Investment Flexibility and Loan Contract Terms

Viet Cao

Department of Banking and Finance, Monash University
Caulfield East, Victoria 3145, Australia
Viet.Cao@monash.edu

Viet Do

Department of Banking and Finance, Monash University
Clayton, Victoria 3800, Australia
Minh.Do@monash.edu

Tram Vu

Department of Banking and Finance, Monash University
Caulfield East, Victoria 3145, Australia
Tram.Vu@monash.edu

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Abstract

We investigate if borrowers' flexibility in making adjustments in their investment decisions can influence loan contract terms. We test this relationship in the bank loan setting and find that borrowers with higher investment flexibility are subject to higher loan spreads. This result indicates that investment flexibility among borrowers is viewed as a potential to heightened moral hazard problems, and so the additional cost of more intense monitoring is passed on to borrowers. In addition to loan cost, banks are also observed to adjust other loan terms, including maturity, collateral, and covenant restrictions, in accordance with different levels of investment flexibility. Overall, our results provide support for both the real option and agency problem theories.

Keywords: Loan spreads, loan terms, agency costs, real option, investment flexibility

1 Introduction

There has been a growing debate in the extant literature in economics and finance on the non-trivial impact of investment flexibility on many important aspects in firms' investment and financing environments. Often defined as the extent to which firms can change their planned investment and disinvestment patterns (Groth and Khan, 2010), a lack of investment flexibility can distort the efficient allocation of resources at firm level (Caggese, 2007). Several studies have linked investment flexibility with costs of capital. Chirinko and Schaller (2009) argue that the discount rate used by firms with investment flexibility is both economically and statistically lower than that used by firms lacking this flexibility. In Zhang's (2005) and Cooper's (2006) models, the inefficiently high level of fixed capital investments during downturns of firms with a lack of investment flexibility gives rise to their higher systematic risks and a higher required rate of return by their equity holders. While there has been some attempt in empirically verifying the association of investment flexibility with cost of equity capital (Gulen *et al.*, 2008; Docherty *et al.*, 2010; Ortiz-Molina and Phillips, 2014), the evidence on investment flexibility and debt characteristics is sparse.

This study investigates the effect of investment flexibility on loan contract design. The paper make two important contributions. First, this paper extends the literature by providing direct evidence on the interaction between investment flexibility and loan contract terms. While the relation between investment flexibility and loan spreads is theoretically modeled in Titman *et al.* (2004), we provide the first empirical evidence for this relation. The relation between investment flexibility and non-price debt contract terms including maturity, collaterals, and covenants is first empirically verified at loan contract level in this study. We therefore bring empirical evidence for

several theoretical models advocating this relation. Second, we enrich the literature in cost of capital and debt contracting. While previous empirical literature tends to focus on the impact of investment flexibility on cost of equity capital (Gulen *et al.*, 2008, Docherty *et al.*, 2010; Ortiz-Molina and Phillips, 2014), our study sheds new light of its impact on the cost of capital from the perspective of debt holders. Our investigation of the substitution between price and non-price loan contract terms to curb the potential agency problems arising from investment flexibility also extends our understanding on debt contracting.

Investment flexibility can potentially affect loan spreads through two channels: real option effect and agency problem. On the one hand, the real option channel suggests that investment flexibility allows firms to flexibly adjust their capital stocks to respond to macro-economic and product demand shocks. Mauer and Triantis (1994) model that this real option effect lowers firms' default risk and expected reorganization and recapitalization costs. This view is also shared by Aivazian and Berkowitz (1998) in their discrete time model. Further, Zhang's (2005) and Cooper's (2006) models, allowing for asymmetric adjustment costs (*i.e.* expansion is more costly than contraction), conjecture that during downturns, firms with high investment flexibility are not burdened with unproductive idle capital. This view implies that firms with high investment flexibility are less adversely affected by reduced product market demands during downturns and therefore are less risky. Consequently, investment flexibility is potentially negatively associated with loan spreads due to the alleviation of firms' systematic risk.

On the other hand, Titman *et al.* (2004) suggest that the real option effect only has implication to debt-holders during downturns when borrowers' probability of

default is higher. The argument is that investment flexibility adds value during market upturns but debt holders are unable to share such benefit. However, investment flexibility allows firms to cut back on investments and reduce the quality of assets during downturns, hence lowers collateral value. Titman *et al.*'s (2004) model therefore predicts a positive association between investment flexibility and loan spreads. Overall, the real option effect on the association between investment flexibility and loan spreads is theoretically ambiguous. A negative association is consistent with viewing firms as going concerns that become less risky due to less excess capacity when the product market demand is low during downturns. A positive association is consistent with the potential deterioration of collaterals that might be called for when default probability is heightened during the same period. [1]

In addition to the real option effect, investment flexibility may affect loan spreads by intensifying the agency problem between shareholders and debt-holders. Jensen and Meckling (1976) suggest two mechanisms, *i.e.* risk shifting and asset substitution, through which the interests of shareholders and debt-holders are misaligned. Several contingent claim models, such as Green and Talmor (1986), Mello and Parsons (1992), Mello *et al.*, (1995) and Leland (1998), conjecture that investment flexibility facilitates risk shifting and asset substitution. Titman *et al.*'s (2004) model suggests that banks, in anticipation of this ex-post behavior, increase the spread they charge firms with high investment flexibility. This positive relation between investment flexibility and loan spread is independent of the real option effect.

[1] While the collateral value in liquidation is important in determining loan prices, according to Myers (1977, p. 155), "for most lenders, (t)heir loans' value depends on the value of the firm as a going concern, not on the value of any specific physical assets."

Besides loan spreads, lenders also rely on alternative non-price mechanisms to align borrowers' interest with that of shareholders. MacKay (2003) suggests that firms with high investment flexibility have high financial leverage as the agency costs can be curbed using contractual terms such as collaterals and covenants. Also, banks are more likely to demand collateral from borrowers with lower quality to secure the loans (Boot *et al.*, 1991; Holmstrom and Tirole, 1997). At the same time, one may argue that firms with investment flexibility may be willing to supply collateral to signal their willingness to respect debt-holders' interests, similar to the signaling motivation by better quality borrowers in Besanko and Thakor (1987). Therefore, firms with a high level of investment flexibility are expected to associate with a higher likelihood of collateral and more covenant restrictions.

We find that firms with higher level of investment flexibility face a higher cost of debt on their loan contracts after controlling for borrower characteristics, loan terms, and macroeconomic conditions. This result is consistent with both the agency cost channel and the real option effect along the lines of Titman *et al.* (2004) where the primary concern is the deterioration of the collaterals of firms with high investment flexibility during downturns. To shed further light on which channel drives our result, we investigate whether the positive association between investment flexibility and loan spreads holds among firms with different degrees of agency problems.

