies is the classical risk-shifting strategy based on stringent covenants, which may dilute any informational content linked to

accepting tight covenants by good-quality firms. Then, good firms that use such signaling should avoid to invest aggressively, to be consistent as well as for reputational reasons. Moreover, these firms will prefer not to gamble with the investment policy as they might be in better conditions to afford delaying investment until uncertainty is resolved. Such conjecture goes in line with the conclusions of papers such as Chava and Roberts (2008) or Roberts and Sufi (2008) which argue that after a covenant violation corporate investment decreases. We conjecture that firms that were initially in better conditions also invested more but once they accepted tighter covenants (*e.g.* as a signaling mechanism) they should follow a more conservative investment policy. This is stated in the following hypothesis:

Hypothesis 2: Firms in better conditions that accept tight covenants reduce their investment intensity as they follow a conservative policy

Another question is: what happens when a covenant is violated? This very much depends on the causes of such violation. The existing evidence that focus on technical covenant violations is mixed. Beneish and Press (1993) and Frost and Bernard (1989) report that technical defaults are generally triggered by the deterioration of firms' operating performance and not by mandated changes in GAAP which is another common reason for a covenant violation to occur. Beneish and Press (1993) report no technical defaults triggered by mandated accounting changes, and Frost and Bernard (1989) report only two. Dichev and Skinner (2002) report that covenant violations are not always associated to financial distress. We follow this line and we propose that covenant violation by those firms that have accepted tighter covenants and follow a conservative policy is not caused by firm financial deterioration, but by an ex-ante inefficiency of underinvestment. Under such scheme a covenant violation should trigger corrective measures in the form of increases in investment in order to eliminate the ex-ante inefficient underinvestment.¹ However, for the remaining firms, a covenant violation should lead to firm performance deterioration as consistent with Chava and

¹ An alternative way of justifying the increase in investment is based on the risk-shifting theory. However, there should be some deterioration in the financial situation of the firm which triggers a riskier behavior from firms and managers but this would not have lead to an increase in performance as we propose in Hypothesis 5

Roberts (2008) as well as with Nini *et al.* (2009). Creditor will exercise more control over the borrower and the consequence is a more conservative investment policy. This leads to the third hypothesis:

Hypothesis 3: For good-quality firms, covenant violations lead to an increase in investment. However, for the remaining firms, covenant violation should trigger a more conservative investment policy.

Note that after a covenant violation it is expected that covenant binding distance increases, which, according to Hypothesis 2, would lead to an increase in investment. This is consistent with the rise in investment proposed in Hypothesis 3 after a covenant violation.

Some authors such as Nini *et al.* (2009) show that firms are more closely monitored by financial institutions after a covenant violation. Such policy has consequences in terms of managerial replacement and investment policy. In particular, these authors suggest that lenders force borrowers to follow a more conservative investment policy. The result of a superior lender control is an improvement in performance. Our claim is that the increase in performance appears as a correction to an underinvestment situation that is triggered as covenants became tighter. According to Hypothesis 2, firms that followed an underinvesting policy are those with better financing conditions that arguably invested more ex-ante and accepted tighter covenant as a signaling mechanism. Furthermore, according to Hypothesis 3, these firms react to a covenant violation by increasing investment. We argue that such change in the investment pattern is what generates an increase in performance for these firms. Thus, we propose as a last hypothesis to contrast:

Hypothesis 4: Covenant violations lead to an increase in ROA for those firms that increase their investment after a covenant violation to correct an underinvestment situation

3. Databases

A. Databases

The databases used for conducting our study are COMPUSTAT and DealScan. The sample period is between 1996 and 2006 on a quarterly basis. We start by downloading loan information from DealScan and match using company name and ticker to Compustat data on firms' characteristics (all the variables constructed from these data are formally defined in Table 1).

[Insert Table 1 here]

We exclude financial firms (SIC codes 6000-6999) and firms for which there is no information on the current ratio or on the (tangible) net worth covenants. We use quarterly observations because borrowers in most cases report their financial statements to creditors every quarter for them to monitor on the compliance with the covenant requirements. Then, we use the highest frequency accounting data available as this in order to obtain the best approximation possible to the period in which a covenant violation occurs. The result of matching both databases, COMPUSTAT and DealScan leads to 106024 observations that correspond to 1528 different firms.

B. Covenant Violation

There are different covenants that constraint managerial discretion by fixing minimum thresholds on different financial ratios. The characteristics of the different covenant in our sample are shown in Table 2.

