Firm-Level Investment Flexibility and Loan Contract Terms

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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, as consistent with agency cost theories. 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. Our results are found most pronounced among smaller borrowers and also show that the price impact of investment flexibility can be mitigated through strong institutional monitoring.

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 role of investment flexibility on 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 lower than that used by firms lacking this flexibility. In Zhang's (2005) and Cooper's (2006) models, the inefficiently high level of fixed investments during downturns of firms with a lack of investment flexibility gives rise to higher systematic risk and higher equity holders' required rate of return. While there has been some attempt in empirically verifying the association between investment flexibility and expected equity returns (Gulen *et al.*, 2008; Docherty *et al.*, 2010; Ortiz-Molina and Phillips, 2014), the evidence on its relation with debt characteristics is sparse.

In this study, we investigate the effects of investment flexibility on loan contract design in both a real options framework and through an agency channel. The study makes three important contributions. Our primary contribution is to provide early evidence on the interaction between investment flexibility and loan contract terms in a real options framework. On the one hand, investment flexibility allows firms to flexibly adjust their capital stocks to respond to macroeconomic and product demand shocks. Mauer and Triantis (1994) and Aivazian and Berkowitz (1998) theoretically predict that such flexibility lowers firms' default risk. Allowing for asymmetric adjustment costs where expansion is more costly than contraction, Zhang's (2005) and Cooper's (2006)

models conjecture that unlike value firms, growth firms with high investment flexibility are not burdened with unproductive idle capital during downturns. Hence, growth firms are less affected by adverse product market demands, making them less risky compared to value firms. On the basis that investment flexibility lowers firms' exposure to external shocks, we expect firms with a higher degree of investment flexibility to enjoy smaller loan spreads.

On the other hand, due to the asymmetric payoffs of debt-holders and share-holders, investment flexibility may affect the riskiness of debts and shares differently. Titman *et al.* (2004) suggest that the real options effect is relevant to debt-holders only during downturns when the borrowers' probability of default is higher. While investment flexibility allows firms to expand to take advantage of rising product market demands during upturns, debt-holders are unable to benefit from this expansion as their payoffs are capped. By contrast, during downturns, investment flexibility allows firms to curtail their investments and asset quality, hence lowering collateral value at the cost of debt-holders. Hence, debt-holders may require higher spreads on loans to firms with higher investment flexibility.

Overall, from the perspective that investment flexibility allows firms to have real options to invest and disinvest, 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 as investment flexibility can shelter them from weak product market demands during downturns. A positive association is consistent with the potential deterioration of firms' loan collaterals which

might be called for exactly when the default probability is heightened. Which relation dominates is an empirical question that the current study aims to address. [1]

Our second contribution is to provide evidence on the role of market imperfections to the relation between investment flexibility and loan spreads. In the absence of perfect contracting, investment flexibility may intensify 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. In both cases, Titman *et al.*'s (2004) model suggests that banks raise the spread on the loans to firms with high investment flexibility.

Finally, we provide early evidence on how investment flexibility might affect loan contract terms other than loan spreads. 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 higher investment flexibility have higher financial leverage as the agency costs can be curbed using contractual terms such as collaterals and covenants.[2] Alternatively, firms with high investment flexibility may themselves be willing to supply collateral to signal their willingness to respect debt-holders' interests, similar to the signaling motivation by better quality borrowers in

[1] The literature is long divided between the relative importance of collateral value and value of firms as a going concern. 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." Our investigation on investment flexibility reflects this tension between collateral and firms' going concern value through their ability to shelter aggregate shocks.

[2] This is consistent with the common view in the literature that banks are more likely to demand collateral from borrowers with lower quality to secure the loans (Boot et al., 1991; Holmstrom and Tirole, 1997).

Besanko and Thakor (1987). Therefore, we argue that firms with a high level of investment flexibility have loans with a higher likelihood of collateral and more covenant restrictions.

Overall, while the relation between investment flexibility and loan spreads is theoretically modeled in Titman *et al.* (2004) and other studies, we provide the first empirical evidence for this relation. We also provide early evidence for the relation between investment flexibility and non-price loan contract terms (*i.e.* maturity, collaterals, and covenants) at loan contract level. Our investigation of the substitution between price and non-price loan contract terms to curb the potential agency problems arising from investment flexibility enriches the literature in debt contracting. While previous empirical literature tends to focus on the impact of investment flexibility on cost of capital from equity holder's perspective (Gulen *et al.*, 2008, Docherty *et al.*, 2010; Ortiz-Molina and Phillips, 2014), our study sheds new light on this relation from the perspective of debt-holders.