Our results show that the positive relation between investment flexibility and loan spreads holds more strongly among smaller firms. According to MacKay (2003), small firms are more prone to the agency problem arising from risk shifting due to more concentrated managerial power and share ownership and growth options. Our results therefore suggest that agency costs drive the positive association between investment

flexibility and loan spreads, consistent with several theoretical models, including Titman *et al.* (2004). The lack of statistical significance of this relation in firms with potentially low agency costs reflects the division in the theories on the real option effect depending on whether banks view firms as going concerns or focus on the liquidation value of collaterals. The impact of investment flexibility on loan spreads is robust after controlling for the endogeneity of investment flexibility as well as joint determination of non-price contract terms.

We also show that lenders and borrowers are able to negotiate alternative channels through non-price contract terms in the face of investment flexibility. High investment flexibility is associated with higher collateral incidence and more frequent use of excess cash flow sweep covenants, in line with the agency theory. Loan maturities are shortened among smaller borrowers with high investment flexibility as suggested by the agency theory of Titman *et al.* (2004). Among larger borrowers with high investment flexibility, however, lenders are more willing to offer longer-term loans, which seems to suggest that when agency problems are mild, investment flexibility may be viewed as value-adding real options in line with Zhang (2005) and Cooper (2006).

The remainder of the paper is structured as follows. Section 2 discusses the model and defines the variables used in this study. Section 3 specifies the data sources and sample construction process, as well as presents the summary statistics. Section 4 to 6 present the results for the effects of investment flexibility on loan spreads and other loan terms, including maturity, collateral and covenants. Sections 7 addresses the potential endogeneity of investment flexibility, while section 8 takes into account simultaneity among loan terms. Finally, section 9 concludes the study.

2 The model

We adopt the following regression to test whether companies with high investment flexibility pay a higher risk-adjusted loan spread, controlling for firm characteristics, loan characteristics and macroeconomic conditions:

$$AISD_{i,t} = \beta_0 + \beta_1(Flex_{i,t}) + \sum \beta_i (Loan_{i,t}) + \sum \beta_j (Borrower_{i,t}) + \sum \beta_k (Controls_{i,t}). \quad (1)$$

The subscripts i, t represent the borrower and year of the loan at origination. The variables are defined as follows:

- AISD: The dependent variable is "All-in-spread-drawn" (AISD) which represents the interest rate margin over LIBOR on drawn loan amount plus annual fees. This variable is expressed in basis points.
- Flexibility: Central to our research question, this variable measures investment flexibility. This concept covers several aspects, from the speed of depreciation to the extent to which assets are rented as opposed to owned, to asset redeployability.[2] Motivated by the theory, the extant empirical literature and the practical motive, we use the speed of depreciation to proxy for investment flexibility. Titman *et al.*'s (2004) model on investment flexibility and bank loan spread provides the most direct theoretical backbone for our empirical endeavor. Investment flexibility in Titman *et al.* (2004) refers to firms' ability to adjust the quality level of their assets through the depreciation of existing assets together with new investments. Depreciation is a natural channel through which the capital stock evolves even in the absence of a rental market or a market for second-hand assets.

[2] MacKay (2003) also classifies labour flexibility, *i.e.* the ability to hire and fire workers, as part of investment flexibility. Consistent with the industrial organization literature, our focus is on the ability to adjust firms' capital stock only.

While some studies use asset tangibility as a proxy for investment flexibility (Gulen *et al.*, 2008; Docherty *et al.*, 2010), it does not suit the purpose of proxying for investment flexibility in Titman *et al.*'s (2004) model because it describes the asset or quality level, rather than the change in the quality level. Depreciation is also used in the industrial organization literature to describe investment flexibility (Farinas and Ruano, 2005; Chirinko and Schaller, 2009). Finally, a practical reason to use depreciation ratio is the availability of this variable. A proxy for the redeployability of firms' physical assets would result in a much smaller sample as in the case of MacKay (2003) and Ortiz-Molina and Phillips (2014).

Our measure of investment flexibility is firm level depreciation ratio (DEP), calculated as the annual depreciation expense divided by the beginning of the year net fixed assets. The shorter the useful life of an asset (*i.e.* the higher depreciation ratio), the easier it is to replace them with new assets, hence the higher level of flexibility. In addition to this main proxy, we also test our hypothesis using other two proxies for robustness. The first is rent over total asset ratio (RENT). Instead of buying the machinery or warehouse, firms could opt to rent these assets. This would make them more flexible in their investment decision as it is easier to exit the market in the case of economic downturn. The second is a composite (COMP) of all the above mentioned variables: depreciation, tangibility and rent. This variable would capture all the different dimensions of investment flexibility.

- $Loan_i$: vector of loan characteristics including the following variables,
  - LNMAT: Measured as the natural logarithm of loan maturity in number of months.

- SECURED: A binary variable taking the value of 1 for secured loans and zero for unsecured loans.[3]
- STRICT: A binary variable taking the value of 1 if the loan facility carries three or more types of covenant restrictions and zero otherwise.
- REVOLVER: A binary variable taking the value of 1 if the loan facility is a revolving facility and zero otherwise.
- LNLOANSIZE: Measured as the natural logarithm of loan facility amount adjusted for inflation in year 1983 dollars.

❖ $Borrower_j$: vector of borrower characteristics including the following variables,

- LNASSETS: Natural logarithm of borrower's book value of total assets adjusted for inflation in year 1983 dollars.
- LEVERAGE: Borrower's leverage ratio calculated as book value of total debts divided by book value of total assets.
- CURRENT: Borrower's current ratio calculated as current assets divided by current liabilities.
- LNCOVERAGE: Calculated as natural logarithm of (1 + EBITDA/Interest expenses).
- OPLEV: Calculated as sum of cost of goods sold and selling and general administration expenses, scaled by total assets.
- PROFITABILITY: Ratio of EBITDA over sales.
- MTB: Borrower's market to book ratio calculated as ratio of (book value of assets – book value of equity + market value of equity) to book value of assets.

[3] Bharath *et al.* (2011) and Saunders and Steffen (2011) documented that the secured status as recorded on Dealscan is subject to missing information in several instances. They treated loans with no record of secured status as unsecured loans and conduct robustness on a subsample of loans with recorded secured status. We follow the same approach.

- ❖ Controls: vector of control variables including dummies for borrower credit rating (AAA, AA, A, BBB and other ratings), loan purpose dummies, loan year dummies, and borrower industry dummies (based on one-digit SEC codes).

We estimate equation (1) using pooled OLS regression. The standard errors are adjusted for heteroskedasticity and clustered at the firm level, following Saunders and Steffen (2011).[4]

3 Data and sample

The sample in this study is constructed using two main data sources: 1) Loan Pricing Corporation DealScan (LPC) database and 2) Merged CRSP Compustat database. The LPC database provides information about loan characteristics such as loan price, maturity, collateral, covenants, and loan purpose. Each loan facility is matched with their borrower characteristics obtained from the Merged CRSP Compustat database. For every loan in year t, if the loan active date is six months or more after its firm's Compustat fiscal year ending month, we match it with the Compustat financial information for the same fiscal year. If the loan active date is less than six months after the fiscal year ending month, we match it with the Compustat financial information for the previous fiscal year. This is the same process described in Bharath *et al.* (2011).[5] Compustat also provides borrowers' primary SIC code. We exclude all loans extended to financial services borrowers (SIC codes between 6000

[4] Our results are robust when clustering at the loan deal level.