[Insert Table 2 here]

In this paper we focus on covenants involving the current ratio as well as the net worth because they appear frequently (Dichev and Skinner, 2002) and are standardized and unambiguous.²

This is in contrast to other covenants like, for example, those fixing a minimum threshold over the debt-to-EBITDA ratio. In this case there is ambiguity over what type of debt they refer to, whether long-term debt, short-term debt or total debt. Also, contrarily to covenants on leverage or interest payments, these covenants are less subject to GAAP adjustment (Leftwich, 1983). And finally, other studies identify these covenants as the ones that most commonly lead to technical default: net worth (or tangible net worth) covenants lead to the most frequent violations, followed by the current ratio covenant (e.g. Beneish and Press, 1993; Chen and Wei, 1993; Sweeney, 1994). Table 3 focuses on the covenants of interest to us (net worth, tangible net worth and current ratio) and provide information on the frequency of the different covenant violations both at a facility and at a firm level.

[Insert Table 3 here]

This table shows that there are 1771 firm-quarter observations in which there is a violation in one of the covenants that are analyzed (current ratio, tangible net worth or net worth). This represents 10.31% of the observations for which we have information about one of these covenants. In terms of firms, there are 408 firms for which there is a violation in one of the previous covenants out of a total of 1328 (30.72%). When we decompose the analysis in the previous three covenants, we find that there are 441 firm-quarter observations for which there is a violation in current ratio. This represents 11.53% of the observations with information on those covenants. In terms of firms, there are 126 firms (32.39% of the total with such covenant information) for which there has been a violation of the current ratio in at least one quarter. The numbers for net worth are 9.01% of observations with covenant violations which corresponds to 24.38 firms. Finally, for the tangible net worth covenant there is a slightly smaller percentage

² The covenants that we are considering capture different aspects of a firm's credit risk. The net worth is a measure of performance and solvency and the current ratio is a measure of short-term liquidity. From the literature on financial contracting, for example Smith and Warner (1979), we can expect covenants based on these ratios to be included on debt contracts depending on firm's characteristics. Demerjian (2007) shows that debt contracts of borrowers with losses, low profitability, and highly volatile earnings are likely to include covenants measured with shareholder's equity, such as net worth. And those borrowers with high levels of working capital, but not necessarily with problems of poor performance or insolvency, are more likely to contain current ratio covenants.

of violations (8.49% of observations and 22.17 firms). Such statistics are slightly lower than those in Chava and Roberts (2008). In the sample considered there (1994-2005) the percentage of firms with a current ratio violation is 37% and 31% violate the net worth or the tangible net worth covenants. The percentages in our case are 32.39% and 25.40 respectively. The difference of 5% may be attributed to the different time span in both articles.

Moreover, following Chava and Roberts (2008) and in order to gain observations, we aggregate violations in the net worth covenant and in the tangible net worth covenant in a single covenant violation (binding=1). From now on, we use the aggregate measure of binding to denote covenant violations.

C. Summary of variables. The relevance of the Investment variable

In Table 4, we show the values of the relevant variables for this study. We find that the mean size of a facility in our sample is 314 Million \$; the spread has a mean value of 200 basis point and the maturity is around 36 months (3 years). In terms of borrowers' characteristics, the ROA has a mean value of 2.24%. The investment intensity (capital expenditure over total assets) has a value of 4.69%; mean leverage has a value of 25.69% and the Z-score, which is inversely related to the probability of default has a mean value of 4, which is well beyond the critical threshold of 1.83, which is considered as the level below which there is a substantial probability of default. Hence, the firms in our sample show a remarkable financial strength.

[Insert Table 4 here]

We also separate the firms depending on whether they are investing above or below the sector median for a given quarter (see Table 5). We find that the firms which are investing above the sector median show significantly better performance. In addition, these firms are more levered and show larger Zscore values (i.e. they are less risky). Finally we also infer that the firms which are investing above the sector median also have better financing conditions.

[Insert Table 5 here]

4. Covenants and the investment policy

A. Non-Parametric Analysis

Table 6 shows a contingency analysis of the effect of covenant tightness (Panel A) and covenant violation (Panel B) on investment and performance when we separate firms according to whether their investment is above (Dummy investment =1) or below (Dummy investment =0) the median for the sector at a given quarter.

[Insert Table 6 here]

The results of Panel A show that for investment intensive firms, i.e. firms that are investing above the sector median at a given quarter, those with tight covenants (the distance between the financing ratio and the covenant is less than 20%) invest less than that their counterparts. This is consistent with the implementation of a conservative policy as covenants become tighter (Hypothesis 2). This result does not hold for non-investment intensive firms.

Once we focus on Panel B, we find that among the investment-intensive firms, those that have violated a covenant invest more than their counterparts (consistent to Hypothesis 3). However, for non-investment intensive firm the opposite result holds (which is consistent to papers like Chava and Roberts, 2008). The performance analysis indicates that covenant violation has negative consequences for non-investment intensive firms but not for investment intensive ones, which is not in contradiction with Hypothesis 4.

In order to investigate in more depth these issues we conduct below a parametric analysis on the relationship between covenant tightness and covenant violation, on the one hand, and investment and performance on the other hand.

B. Signaling role of covenants: Investment pattern contingent on covenant tightness

We analyze whether better firms, in terms of performance, accept more stringent conditions as a signaling mechanism when they sign new loans contracts. To conduct this analysis, we rely on the following specification:

$$\text{Covenant distance}_{it} = \alpha_0 + \alpha_1 \text{ROA}_{it-1} + \alpha_2 X_{it} + \eta_i + \nu_t + \varepsilon_{it} \quad (1)$$

where *Covenant distance* is the difference between the covenant threshold written in the loan contract and the corresponding accounting measure for the most restrictive covenant, among the current ratio, net worth and tangible net worth covenant. X_{it} is a vector of control variables, η_i is a firm fixed effect, ν_t is a year-quarter fixed effect, and ε_{it} is a random error that is assumed to be correlated within observations and potentially heteroskedastic (Petersen, 2009). For the control variables, we follow Chava and Roberts (2008) and John et al. (2008). In particular, we consider Size (total assets on a log scales), a proxy of growth opportunities (*Macro q*), Cash flow, Leverage (total liabilities to total assets) and investment intensity through a dummy that is equal to 1 when the capital expenditures over the lagged PPE is above the median of the sector. Also, we include two additional variables: one for liquidity (proxied by cash-to invest over lagged PPE) and the other for risk, proxied by the Altman's Z score (Sufi, 2007). All variables are defined in Table 1. As usual, time dummies are incorporated in the specification.

We conduct a fixed-effect estimation in order to eliminate the firm-specific component of the error term and we cluster the errors at a firm level. Also, in order to take care of potential reverse causality issues related to the fact that covenant tightness might be the driver of improvements in performance, we lag the performance variable by one period. The results for this specification are shown in Table 7. In column 1, we focus on the overall sample, while in column 2 we restrict to the “discontinuity” sample. This is a restricted sample of observations for which the difference between the most restrictive covenant (current ratio, net worth and tangible net worth) is lower than 20% of the corresponding financing ratio in the accounting of the firms at a given quarter.³ Using this restricted sample also reduces potential endogeneity issues of reverse causality given that the effect of changes in covenant tightness on performance will be less important for those firms that were already suffering pressure due to their covenants. Moreover, such discontinuity sample provides further robustness to our results. This is because for those firms that are close to a covenant violation, covenant tightness is a less significant signal of being a good firm that accepts tighter conditions.

³ We use the 20% threshold as chosen by Chava and Roberts (2009) using a quite similar database.

[Insert Table 7 here]

The results of Table 7 indicate that performance has a negative impact on covenant distance in the overall sample as well as in the “discontinuity” sample. This confirms Hypothesis 1. Moreover, control variables show that larger firms (with larger bargaining power) can obtain better financing condition (larger covenant distance).

The next step according to the theoretical motivation developed above, is to investigate whether covenant tightness generates a change in the investment pattern of firms, particularly for those firms which use covenant tightness as a signal (“good firms”). We identify these firms as those that are investing above the median of the sector. Note that Table 5 shows that these firms have a ROA of 4.4%, which almost double the ROA of the remaining firms (2.2%). They are also characterized by higher leverage levels. The specification we estimate is as follows:

$$Investment_{it+1} = \beta_0 + \beta_1 \text{Covenant distance}_{it} + \beta_2 \text{Dummy investment}_{it} + \beta_3 \text{Dummy investment} \times \text{Covenant distance}_{it} + \beta_4 X_{it} + \eta'_i + v'_t + \varepsilon'_{it} \quad (2)$$

where *Investment*, defined as capital expenditures to total assets, is explained in terms of *Covenant distance*, the variable that captures the type of firm *Dummy investment*, the interaction between these two variables, a set of controls X_{it} that are the same as in the previous specification, η'_i a firm fixed effect, v'_t a year-quarter fixed effect, and ε'_{it} a random error assumed to be correlated within observations and potentially heteroskedastic (Petersen, 2009). In columns 1 and 2 of Table 8 we present the results for the overall sample, while in columns 3 and 4, we focus on the discontinuity sample of firms that are close to covenant violation. Firms in this sample are suffering stronger covenant pressure and for this reason, we expect changes in investment to have less visible consequences on changes in covenant conditions. Hence the reverse causality issue is less relevant. Additionally, we tackle this problem by leading the dependent variable by one period. The specifications are completed with the inclusion of year dummies.

We conduct a fixed-effect estimation in order to eliminate the firm-specific component of the error term and we cluster the errors at a firm level.