[5] The matching process is aided by the Dealscan-Compustat link file that identifies the GVkey of borrowers in LPC database. We thank Professor Michael R. Roberts for sharing this link file. Details of this link file are described in Chava and Roberts (2008).

and 6999). Our final sample includes 26,420 loan facilities originated during the period from 1985 to 2015.

[Insert table 1 here]

Table 1 provides the descriptive statistics for our data. Panel A shows the calendar year distribution of the loans during our sampling period. Loan origination grew rapidly in the late 1990s and early 2000s. The loan number dropped considerably after the 2008 financial crisis. Panel B shows the main purposes these loans are used for, most common of which are general corporate purposes, working capital, and debt repayment. Panel C lists the one-digit SIC code of the borrowers in our sample. The main concentration is among borrowers in the manufacturing sector (SIC code between 2000 and 3999), wholesale and retail sector (SIC code between 5000 and 5999) and service sector (SIC code between 7000 and 7999). Panel D shows the distribution of borrowers' credit rating status in our sample. About two-thirds of the sample consist of loans made to rated borrowers whose most common ratings are A and BBB.

[Insert table 2 here]

Table 2 reports summary statistics of the key loan characteristics and borrower characteristics in our sample. The data are winsorized at 1% and 99% levels to remove extreme outliers. The mean loan spread (All-in-Spread Drawn, AISD) is 173 basis points, mean maturity 49 months and mean facility size $US395 million. The mean book value of assets for our borrowers is $US6.8 billion.

4 Investment flexibility and loan spread

This section discusses the result of the effect of investment flexibility on loan spread as presented in table 3. The models are estimated using pooled OLS technique.

All three regressions include borrower industry, borrower rating, loan purpose and year dummies. The reported standard errors are shown in parentheses and corrected for clustering at the firm level. Column (1) of table 3 reports the impact of investment flexibility on loan spreads with depreciation ratio (DEP) as proxy for investment flexibility. Column (2) and (3) use rent (RENT) and composite (COMP) as proxies for investment flexibility, respectively. The results suggest that firms with higher level of investment flexibility pay higher loan spreads. The coefficients in all three models are positive and significant at 1% and 5% levels.

[Insert table 3 here]

The results for control variables are consistent with prior literature on the determinants of loan spread. Among loan characteristics, larger loans and revolving loans are associated with lower loan spreads while loans with longer maturity, secured loans and those with more covenant restrictions carry higher loan spreads. Among firm characteristics, larger borrowers, better rated borrowers and borrowers with higher interest coverage are paying less for their loans. More profitable borrowers and those with higher market-to-book ratios are also charged less. At the same time, borrowers with higher leverage ratio and unrated borrowers are paying higher loan spreads.

The result that borrowers with higher investment flexibility pay, ceteris paribus, higher loan spreads is consistent with Titman *et al.*'s (2004) agency channel where, in anticipation of potential risk shifting and asset substitution facilitated by investment flexibility, banks charge higher loan spreads. This pattern might also be consistent with the real option effect advocated in Titman *et al.* (2004) where investment flexibility may lead to the deterioration of collateral quality during downturns. It is, however, inconsistent with the insight in Zhang (2005) and Cooper (2006) where adjustment

costs are asymmetric, and firms with high investment flexibility, with less idle physical capital, are less adversely affected by the negative demand shocks. Section 5 further investigates the relative contribution of agency costs and real option effects.

5 The Importance of Agency Costs of Debt

In this section, we explore the importance of the agency costs of debt to the positive association between investment flexibility and loan spreads. To differentiate this channel from the real option effects, we examine the pattern among firms with potentially different degrees of agency problems. The agency channel suggests that the pattern continues to hold among firms with a high probability of agency problems. The real option effect advocated by Titman *et al.* (2004) suggests that the pattern continues to hold even in the absence of agency costs, while the real option effect along the lines of Zhang (2005) and Cooper (2006) predicts the opposite relation (*i.e.*, high investment flexibility firms enjoying lower loan spreads). We test these views by running model (1) on different groups of borrowers. Table 4 presents the result of our tests.

[Insert table 4 here]

We partition our loan sample into quartiles based on borrower asset size. MacKay (2003) suggests that small firms are likely to have more severe agency problems as these firms are often characterized with more concentrated managerial power, share ownership and growth options. Using total assets as a proxy for size, we report the results for the loan subsamples of smallest to largest firms in columns (1) to (4) of table 4. Smaller borrowers are found to pay higher loan spreads when they possess higher investment flexibility as can be observed in columns (1) and (2). Among larger borrowers, there is a weak (5% significance) or no statistical difference in the loan spreads between more and less flexible firms as shown in columns (3) and (4).

[Insert table 5 here]

We repeat this exercise using credit rating as proxy for potential agency problem and information asymmetry. We split our sample into four groups: unrated borrowers, rated but below investment grade, investment grade but below A and those with A and above credit rating A. Although the sample distribution is different from using size quartile, the result is very similar. We obtain a strong effect of investment flexibility among unrated firms and firms with credit rating below investment grade. The coefficients for these two groups are positive and strongly significant at the 1% level. The effect is weaker among investment grade borrowers rated below A (effectively BBB rated borrowers). The coefficient of investment flexibility is only significant at the 10% level for this group. Finally the effect disappear for those with credit rating of A or better.

Overall, the results suggest that the increase in loan spreads caused by investment flexibility of borrowers is concentrated only among firms with heightened probability of agency problems where the problem of moral hazard and increasing cost of monitoring is most severe. Our result remain stable when using size and credit rating as proxies for potential agency cost. The results are consistent with the agency channel in Titman *et al.* (2004). The insignificant relation between investment flexibility and loan spreads in firms with less severe agency problems is also consistent with the ambiguity in the theories where the real option effect can imply either a positive relation (Titman *et al.*, 2004) or a negative relation (Zhang, 2005; Cooper, 2006).

6 Investment flexibility and non-price loan terms

6.1 Maturity

As widely suggested in the current literature, maturity can be employed to alleviate the information asymmetries between borrowers and lenders. Advocates of adverse selection argue that low risk borrowers signal their quality by accepting shorter-term loans (Flannery, 1986; Kale and Noe, 1990). More empirical studies have begun to produce supporting evidence for this argument. Berger, Espinosa-Vega, Frame, and Miller (2005) show that loan maturities increase when borrowers' asymmetric information is reduced, hence their signaling incentives are lessened. Gottesman and Roberts (2004) find that loan yields are lower for shorter-term loans, suggesting that good quality borrowers are willing to accept shorter maturities in exchange for lower borrowing costs. Meanwhile, the moral hazard theory predicts that firms with a higher risk of shirking are more likely to borrow for shorter terms (Smith and Warner, 1979; Boot *et al.*, 1991). This is because lenders attempt to limit their losses by shortening the funding period. Barclay and Smith (1995), and Dennis *et al.* (2000) find that shorter-term loans are extended to firms with more severe agency costs of debt. Correia (2008)'s findings strongly suggest that the choice of maturity in UK Eurobonds is determined to alleviate agency costs of debt.