[Insert Table 8 here]

Table 8 shows that reductions in covenant distance lead to a reduction in investment but only for firms that invest more than the median of the sector. We have described these firms as those the best performance and most leverage. Thus, those firms that use the decrease in covenant distance as a signaling mechanism (“good” firms), reduce their investment level. We can argue that these firms follow a conservative investment policy, which conforms to what is stated in Hypothesis 2.⁴

C. Covenant violation. Effects in Investment and Performance

In the second-stage of our analysis, we investigate the consequences for investment and performance if a firm does violate a covenant. Our objective is to make a contingency analysis and inspect whether the effect of covenant violation in investment depends on firm characteristics. In particular, we focus on what we have defined as “good” firms – those that invest above the median of the sector-. As the analysis that we want to conduct is an extension of Chava and Roberts (2008), we propose their specification and we only add an interactive term *Dummy investment x Covenant violation* in order to conduct the contingency analysis. Thus, the specification we estimate is as follows:

$$Investment_{it+1} = \gamma_0 + \gamma_1 \text{Covenant violation}_{it} + \gamma_2 \text{Dummy investment}_{it} + \gamma_3 \text{Dummy investment} \times \text{Covenant violation}_{it} + \gamma_4 X_{it} + \eta''_i + v''_t + \varepsilon''_{it} \quad (3)$$

where the variable of *Investment* is explained in terms *Covenant violation*, the dummy that characterizes “good” firms, *Dummy investment*, the aforementioned interactive term of both variables and the set of variables used in the previous specifications that control for size, growth opportunities, cash-flow, financial structure,

⁴ We have investigated, for consistency, whether the conservative investment policy followed by “good” firms after a covenant tightness lead to a reduction in probability of covenant violation. The results (available upon request) show that the probability of a covenant violation decreases as there is a decrease in investment, particularly among those firms that were investing above the median for the sector and year.

liquidity and risk (see Table 1 for details). Also, we recognize the existence of, firm fixed effects, η_i " year-quarter fixed effect, v_i " and a random error ε_{it} " potentially correlated with the explanatory variables and potentially heteroskedastic (Petersen, 2009).

The parameter of interest is γ_3 which according to Hypothesis 3, should be positive. Following Chava and Roberts (2008), the nonlinear relation in the previous specification allows finding a consistent estimate of γ_3 , even if there is correlation between the error term and some of the explanatory variables. The condition for finding such consistent estimates in this type of estimation only requires that the discontinuity in the error term does not coincide with that in the covenant variable (*Covenant violation*). Then, we make use of the discontinuity introduced by the *Covenant violation* variable to tackle the endogeneity problem in the previous specification given that the level of investment may perfectly affect the probability of a covenant violation. We tackle such problem in two ways: using regression discontinuity design and leading the dependent variable by different periods. The idea behind the discontinuity regression is that by focusing on those violations in which the financing ratio is not too far away from the threshold, we eliminate possible spurious correlation between investment and covenant violations due to external shocks that may eventually affect significantly firm's financing ratios. Moreover, if we restrict the estimation to the sample where covenant violation has "almost" occurred, we tackle reverse causality concerns given that we eliminate those observations where changes in investment patterns triggers significant variations in key financing ratios, leading to "clear" covenant violations. This approach has been used extensively in the econometrics and economics literature. See Hahn, Todd and Van der Klaauw (2001) for an explanation of how the method works and (include references) for some application of these method. In the finance literature, this method has been used by Chava and Roberts (2008) or by Roberts and Sufi (2008) among others.

The results for the previous specification are shown in Table 9. In columns 1 and 2, we lead the dependent variable by one period while in columns 3 and 4 we lead such variable by two periods. All specifications are estimated using fixed-effects.

[Insert Table 9]

Table 9 shows that the effect of a covenant violation in investment only appears after two periods (see column 4). In this case, for those firms that have invested below the median for the sector and year, the effect of a covenant violation is a decrease in investment of 8.40% over the mean value of investment. This decrease in investment coincides with Chava and Roberts (2008) result. However, when a firm has invested above the median for the corresponding sector and year, the net effect is positive (the sum of $-0.00393 + 0.0351 = 0.03117$). This number represents an increase of 66.5% from the mean investment value. Hence, it is not only statistically significant but also economically significant.⁵ As far as the control variables are concerned, the results show that larger firms invest more and that leverage detracts firms from increasing their investment. This result is consistent with Hypothesis 3. Firms that according to our theoretical motivation invest more than the sector median but follow a conservative policy due to covenant tightness increase investment in a very significant way once they violate a covenant. We interpret this result in terms of a correction of an underinvestment situation.

In order to investigate further the previous result we study the effect in performance of a covenant violation for firms that invest above and below the sector at a given quarter. We show the results in Table 10.

[Insert Table 10]

The results confirm that the effect of a covenant violation in performance appears 1 year after the violation (4 quarters). Note that the effect of a covenant violation on investment appears 2 quarters ahead and the effects of this investment seem to need 2 additional periods. Column 4 shows that when firms that invest above the sector median violate a covenant violation the increase in future performance is of 1.29%, which represent a relative increase over the mean ROA for these firms of 31.5% (according to Table 5, the mean ROA of these firms is 4.4%). Such significant increase

⁵ When we separate covenant violation between current ratio and net worth, we do find that the effect of violations of the current ratio have more significant effect in investment policies than the violations of the covenant net worth. One possible explanation for this fact is that liquidity (measured by the current ratio) might be a matter of more concern for managers than profitability (measured by the net worth). The current ratio measures the short-term liquidity of a firm which is very important for the firm's survival and can compromise the firm's activities. If firms cannot pay to their suppliers and as a consequence, suppliers stop making raw materials and other goods available to firms, production or sales might be compromised. Profitability is, of course, also important but it might have to be quite low, for managers to change their course of action.

is fully consistent with the substantial increase in investment (66.5%) that appears two periods before (two periods ahead after a covenant violation). Such result is also consistent with our interpretation of a correction of an underinvestment situation in order to approach the investment level to the optimal level.