The regression output in table 6 shows opposite effects of investment flexibility on loan maturity among smaller and larger firms. For the smallest firm quartile (column 2), banks shorten the length of a loan contract when lending to highly flexible firms. This is consistent with the agency channel in Titman *et al.* (2004) as observed among borrowers more prone to agency problems. In contrast, higher investment flexibility is associated with longer loan maturities among larger firms, as seen in the two largest

firm quartiles (columns 4-5). This suggests when agency problems are not severe, the real option effect in the line of Zhang (2005) and Cooper (2006) may dominate, allowing firms with high investment flexibility to borrower on longer terms.

[Insert table 6 here]

6.2 Collateral

Collateral can be viewed from both supply and demand sides. On the supply side, firms with investment flexibility may be willing to supply collateral to signal their willingness to respect the bank's interest, mirroring what better quality borrowers would do to signal their credit quality along the line of Besanko and Thakor (1987). On the other hand, banks are more likely to demand collateral from borrowers with higher agency costs (MacKay, 2003). Firms with investment flexibility may also be more willing to accept less flexible financing arrangements (Mauer and Triantis, 1994; MacKay, 2003; Gamba and Triantis, 2008).

[Insert table 7 here]

Table 7 reports the relation between investment flexibility and collateral incidence for the whole sample (column 1) and for loans split into quartiles based on borrower asset size (columns 2-5). We use the dummy variable SECURED to flag whether a loan is secured by collateral, which takes the value of 1 if the loan has collateral requirements and zero otherwise.[6]

[6] Bharath *et al.* (2011) and Saunders and Steffen (2011) documented that the secured status as recorded on Dealscan is subject to missing information in several instances. In our tests, those observations with missing secured status are excluded which reduces the sample to 21,813 facilities.

The coefficient of investment flexibility is statistically significant and positive for the entire sample in column 1 and subsample of loans in columns 2-4. There is no significant effect of investment flexibility on collateral incidence among loans made to the largest firm quartile. The results indicate that banks are more likely to require collateral pledging from firms with high investment flexibility in general, and particularly so when agency problems are more likely to arise. Again, the signaling motive does not hold. The results also support that firms are more likely to compromise financial flexibility when in possession of investment flexibility, consistent with Mauer and Triantis (1994), MacKay (2003) and Gamba and Triantis (2008).

6.3 Covenant

Covenant restrictions tend to be clustered, *i.e.* if a firm attracts a particular covenant, it is likely to also attract other types of covenant. Firms with investment flexibility may be willing to accept less flexibility in other areas that loan covenants may impose. Given that firms consider different forms of flexibility as substitutes (Mauer and Triantis, 1994; MacKay, 2003; Gamba and Triantis, 2008) and covenant is another channel that banks may use to curb agency problems (MacKay, 2003), we expect firms with investment flexibility to attract more loan covenant restrictions.

We focus on those covenants that are more likely to be used to curb agency problems associated with investment flexibility. LPC database reports 24 types of covenants grouped into financial covenants and general covenants, of which many are not directly related to investment flexibility. We isolate four particular covenants that can be linked directly to investment flexibility and test if investment flexibility increases the likelihood of those covenants being imposed on borrowers. Such evidence

would lend support to the use of covenants to curb potential agency problems in firms with investment flexibility.

The four covenants identified are Excess Cash Flow Sweep, Asset Sales Sweep, Debt Issuance Sweep and Equity Issuance Sweep. These are restrictive covenants relating to the use of excess cash, sale of existing assets and the issuance of new debt and equity. These covenants address the possibility of risk shifting and asset substitution that borrowers with high investment flexibility are capable of. We present the results on the relation between investment flexibility and the use of these four covenant restrictions in columns 1-4 of table 8.

[Insert table 8 here]

The Probit regression output shows that only the probability of excess cash flow sweeps increases significantly with investment flexibility (at the 1% level, column 1). Banks do not seem to show a higher tendency to use other types of sweep covenants when lending to highly flexible firms.

7 Endogeneity of investment flexibility

So far, we have presented evidence that a borrower's level of investment flexibility has implications for agency problems, which in turn prompts lenders to set loan spreads and non-price contract terms accordingly. In the short run, it is unlikely that loan price could have an effect on the structure of the borrower's business hence its level of investment flexibility. Over the longer term, however, the additional cost of private debt could be a factor in its management's day-to-day business decisions. In other words, it is possible that loan prices and investment flexibility may become endogenous over the long run.

This section addresses the potential endogeneity problem using the instrumental variable (IV) approach. The major challenge, as with all IV methods, is to identify a valid instrument that determines the level of investment flexibility, but does not affect loan spreads except through the investment flexibility channel. Hall (2004) shows that the level of US federal military spending is an exogenous variable and uses that as an instrument for firm's adjustment costs. Our investment flexibility measure can be considered a part of adjustment costs, where highly flexible firms would have lower adjustment costs. Therefore, we follow Hall (2004) and use the level of military spending in the year prior to the loan year as the instrument in our model. Hall (2004) argues that adjustment costs decrease with military spending. This is because military spending helps to stimulate the domestic economy. The same argument could be used for our model, as military spending increases, the aggregate investment flexibility will also increase. Specifically, depreciation rate will be higher as the assets are utilized more in domestic production. And so, we expect a positive relation between military spending and depreciation ratio. At the same time, this macro variable should have no effect on the firm-specific cost of debt. Table 9 shows the result for both the first and second stage of this 2SLS estimation.

[Insert table 9 here]

In the first stage (column 1), our instrumental variable performs well in explaining the level of investment flexibility. The coefficient of military expense is 0.094 and significant at the 1% level. This result is consistent with that presented by Hall (2004) and shows that military spending has a significant effect on adjustment costs hence investment flexibility.

Column 2 in table 8 shows the result for the second stage. Following Bharath *et al.* (2011), the fitted value of depreciation ratio from the first stage is used as an instrument in the second stage. The key variable of interest (DEP) remains strongly significant at the 5% level. The coefficient of DEP is about 141 in the IV model, about 5 times higher than that reported under the OLS estimation. This is quite consistent with prior literature. Both Bharath *et al.* (2011) and Saunders and Steffen (2011) report that the IV coefficients of the variable of interest increased about 4 to 5 times compared to OLS. The results for other variables in the second stage are also consistent with the OLS estimation. Larger firms, more profitable firms and less highly levered ones receive lower loan spreads, while smaller loans and secured loans are associated with higher loan spreads.

While our instrument is motivated by existing theoretical models and prior empirical research, it also needs to be tested econometrically for validity. First, we perform the Durbin (1954) chi-squared test and Wu-Hausman (Wu 1974; Hausman 1978) F-test to determine whether investment flexibility is indeed endogenous. We found a chi-squared test statistic of 3.35 and F-test statistic of 3.34. Both tests carry a p-value of 0.067. This indicates that at the 10% level, we cannot reject the null hypothesis of endogeneity. The finding is consistent with our prior argument that in the short run loan spread is unlikely to affect the level of investment flexibility. However, in the long run a reverse causality between these variables may hold.