5. Final Remarks

This paper analyzes the role of covenants in debt contracts as a driver of borrowing firms' investment behavior. We find evidence that good-quality firms accept stringent covenants as a way to signal their quality. However, this has inefficient consequence in their investment pattern as they follow inefficient underinvestment policies in order to avoid covenant violations. Remarkably, when a covenant violation does occur, whether in a covenant related to the current ratio or to the net worth, firms that were subject to stringent covenant start investing more intensively and this behavior has a positive effect on performance.

Therefore, in this paper we extract several recommendations. First, lenders should be aware that fixing an excessively stringent covenant as a way to control borrowers may have a perverse effect in a firm investment decisions, particularly for the good quality firms. Second, in a context in which firms have growth opportunities (growth firms), it is particularly damaging to fix tight covenant because this might generate an excessively conservative investment policy that may put firm's survival at risk. Then good-quality growth firms should avoid this mechanism to signal their quality. Third, we can connect covenant tightness to the existence of powerful creditor's rights. Hence, we propose that stronger creditor rights lead to more conservative policies. In a cross-country analysis, the literature shows that stronger creditor rights induce greater propensity of firms to engage in diversifying acquisitions with high-recovery assets, which result in poorer operating and stock-market abnormal performance. Our results question the value of strong creditor rights as they have an adverse effect on firms by inhibiting management from undertaking value-enhancing risky investments. The last recommendation that we can extract from our paper is that for investors, covenant violation may not need to be a bad signal. Covenant violation may trigger inefficiencies of underinvestment and lead to the generation of value.

We leave for future research the analysis of whether lenders react to covenant violation in a way consistent to the tightness of the initial covenant. We conjecture that firms that accept tighter covenants and follow a conservative policy, are not going to be excessively penalized by lenders when renegotiated occurs as a result of the violation of a covenant.. Another issue is to conduct a detailed analysis and distinguish between different types of covenants (net worth, current ratio, leverage ratio, maximum loan to values ...) in order to investigate different effects of covenant violations. Additionally, we leave for future research the role of syndicated loan characteristics such as the number of members in the syndicate or the distribution of the stake among them, in determining the way borrowers react to covenant tightness and covenant violations. Finally, issues of repeated covenant violations will be addressed in future studies.

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Table 1: Definition of the variables

<i>Investment</i>	It is the capital expenditures divided by the total amount assets lagged by one period.
<i>ROA</i>	Return on Assets is the earnings before interest and taxes to total assets.
Main explanatory Variables:	
<i>Current ratio</i>	Current assets / current liabilities
<i>Net worth</i>	Total assets - total liabilities
<i>Tangible net worth</i>	Current assets plus net physical plant, property, and equipment plus other assets minus total liabilities.
<i>Comentan current ratio distance</i>	Difference between the current ratio and the covenant on the current ratio.
<i>Covenant net worth distance</i>	Difference between the net worth and the covenant on the net worth
<i>Covenant tangible net worth distance</i>	Difference between the covenant on the tangible net worth and the value of the tangible net worth
<i>Comentan distance</i>	Minimum between the Covenant current ratio distances, the Covenant net worth distance and the Covenant tangible net worth distance.
<i>Comentan tightness</i>	Variable equal to 1 (0) when the variable of Covenant distance is below (above) 20% of the value of the tightest covenant.
<i>Covenant current ratio violation</i>	Variable equal to 1 (0) when the Current ratio is lower (larger) than the covenant on the Current ratio.
<i>Covenant net worth violation</i>	Variable equal to 1 (0) when the Net worth is lower (larger) than the covenant on the Net worth
<i>Covenant tangible net worth violation</i>	Variable equal to 1 (0) when the Tangible net worth is lower (larger) than the covenant on the Tangible net worth
<i>Covenant violation</i>	Variable equal to 1 when Covenant current ratio violation is equal to 1 or Covenant net worth violation is equal to 1 or Covenant tangible net worth violation is equal to 1. In the remaining case is equal to 0.
<i>Dummy investment</i>	Variable equal to 1 (0) when investment is above (below) the median value of investment for the corresponding sector and year.
Control variables:	
<i>Size</i>	Total assets on a log scale deflated by the 2000 price level.
<i>Macro q</i>	(Total debt + market value of equity – inventories)/ (property plan and equipment lagged by one period).
<i>Cash-flow</i>	Firm's cash-flow (COMPUSTAT item #308)
<i>Leverage</i>	Total debt divided by total assets.
<i>Z score</i>	Altman's Z core, which is defined as: $Z\text{-Score} = A \times 3.3 + B \times 0.99 + C \times 0.6 + D \times 1.2 + E \times 1.4$; being $A = \text{EBIT} / \text{Total Assets}$; $B = \text{Net Sales} / \text{Total Assets}$; $C = \text{Market Value of Equity} / \text{Total Liabilities}$; $D = \text{Working Capital} / \text{Total Assets}$; $E = \text{Retained Earnings} / \text{Total Assets}$.
<i>Liquidity</i>	Cash to invest divided by property plan and equipment lagged by one period.