Second, we conduct a weak instrument test for military expense. We obtain the F-statistic for joint significance of all explanatory variables in the first stage to be 40.97 with a p-value of zero. This suggests that the first stage model is a good fit. Hall, Rudebusch, and Wilcox (1996) show that simply having an F statistic that is significant

at the typical 1% or 5% level may not be sufficient. Stock, Wright, and Yogo (2002) suggest that when there is one endogenous regressor, the F statistic should be greater than 10 for inference based on the 2SLS estimator to be reliable. Our F-statistic of 40.94 well exceeds the suggested 10. In addition, we test for the second characterization of weak instruments proposed by Stock and Yogo (2005). This characterization considers an instrument to be weak if a Wald test at the 5% level can have an actual rejection rate of no more than 10%.[7] We are able to obtain a critical value, namely "2SLS size of nominal 5% Wald test". At an actual rejection rate of no more than 10%, the value obtained is 16.38. This is well below the F-statistic of 40.94, indicating that we can reject the null hypothesis of weak instrument even under the second characterization.

8 Simultaneity among loan terms

Loan syndication is a complex contract with many aspects. However most of the work in this area focuses on three key factors within the loan: price, maturity and collateral. These loan characteristics may be jointly determined. Dennis, Nandy, and Sharpe (2000) found evidence of substitution effects among these three loan terms. In their model, they allow for maturity and collateral to have a two-way (bi-directional) relation between themselves, while both maturity and collateral have a uni-directional effect on loan spreads. They argue that in the loan syndication process, it is normal to discuss and agree on other loan terms before deciding on loan spreads and loan spread is often the last variable to be decided. Bharath *et al.* (2011) also adopt a similar approach. Following Dennis, Nandy, and Sharpe (2000), we estimate the model below to via a two-stage framework:

[7] This significance level can also be tested at 15%, 20%, or 25% under Stata command. If we can reject the null at 10%, we will also be able to reject the null at other higher levels.

$$AISD_{i,t} = \beta_0 + \beta_1(Flex_{i,t}) + \beta_2(Maturity\_hat_{i,t}) + \beta_3(Collateral\_hat_{i,t}) + \sum \beta_i (Loan_{i,t}) + \sum \beta_j (Borrower_{i,t}) + \sum \beta_k (Controls_{i,t}). \quad (3)$$

[Insert table 10 here]

In the first stage, the two simultaneous variables, maturity (LNMAT) and collateral (SECURED), are estimated independently using a reduced form model. We then obtain the fitted values of both maturity and collateral (namely, Maturity_hat and Collateral_hat) and use them in estimating equation (3). The second-stage estimation for AISD and LNMAT is OLS (columns 1-2) while a logit model is used to estimate SECURED in the second stage (column 3). The decision on instruments for the two endogenous variables LNMAT and SECURED is guided by the literature. We use "Asset Maturity" (ASSETMAT) and "Regulated industry" (REGULATED) as instruments for LNMAT and "Loan concentration" (CONCENTRATION) as instrument for SECURED (Bharath *et al.*, 2011). Consistent with our previous results, firms with high investment flexibility are found to pay higher loan spreads and are more likely to pledge collateral, both strongly significant at 1%. The observed negative relation between investment flexibility and loan maturity is similar to what we reported in column 2 of table 6 among the smallest borrowers. This finding provides evidence that the effect of investment flexibility on loan contract terms is robust on a model that allows for joint determination of non-price terms.

9 Conclusion

This paper investigates how banks perceive borrowers' investment flexibility in private debt contracts. Via a large sample of US loan facilities during the period from 1985 to 2015, we find evidence supporting the view that banks consider investment flexibility

as a source of agency problems including risk shifting and asset substitution. Subsequently, banks require higher loan spreads to compensate for the heightened monitoring costs associated with investment flexibility. Using firm size as a proxy for informational opacity, we find the impact of investment flexibility on loan spreads to be more profound among smaller firms which further supports the agency theory. This is consistent with Titman *et al.*'s (2004) theoretical model. The impact of investment flexibility on loan spreads is robust after controlling for the endogeneity of investment flexibility as well as simultaneity among non-price contract terms.

In addition to loan costs, our results also suggest that investment flexibility has a significant effect on the use of non-price loan terms. Loans are more likely to be secured and to include cash flow sweep covenants when borrowers are highly flexible in making investment adjustments. As for maturity, investment flexibility was found to have opposite effects on contract length between small and large borrowers. Lenders seem to associate investment flexibility with increased agency problems among smaller firms therefore shorten their loan maturities. Meanwhile, larger firms are able to borrow for longer terms when they have more flexible investments, suggesting that where agency problems are not severe, investment flexibility may be viewed as value-adding real options.

Our findings have important implications for both borrowers and lenders with respect to debt contracting practice. Borrowers who are structured to have higher flexibility to make investment adjustments are viewed by banks as being more prone to agency problems. Subsequently, they required closer monitoring and so are charged a higher cost of debt and required to comply with stricter loan terms. Only larger borrowers whose information asymmetries are not severe can use investment flexibility

to their advantage in that their contract maturities are longer. This highlights the importance of a firm's asset selection decisions which may then have ramifications for borrowing costs and other non-price terms. It also raises the question of what can be done by borrowers to signal desirable versus undesirable investment flexibility to lenders during the pre-loan screening process. Future research may further explore the roles of a signaling incentive, where borrowers commit not to use flexibility at the lender's expense via certain terms, in optimal contract design.

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Table 1
Distribution of loan facilities

Panel A: Number of facilities by year		**Panel B: Number of facilities by primary loan purpose**	
1985	4	Acquisition Line	1332
1986	15	Debt Repayment	4368
1987	207	Commercial Paper Backup	1475
1988	418	Takeover	3680
1989	405	LBO, MBO	532
1990	414	General Corporate Purposes	9257
1991	330	Working Capital	4372
1992	430		
1993	647	**Total**	**25016**
1994	990		
1995	964	**Panel C: Number of facilities by borrower's industry**	
1996	1283		
1997	1617	SIC=0	135
1998	1464	SIC=1	1333
1999	1469	SIC=2	5139
2000	1412	SIC=3	8076
2001	1298	SIC=4	2292
2002	1239	SIC=5	4131
2003	1199	SIC=7	3235
2004	1320	SIC=8	1548
2005	1344	SIC=9	147
2006	1162		
2007	1200	**Total**	**26036**
2008	646		
2009	387	**Panel D: Number of facilities by borrower's rating**	
2010	664		
2011	1009	AAA	102
2012	839	AA	414
2013	926	A	2260
2014	824	BBB	3526
2015	294	Not Rated	10860
		Other Rated	7468
Total	**26420**	**Total**	**24630**