Table 2 Characteristics of Covenant Restrictions

The table presents a list of different covenant restrictions found in non-financial firms of the sample resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006.

	N	Mean	Std. Dev.	Min	Max
Current Ratio	1552	1.32261	0.4487628	0.25	7
Tangible Net Worth	2823	206000000	1240000000	-120000000	4.4E+10
Net Worth	2955	711000000	5630000000	-296000000	1.81E+11
Fixed Charge Cover.	5640	1.402569	0.5698456	0.05	10
Debt Service Cover.	1382	1.535217	0.7562744	0.1	8
Interest Coverage	5899	2.516004	0.965817	0.2	10
Cash Interest Cover.	191	2.032356	0.9313602	0.65	5
Leverage Ratio	2344	0.600849	0.1710261	0.05	34790
Debt to cash-flow	8044	4.195528	1.867395	0.55	25
Debt to Tang. Net Worth	1696	2.254776	3.683957	0.03	69.9
Debt to Equity	105	2.016571	1.891611	0.3	13
Required Lenders	12239	55.75429	7.94891	0	100
Term Changes	11668	99.91633	2.164638	0	100
Collateral Release	7038	99.65872	4.379724	0	100
Investment Basket	107	34700000	64600000	0	300000000

Table 3 Covenant Violation

The table presents information on the number of observations as well as of firms that corresponds to the violation of covenants that we focus on in this paper: covenant on current ratio; covenant on net worth and covenant on tangible net worth. The sample is composed of non-financial firms resulting of the intersection between Compustat database and DealScan during the period 1996 to 2006. See Table 1 for the definition of variables.

Variables	Number of observations	% of observations	Number of firms	% of firms that provide information
Covenant violation	1771	10.31%	408	30.72%
Covenant current ratio violation	445	11.53%	126	32.39%
Covenant net worth violation	705	9.01%	148	24.38%
Covenant tangible net worth violation	682	8.49%	174	22.17%

Table 4 Summary of the Variables

The table shows a summary of the variables used in the analysis. Our sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. *Amount* is the capital lent in each facility. *Spread* is the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with any annual (or facility) fee paid to the bank group. *Maturity* is the facility maturity in months. The remaining variables are defined in Table 1.

Variable	Obs.	Mean	S.D.	Min	Max
<i>Amount</i>	4778	3.14E+08	7.73E+08	120000	2.40E+10
<i>Spread</i>	4778	201.2995	128.9612	-95	1154.593
<i>Maturity</i>	4778	36.45626	21.54542	0	276
<i>ROA</i>	43475	0.0223956	0.0869965	-3.555555	9.916666
<i>Investment</i>	40953	0.0469133	0.7781293	-0.0128609	156.2
<i>Covenant distance</i>	17170	2.07E+08	9.44E+08	-9.71E+09	2.67E+10
<i>Covenant violation</i>	17170	0.103145	0.3041571	0	1
<i>Current ratio</i>	46556	2.514638	2.810785	0	235.1905
<i>Tangible net worth</i>	46525	4.94E+08	1.70E+09	-8.11E+09	3.69E+10
<i>Net worth</i>	47810	5.13E+08	1.73E+09	-8.11E+09	3.69E+10
<i>Size</i>	47792	5.480459	1.843517	-4.60517	11.62986
<i>Macro q</i>	43967	19.23786	150.6323	-79.49599	16430
<i>Cash-flow</i>	47535	0.2568727	0.2783836	0	11.26316
<i>Leverage</i>	42112	0.0275762	3.914534	-477	358.75
<i>Z score</i>	45848	4.006357	12.14394	-603.2	554.31
<i>Liquidity</i>	45755	3.607609	134.1886	-0.0300231	19512

Table 5 T-test contingent on the level of investment

The table shows an analysis of the differences in the mean values of the variables used in the analysis under two different scenarios: when their investment level is above (below) the median for the sector and the corresponding year. Our sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. We compare *t Amount* is the capital lent in each facility. *Spread* is the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with any annual (or facility) fee paid to the bank group. *Maturity* is the facility maturity in months. The remaining variables are defined in Table 1.