Table 2
Descriptive statistics for key loan terms and borrower characteristics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Loan characteristics					
All-in-spread drawn (bps)	24231	170.157	113.886	17	600
Maturity (months)	23482	48.393	23.771	1	362
Facility amount (USD mil)	24341	404	976	0.114	49000
Secured dummy	24343	0.483	0.500	0	1
Strict	24343	0.330	0.470	0	1
Revolver dummy	24343	0.605	0.489	0	1
Borrower investment flexibility					
Depreciation ratio	24343	0.228	0.157	0.009	0.898
Rent ratio	24343	0.140	0.177	0.000	0.900
Composite	24343	0.042	0.132	-0.239	0.525
Other borrower characteristics					
Total assets (USD mil)	24343	5687	14540	26	104457
Leverage	24343	0.316	0.195	0	0.903
Current ratio	23365	1.980	1.084	0.393	6.672
Interest coverage	23504	2.175	1.032	0.299	5.740
Profitability	24321	0.155	0.110	0.010	0.720
Market to book ratio	24286	1.700	0.891	0.730	6.033
Operating leverage	24343	1.053	0.754	0.045	4.832

Table 3
OLS regression of loan yield spreads on investment flexibility
This table presents the OLS regression output for All-in-Spread Drawn (AISD) on investment flexibility. Investment flexibility is proxied by three measures: the natural logarithm of the depreciation ratio DEP (column 1), rent ratio RENT (column 2), and composite variable COMP (column 3). Other determinants include loan characteristics and borrower characteristics. All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

Dep. Var. = All-in-Spread Drawn (AISD)			
	(1)	(2)	(3)
DEP	28.287***	--------	--------
	(5.667)	--------	--------
RENT	--------	13.476**	--------
	--------	(5.580)	--------
COMP	--------	--------	24.060***
	--------	--------	(6.310)
LNASSETS	-6.817***	-6.964***	-6.839***
	(1.164)	(1.182)	(1.172)
LEVERAGE	45.086***	43.633***	45.134***
	(7.698)	(7.715)	(7.708)
CURRENT	-2.840***	-3.040***	-3.141***
	(0.896)	(0.902)	(0.904)
LNCOVERAGE	-18.876***	-19.081***	-18.961***
	(1.488)	(1.501)	(1.494)
PROFITABILITY	-69.400***	-59.302***	-60.591***
	(13.244)	(14.012)	(13.508)
MTB	-4.582***	-4.388***	-4.610***
	(1.135)	(1.124)	(1.136)
OPLEV	-5.608***	-6.055***	-5.916***
	(1.775)	(1.801)	(1.787)
LNLOANSIZE	-13.118***	-13.239***	-13.212***
	(0.978)	(0.978)	(0.978)
LNMAT	4.990***	4.986***	5.015***
	(1.299)	(1.299)	(1.299)
SECURED	46.024***	46.622***	46.352***
	(2.197)	(2.188)	(2.193)
STRICT	11.937***	11.920***	11.842***
	(2.063)	(2.070)	(2.069)
REVOLVER	-27.935***	-28.123***	-28.057***
	(1.354)	(1.362)	(1.359)
Constant	430.150***	436.921***	436.639***
	(17.964)	(18.130)	(18.025)
Year dummies	YES	YES	YES
Rating dummies	YES	YES	YES
Industry dummies	YES	YES	YES
Loan purpose dummies	YES	YES	YES
Observations	21,727	21,727	21,727
Adj R-squared	0.588	0.587	0.588

Table 4
OLS regression of loan yield spreads on investment flexibility across different size groups
This table presents the OLS regression output for All-in-Spread Drawn (AISD) on investment flexibility as proxied by the natural logarithm of the depreciation ratio DEP. Other determinants include loan characteristics and borrower characteristics. The results are presented for firms divided according to their asset size from the smallest firm quartile (column 1) to the largest firm quartile (column 4). All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

Dep. Var. = All-in-Spread Drawn (AISD)				
	(1)	(2)	(3)	(4)
DEP	37.574***	40.771***	16.699*	9.362
	(8.936)	(12.233)	(8.762)	(10.097)
LNASSETS	-21.692***	-11.840**	-10.598**	4.827**
	(2.848)	(5.092)	(4.518)	(2.181)
LEVERAGE	40.104***	75.107***	38.204***	25.604
	(14.261)	(13.994)	(14.280)	(17.348)
CURRENT	-6.491***	-1.533	-4.109**	1.796
	(1.455)	(1.649)	(1.844)	(1.918)
LNCOVERAGE	-15.733***	-19.442***	-18.213***	-20.244***
	(2.493)	(2.666)	(3.337)	(3.563)
PROFITABILITY	-45.642	-101.046***	-60.621**	-44.427**
	(34.845)	(26.343)	(25.220)	(21.573)
MTB	-2.714	-6.800***	-5.081**	-0.413
	(2.168)	(2.103)	(2.309)	(2.003)
OPLEV	-8.763***	-8.833***	-3.134	2.365
	(3.266)	(3.353)	(2.857)	(3.893)
LNLOANSIZE	-4.683**	-10.818***	-14.007***	-11.804***
	(1.819)	(1.834)	(1.789)	(1.703)
LNMAT	-3.168	-4.141	13.775***	11.364***
	(2.400)	(2.883)	(2.586)	(2.738)
SECURED	34.899***	40.912***	46.572***	50.810***
	(3.606)	(3.429)	(4.423)	(5.746)
STRICT	14.160***	17.610***	11.304***	7.359
	(3.830)	(4.105)	(3.693)	(4.874)
REVOLVER	-21.891***	-39.192***	-31.122***	-26.690***
	(2.492)	(2.793)	(2.622)	(2.955)
Constant	414.570***	482.927***	508.474***	239.013***
	(32.870)	(47.337)	(54.440)	(39.613)
Year dummies	YES	YES	YES	YES
Rating dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES
Observations	4,807	5,447	5,754	5,719
Adj R-squared	0.425	0.545	0.620	0.666

Table 5
OLS regression of loan yield spreads on investment flexibility across different rating groups
This table presents the OLS regression output for All-in-Spread Drawn (AISD) on investment flexibility as proxied by the natural logarithm of the depreciation ratio DEP. Other determinants include loan characteristics and borrower characteristics. The results are presented for firms divided according to their credit rating. Column 1 shows the result for unrated borrowers. Column 2 shows the result for borrowers with credit rating below investment grade. Column 3 shows the result for borrowers with credit rating above investment grade but below A. Column 4 shows the result for borrowers with credit rating above A. All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