	Dummy investment=1	Dummy investment=0	t-test
<i>Amount</i>	238000000	321000000	0.176
<i>Spread</i>	207.774	200.433	0.465
<i>Maturity</i>	41.229	36.423	0.003
<i>ROA</i>	0.041	0.022	0.000
<i>Investment</i>	0.387	0.035	0.000
<i>Covenant violation</i>	225000000	213000000	0.789
<i>Current ratio</i>	0.149	0.104	0.001
<i>Tangible net worth</i>	1.842	2.554	0.000
<i>Net worth</i>	433000000	508000000	0.142
<i>Size</i>	414000000	531000000	0.021
<i>Macro q</i>	5.473	5.496	0.651
<i>Cash-flow</i>	13.673	20.076	0.156
<i>Leverage</i>	0.298	0.252	0.000
<i>Z score</i>	0.024	0.042	0.845
<i>Liquidity</i>	5.365	3.913	0.000
<i>Amount</i>	0.208	4.001	0.335

Table 6 T-test of covenant tightness and covenant violation

The table shows a test of mean differences of the variables of *Investment* and *ROA* when we compare two situations: when covenants are tight versus non tight (Panel A) and when there is covenant violation versus non-covenant violation (Panel B). The analysis is separated among firms that invest above the median of the sector (Dummy investment =1) and below (Dummy investment =0). Our sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. The variables are defined in Table 1.

PANEL A				
	Dummy investment=1		Dummy investment=0	
	Covenant Tightness=1	Covenant Tightness=0	Covenant Tightness=1	Covenant Tightness=0
Investment	0.152	0.193	0.035	0.038
T-test	(0.006)		(0.870)	
ROA	0.043	0.039	0.021	0.021
T-test	(0.584)		(0.948)	
PANEL B				
	Dummy investment=1		Dummy investment=0	
	Covenant Violation=1	Covenant Violation=0	Covenant Violation=1	Covenant Violation=0
Investment	0.235	0.181	0.027	0.034
T-test	(0.001)		(0.000)	
ROA	0.043	0.044	0.007	0.027
T-test	(0.716)		(0.000)	

TABLE 7. The Effect of Performance on Covenant Tightness

Table 7 reports the results of conducting fixed-effect regressions of Covenant distance in terms of performance (lagged by one period) and other control variables. We focus on three covenants: current ratio, net worth and tangible net worth. The sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. In column 2 we impose the additional condition that Covenant distance is below 20% of the value of the tightest covenant (discontinuity sample). The specifications include temporal dummy variables. See Table 1 for the definition of variables.

VARIABLES	Covenant distance	Covenant distance
ROA(t-1)	-7.680e+07** (-1.905)	-1.473e+07** (-1.80)
Dummy investment	-7.741e+06 (-0.511)	-310002 (-0.150)
Size	6.839e+07*** (2.784)	6.816e+06* (1.636)
Macro q	61194 (1.332)	-12184 (-0.513)
Cash-flow	276913** (1.795)	1909 (0.00799)
Leverage	-2.665e+07 (-0.458)	-5.922e+06 (-0.651)
Z score	-1.057e+06 (-1.352)	-213753 (-0.863)
Liquidity	-223221 (-0.952)	14125 (0.566)
Intercept	-1.610e+08 (-1.031)	1.561e+07 (0.707)
Observations	11183	3244
R ² (%)	19.75%	9.33%
Fitness test (F test)	1.66 (0.004)	1.68 (0.004)

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

TABLE 8. The Effect of Covenant Tightness on Investment

Table 8 reports the results of conducting fixed-effect regressions of *Investment* (lead by one period) in terms *Covenant distance*, the interactive term *Dummy investment x Covenant distance* and different control variables. We focus on three covenants: current ratio, net worth and tangible net worth. The sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. In column 2 and 4, we impose the additional condition that Covenant distance is below 20% of the value of the tightest covenant (discontinuity sample). The specifications include temporal dummy variables. See Table 1 for the definition of variables.

Variables	Investment (t+1)	Investment (t+1)	Investment (t+1)	Investment (t+1)
Covenant distance	0.00570* (1.901)	0.0222 (1.392)	0.00398* (1.857)	0.0148 (1.251)
Dummy investment			0.0377*** (4.463)	-0.00580 (-0.431)
Dummy investment x Covenant distance			0.0507** (2.437)	0.329*** (3.160)
Size	-0.00105 (-0.283)	0.00830 (1.065)	-0.00193 (-0.560)	0.00753 (0.989)
Macro q	-1.81e-05 (-0.862)	5.51e-06 (0.0773)	-2.21e-05 (-1.197)	2.23e-05 (0.323)
Cash-flow	-0.0422*** (-4.200)	-0.0193 (-0.820)	-0.0437*** (-4.782)	-0.0203 (-0.999)
Leverage	-0.000705 (-1.453)	-0.00587*** (-3.415)	-0.000617 (-1.339)	-0.00596*** (-3.332)
Z score	0.000313 (1.094)	0.00282*** (2.960)	8.14e-05 (0.461)	0.00243*** (3.088)
Liquidity	-0.000111 (-0.704)	-0.000551* (-1.681)	-8.71e-05 (-0.568)	-0.000334 (-1.042)
Intercept	0.0762*** (3.655)	0.00472 (0.108)	0.0647*** (3.184)	0.0109 (0.255)
Observations	11477	1963	11066	1886
R ² (%)	26.30 %	38.30%	32.70%	41.74%
Fitness test (F test)	22.41 (0.000)	12.12 (0.000)	24.07 (0.000)	12.95 (0.000)

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

TABLE 9. The Effect of Covenant Violation on Investment

Table 9 reports the results of conducting fixed-effect regressions of *Investment* (lead by one period in columns 1 and 2 and two periods in columns 3 and 4) in terms *Covenant violation*, the interactive term *Dummy investment x Covenant violation* and different control variables. We focus on three covenants: current ratio, net worth and tangible net worth. The sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. In all specifications, we impose the additional condition that Covenant distance is below 20% of the value of the tightest covenant (discontinuity sample). The specifications include temporal dummy variables. See Table 1 for the definition of variables.

VARIABLES	Investment (t+1)	Investment (t+1)	Investment (t+2)	Investment (t+2)
Covenant violation	0.00282 (0.790)	0.00329 (1.050)	-0.00169 (-0.590)	-0.00393* (-1.631)
Dummy investment		0.0239*** (2.789)		0.0110 (1.108)
Dummy investment x Covenant violation		0.00294 (0.129)		0.0351*** (2.485)
Size	0.0267* (1.934)	0.0226* (1.742)	0.0187* (1.746)	0.0145* (1.632)
Macro q	-6.01e-05 (-0.480)	-9.54e-05 (-0.762)	0.000216* (1.797)	0.000165 (1.355)
Cash-flow	-0.0605** (-2.062)	-0.0632** (-2.252)	-0.0478 (-1.495)	-0.0624** (-1.941)
Leverage	-0.00217 (-1.466)	-0.00258* (-1.762)	0.00124 (0.793)	0.000684 (0.438)
Z score	0.000865 (0.998)	0.00121 (1.470)	-0.000320 (-0.221)	0.000268 (0.181)
Liquidity	-9.26e-05 (-0.707)	-6.42e-05 (-0.493)	-0.000270** (-2.088)	-0.000215 (-1.643)
Intercept	-0.0453 (-0.672)	-0.0715 (-1.042)	-0.0634 (-1.048)	-0.0412 (-0.800)
Observations	1701	1649	1731	1620
R ² (%)	33.20%	34.29%	29.50%	31.17%
Fitness test (F test)	9.40 (0.000)	9.07 (0.000)	6.68 (0.000)	7.95 (0.000)

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

TABLE 10. The Effect of Covenant Violation on Performance

Table 10 reports the results of conducting fixed-effect regressions of performance $-ROA$ (lead by two periods in columns 1 and 2 and four periods in columns 3 and 4) in terms *Covenant violation*, the interactive term *Dummy investment x Covenant violation* and different control variables. We focus on three covenants: current ratio, net worth and tangible net worth. The sample is composed of non-financial firms resulting of the intersection between COMPUSTAT database and DealScan during the period 1996 to 2006. In all specifications, we impose the additional condition that Covenant distance is below 20% of the value of the tightest covenant (discontinuity sample). The specifications include temporal dummy variables. See Table 1 for the definition of variables.

VARIABLES	ROA (t+2)	ROA (t+2)	ROA (t+4)	ROA (t+4)
Covenant violation	0.00272 (1.409)	0.00273 (1.353)	-0.00271 (-1.069)	-0.00437 (-1.525)
Dummy investment		0.00200 (0.540)		-0.00662* (-1.654)
Dummy investment x Covenant violation		-0.00669 (-1.454)		0.0129** (2.166)
Size	-0.00576 (-1.460)	-0.00641 (-1.538)	-0.000485 (-0.0854)	-0.00430 (-0.633)
Macro q	8.13e-05 (0.587)	7.37e-05 (0.528)	0.000413 (1.620)	0.000407 (1.526)
Cash-flow	-0.0115 (-0.667)	-0.00541 (-0.282)	0.00386 (0.187)	0.00743 (0.325)
Leverage	0.000307 (0.145)	7.93e-05 (0.0370)	0.00721* (1.863)	0.00712* (1.786)
Z score	0.00580*** (7.827)	0.00548*** (7.326)	0.00253 (1.473)	0.00255 (1.324)
Liquidity	-0.000361*** (-2.632)	-0.000353** (-2.545)	-0.000422 (-1.646)	-0.000409 (-1.527)
Intercept	0.0291 (1.208)	0.0312 (1.231)	0.0192 (0.534)	0.0401 (0.964)
Observations	1751	1569	1639	1460
R^2 (%)	15.51%	16.05%	6.10%	7.01%
Fitness test (F test)	15.50 (0.000)	19.30 (0.000)	1.86 (0.001)	2.08 (0.000)

Robust t-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$