Dep. Var. = All-in-Spread Drawn (AISD)				
	(1)	(2)	(3)	(4)
DEP	36.179***	27.948***	11.883*	-16.276
	(7.908)	(9.622)	(6.436)	(16.046)
LNASSETS	-14.931***	-8.719***	1.608	8.564***
	(1.613)	(2.533)	(1.967)	(2.487)
LEVERAGE	52.573***	57.966***	1.534	29.096
	(11.187)	(14.254)	(14.804)	(18.882)
CURRENT	-3.059***	-6.237***	1.874	3.469
	(1.176)	(1.825)	(1.657)	(2.624)
LNCOVERAGE	-18.608***	-23.298***	-4.966	-1.115
	(1.731)	(4.558)	(3.563)	(3.547)
PROFITABILITY	-41.796**	-94.801***	-69.945***	22.910
	(19.551)	(25.448)	(18.264)	(47.343)
MTB	-4.123***	-9.598***	-3.080	-2.256
	(1.521)	(2.888)	(2.451)	(2.537)
OPLEV	-7.616***	-4.319	-4.333*	5.975
	(2.340)	(3.710)	(2.313)	(6.234)
LNLOANSIZE	-8.909***	-11.702***	-8.643***	-10.376***
	(1.407)	(1.919)	(2.074)	(2.712)
LNMAT	-2.133	-16.959***	13.168***	19.756***
	(1.888)	(3.494)	(2.182)	(5.268)
SECURED	44.615***	32.697***	61.113***	77.186***
	(2.680)	(4.069)	(7.028)	(15.117)
STRICT	19.212***	4.693	11.932***	9.690*
	(2.939)	(3.565)	(4.595)	(5.007)
REVOLVER	-28.368***	-45.207***	-15.361***	-29.171***
	(2.069)	(2.458)	(2.897)	(8.326)
Constant	454.616***	525.456***	189.396***	192.311***
	(26.916)	(38.215)	(37.413)	(46.275)
Year dummies	YES	YES	YES	YES
Rating dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES
Observations	9,502	6,707	3,142	1,094
Adj R-squared	0.498	0.408	0.583	0.630

Table 6
OLS regression of loan maturity on investment flexibility
This table presents the OLS regression output for the natural logarithm of loan maturity (LNMAT) on investment flexibility as proxied by the natural logarithm of the depreciation ratio DEP. Other determinants include loan characteristics and borrower characteristics. The results are presented for all firms (column 1), and for firms divided according to their asset size from the smallest firm quartile (column 2) to the largest firm quartile (column 5). All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

Dep. Var. = Maturity (LNMAT)					
	(1)	(2)	(3)	(4)	(5)
DEP	0.006	-0.139**	0.047	0.116**	0.135**
	(0.031)	(0.071)	(0.050)	(0.055)	(0.056)
LNASSETS	-0.029***	-0.051***	-0.076**	-0.057**	-0.012
	(0.008)	(0.018)	(0.031)	(0.027)	(0.015)
LEVERAGE	0.208***	0.098	0.161*	0.240***	0.211**
	(0.045)	(0.082)	(0.085)	(0.074)	(0.095)
CURRENT	0.006	0.003	-0.019*	0.033***	0.016
	(0.006)	(0.009)	(0.010)	(0.010)	(0.014)
LNCOVERAGE	0.016*	-0.010	0.021	0.023	0.005
	(0.008)	(0.013)	(0.015)	(0.015)	(0.020)
PROFITABILITY	0.214***	0.561***	0.049	0.079	0.150
	(0.083)	(0.179)	(0.172)	(0.128)	(0.129)
MTB	-0.018**	-0.032**	-0.021	-0.026**	-0.009
	(0.007)	(0.013)	(0.013)	(0.013)	(0.014)
OPLEV	-0.017	0.031	-0.049**	-0.020	-0.018
	(0.012)	(0.020)	(0.023)	(0.021)	(0.028)
LNLOANSIZE	0.058***	0.124***	0.132***	0.087***	-0.046***
	(0.008)	(0.013)	(0.013)	(0.012)	(0.014)
SECURED	0.162***	0.041	0.090***	0.207***	0.363***
	(0.014)	(0.027)	(0.024)	(0.025)	(0.033)
STRICT	0.094***	0.139***	0.131***	0.064***	-0.060**
	(0.013)	(0.023)	(0.023)	(0.022)	(0.027)
REVOLVER	0.253***	-0.147***	0.075***	0.303***	0.604***
	(0.016)	(0.023)	(0.023)	(0.024)	(0.032)
Constant	2.346***	2.250***	1.089***	2.217***	4.430***
	(0.154)	(0.250)	(0.333)	(0.387)	(0.302)
Year dummies	YES	YES	YES	YES	YES
Rating dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES	YES
Observations	21,487	4,786	5,386	5,681	5,634
Adj R-squared	0.237	0.160	0.193	0.333	0.443

Table 7
Probit regression of loan secured status on investment flexibility
This table presents the Probit regression output for the secured status dummy (SECURED) on investment flexibility as proxied by the natural logarithm of the depreciation ratio DEP. Other determinants include loan characteristics and borrower characteristics. The results are presented for all firms (column 1), and for firms divided according to their asset size from the smallest firm quartile (column 2) to the largest firm quartile (column 5). All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

Dep. Var. = SECURED					
	(1)	(2)	(3)	(4)	(5)
DEP	0.484***	0.373**	0.654***	0.427**	0.237
	(0.101)	(0.188)	(0.162)	(0.194)	(0.172)
LNASSETS	-0.058**	-0.280***	0.096	-0.032	0.084
	(0.026)	(0.057)	(0.085)	(0.099)	(0.065)
LEVERAGE	0.878***	0.823***	1.113***	0.836***	0.972***
	(0.153)	(0.277)	(0.268)	(0.291)	(0.377)
CURRENT	0.011	-0.017	0.041	0.030	0.036
	(0.017)	(0.025)	(0.029)	(0.039)	(0.048)
LNCOVERAGE	-0.253***	-0.224***	-0.238***	-0.236***	-0.331***
	(0.025)	(0.038)	(0.045)	(0.059)	(0.083)
PROFITABILITY	0.025	-0.603	-0.008	0.523	-0.034
	(0.244)	(0.463)	(0.494)	(0.497)	(0.501)
MTB	-0.093***	-0.004	-0.087**	-0.230***	-0.093
	(0.023)	(0.036)	(0.039)	(0.057)	(0.066)
OPLEV	0.048	-0.047	0.086	0.110	-0.047
	(0.034)	(0.048)	(0.061)	(0.068)	(0.097)
LNLOANSIZE	-0.231***	-0.202***	-0.225***	-0.141***	-0.182***
	(0.022)	(0.037)	(0.035)	(0.039)	(0.043)
LNMAT	0.256***	0.106**	0.151***	0.365***	0.581***
	(0.023)	(0.044)	(0.047)	(0.052)	(0.061)
STRICT	0.964***	0.795***	1.044***	1.279***	1.007***
	(0.038)	(0.074)	(0.065)	(0.079)	(0.108)
REVOLVER	-0.082***	0.002	-0.007	-0.126**	-0.271***
	(0.026)	(0.047)	(0.047)	(0.051)	(0.059)
CONCENTRATION	1.033***	0.895***	1.190***	1.012***	0.846***
	(0.109)	(0.192)	(0.187)	(0.197)	(0.283)
Constant	3.037***	3.989***	2.159**	1.217	0.439
	(0.404)	(0.655)	(0.851)	(1.146)	(0.983)
Year dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Rating dummies	YES	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES	YES
Observations	21,813	4,818	5,460	5,772	5,730
Pseudo R-squared	0.391	0.228	0.289	0.444	0.511
Chi-squared	3330	611.6	915.6	1141	1030
Probability > $\chi 2(1)$	0.00	0.00	0.00	0.00	0.00

Table 8
Probit regression of covenant restrictions on investment flexibility
This table presents the Probit regression output for four specific covenant sweeps on investment flexibility as proxied by the natural logarithm of the depreciation ratio DEP. The four sweep types are Excess Cash Flow Sweep, Asset Sale Sweep, Debt Issue Sweep, and Equity Issue Sweep, presented in columns 1 to 4 respectively. Other determinants of covenant usage include loan characteristics and borrower characteristics. All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

Dep. Var. = Dummy for a specific sweep covenant				
	(1)	(2)	(3)	(4)
DEP	0.261***	-0.015	0.092	0.114
	(0.099)	(0.098)	(0.095)	(0.088)
LNASSETS	-0.106***	-0.140***	-0.129***	-0.138***
	(0.021)	(0.020)	(0.020)	(0.020)
LEVERAGE	0.525***	0.246*	0.389***	0.439***
	(0.140)	(0.127)	(0.130)	(0.132)
CURRENT	-0.022	-0.012	-0.033*	-0.031*
	(0.018)	(0.017)	(0.017)	(0.018)
LNCOVERAGE	0.001	-0.037	0.009	-0.005
	(0.027)	(0.023)	(0.024)	(0.024)
PROFITABILITY	-0.843***	-0.241	-0.430*	-0.445*
	(0.253)	(0.239)	(0.244)	(0.237)
MTB	0.019	0.006	-0.021	-0.013
	(0.024)	(0.021)	(0.022)	(0.023)
OPLEV	-0.097***	-0.086***	-0.114***	-0.073**
	(0.033)	(0.031)	(0.031)	(0.031)
LNLOANSIZE	0.150***	0.175***	0.178***	0.170***
	(0.018)	(0.018)	(0.017)	(0.017)
LNMAT	0.262***	0.156***	0.124***	0.094***
	(0.025)	(0.024)	(0.024)	(0.024)
SECURED	0.839***	0.938***	0.833***	0.740***
	(0.039)	(0.039)	(0.038)	(0.039)
REVOLVER	-0.219***	-0.186***	-0.209***	-0.166***
	(0.022)	(0.022)	(0.022)	(0.022)
Constant	-4.976***	-3.953***	-4.075***	-4.464***
	(0.361)	(0.333)	(0.345)	(0.350)
	0.261***	-0.015	0.092	0.114
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Rating dummies	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES
Observations	20,950	21,145	20,716	20,716
Pseudo R-squared	0.314	0.272	0.248	0.259
Chi-squared	2598	2529	2364	2258
Probability > $\chi 2(1)$	0	0	0	0

Table 9
Instrumental variable regression of loan yield spreads on investment flexibility
This table presents the output for the instrumental variable estimation of All-in-Spread Drawn (AISD) on investment flexibility as proxied by the natural logarithm of the depreciation ratio DEP. The loan spread determinants include loan terms and borrower characteristics. The instrument for investment flexibility is the amount of national defence expenditure. The OLS estimation of DEP is presented in column 1; the instrumental variable estimation of AISD is presented in column 2. All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

	DEP (1)	AISD (2)
DEP	-----	141.268**
	-----	(64.251)
LNASSETS	-0.020***	-5.025***
	(0.002)	(1.241)
LEVERAGE	-0.059**	57.514***
	(0.026)	(8.386)
CURRENT	-0.005*	-1.965***
	(0.003)	(0.749)
LNCOVERAGE	-0.001	-18.307***
	(0.006)	(1.084)
PROFITABILITY	0.194	-97.570***
	(0.134)	(17.527)
MTB	0.015***	-6.270***
	(0.006)	(1.274)
OPLEV	-0.013	-4.872***
	(0.009)	(1.229)
LNLOANSIZE	-----	-13.195***
	-----	(0.731)
LNMAT	-----	5.262***
	-----	(1.078)
SECURED	-----	41.818***
	-----	(2.570)
REVOLVER	-----	-26.984***
	-----	(1.380)
STRICT	-----	11.819***
	-----	(1.463)
Constant	-0.187	495.946***
	(0.124)	(33.859)
Year dummies	NO	YES
Industry dummies	YES	YES
Rating dummies	NO	YES
Loan purpose dummies	NO	YES
Defence expenditure	0.094***	-----
	(0.018)	-----
Observations	23,820	21,430
Adj/Pseudo R2	0.136	0.558
Chi-squared	-----	33623
Probability > $\chi 2(1)$	-----	0.00

Table 10
Simultaneous two-stage estimation of loan spreads, maturity, and secured status
This table presents the second stage of two-stage estimation output for All-in-Spread Drawn (AISD), loan maturity (LNMAT), and secured status (SECURED) on investment flexibility proxied by the natural logarithm of the depreciation ratio DEP. This procedure takes into account the simultaneity between non-price loan terms (LNMAT and SECURED) by regressing them on all exogenous determinants and obtaining their predicted values in the first stage regressions. All variables are defined in section 2. The standard errors are corrected for clustering at the firm level. ***, **, * represent significance at 1%, 5%, and 10% level, respectively.

	Dep. Var. = AISD (1)	Dep. Var. = LNMAT (2)	Dep. Var. = SECURED (3)
DEP	24.775***	-0.336***	0.937***
	(6.365)	(0.032)	(0.195)
LNASSETS	5.670***	0.148***	0.921***
	(1.347)	(0.008)	(0.046)
LEVERAGE	24.595***	0.194***	-1.520***
	(7.824)	(0.040)	(0.283)
CURRENT	-3.600***	0.024***	-0.048
	(0.896)	(0.005)	(0.031)
LNCOVERAGE	-12.596***	0.260***	-0.248***
	(1.706)	(0.009)	(0.048)
PROFITABILITY	-143.716***	0.049	-8.561***
	(14.078)	(0.074)	(0.494)
MTB	1.611	0.058***	0.323***
	(1.177)	(0.007)	(0.047)
OPLEV	-0.906	-0.057***	0.738***
	(1.757)	(0.012)	(0.062)
LNLOANSIZE	-25.993***	0.159***	-2.052***
	(1.323)	(0.007)	(0.053)
LNMAT	263.417***	-----	30.090***
	(13.456)	-----	(0.667)
SECURED	82.577***	3.552***	-----
	(10.179)	(0.073)	-----
STRICT	-34.663***	-0.857***	-1.703***
	(3.515)	(0.024)	(0.083)
REVOLVER	-90.880***	0.326***	-7.588***
	(3.653)	(0.014)	(0.176)
CONCENTRATION	-----	-----	1.089***
	-----	-----	(0.191)
ASSETS MATURITY	-----	0.035***	-----
	-----	(0.008)	-----
REGULATED	-----	-0.039	-----
	-----	(0.041)	-----
Constant	-299.224***	-2.682***	-70.281***
	(39.223)	(0.184)	(1.711)
Year dummies	YES	YES	YES
Rating dummies	YES	YES	YES
Industry dummies	YES	YES	YES
Loan purpose dummies	YES	YES	YES
Observations	21,402	21,487	22,261
Adj/Pseudo R-squared	0.591	0.422	0.873
Chi-squared			2500
Probability > $\chi^2(1)$			0