Our results show 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 real option effect and the agency channel along the lines of Titman *et al.* (2004). We study whether the positive association between investment flexibility and loan spreads holds among firms with different degrees of agency problems. We document the role of firm size to the positive relation between investment flexibility and loan spreads. This relation 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 restrictive 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). The impact of investment flexibility on both loan price and non-price terms is most pronounced among smaller borrowers. Our results also suggest that the price impact of investment flexibility can be mitigated by strong institutional monitoring.

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 investigates mitigating factors on the impact of investment flexibility. Finally, section 9 concludes the study.

2 The Model and the Key Variables

2.1 The Model

To test the impact of investment flexibility on loan pricing, we use pooled OLS regression to estimate the following model of loan spread on investment flexibility, 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 standard errors are adjusted for heteroskedasticity and clustered at the firm level, following Saunders and Steffen (2011).[4] The subscripts *i* and *t* represent the borrower and year of the loan at origination, respectively. The variables are defined as follows:

- *AISD*: "All-in-spread-drawn", measured in basis points, which represents the interest rate margin over LIBOR on drawn loan amount plus annual fees.
- *Flex*: Investment flexibility. We discuss our choice of proxies for investment flexibility in section 2.2 below.
- *Loan*: A vector of loan characteristics, including
  - *LNMAT*: The natural logarithm of loan maturity in months.
  - *SECURED*: A binary variable taking the value of 1 for secured loans and zero for unsecured loans.[6]
  - *STRICT*: A binary variable taking the value of 1 if the loan facility carries three or more types of covenant restrictions and zero otherwise.

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

[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. 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.

- *REVOLVER*: A binary variable taking the value of 1 if the loan facility is a revolving facility and zero otherwise.
- *LNLOANSIZE*: The natural logarithm of loan facility amount adjusted for inflation in year 1983 dollars.

❖ *Borrower*: A vector of borrower characteristics, including

- *LNASSETS*: The natural logarithm of book value of total assets adjusted for inflation in 1983 dollars.
- *FINLEV*: Financial leverage, calculated as book value of total debts divided by book value of total assets.
- *CURRENT*: Current ratio, calculated as current assets divided by current liabilities.
- *LNCOVERAGE*: The natural logarithm of (1 + EBITDA/Interest expenses).
- *OPGEAR*: Operational gearing of assets-in-place. Developed by Novy-Marx (2011), this novel measure of operating leverage is calculated as the sum of cost-of-goods-sold and selling and general administration expenses to total assets. Refer to section 2.3 for a discussion on the inclusion of *OPGEAR* in the set of borrower characteristics.
- *PROFIT*: Profitability, calculated as EBITDA divided by sales.
- *MTB*: Market-to-book ratio of assets, calculated as the ratio of (book value of assets – book value of equity + market value of equity) to book value of assets.

❖ *Controls*: A 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).

2.2 Investment Flexibility (*Flex*)

Our empirical proxy for investment flexibility is heavily influenced by the settings of Titman *et al.*'s (2004) structural model on the relation between investment flexibility and default spread. Investment flexibility reflects "the owner's flexibility to alter the quality level [of the investment project]" (Titman *et al.*, 2004, p. 179). Titman *et al.* (2004) use the depreciation rate to represent investment flexibility in their model and calibrate it using the U.S office building and commercial mortgages data. The depreciation rate is also used by several studies (Farinas and Ruano, 2005; Chirinko and Schaller, 2009; Cao, 2015; Gulen and Ion, 2015) to proxy for the level of investment irreversibility amongst the universe of U.S listed firms.[8]

Motivated by the choice of the depreciation rate in Titman *et al.*'s (2004) model and several other empirical studies, we use this variable as our main proxy for investment flexibility. The depreciation rate (*DEP*) is measured as the annual depreciation expense divided by beginning-of-the-year net fixed assets. The shorter the useful life of an asset (*i.e.* the higher the depreciation ratio), the easier it is to replace them with new assets, hence the higher level of investment flexibility.

While depreciation is a natural channel through which the capital stock evolves, firms may have more freedom to adjust the quality level of their capital stock if they rely more on rented assets. This aspect of investment flexibility is irrelevant in the setting of Titman *et al.*'s (2004) model where firms specialize in leasing out office building and commercial mortgages (*i.e.* they lease out their own properties rather than sub-leasing leased properties). However, in several studies (Farinas and Ruano, 2005; Chirinko and Schaller, 2009; Cao, 2015; Gulen and Ion, 2015), the degree to which assets are rented is used to proxy for investment irreversibility in a typical U.S listed

[8] Investment irreversibility is used interchangeably with (the lack of) investment flexibility in our paper.

firm. In this paper, we also employ the rental rate (*RENT*), calculated as the ratio of rental expense to beginning-of-the-year net fixed assets. The higher the rental rate, the more flexible the firm is in adjusting the quality level of their capital stock.

Asset tangibility (*i.e.* the ratio of tangible fixed assets to total assets) is also used to proxy for investment irreversibility (see Gulen *et al.*, 2008; Docherty *et al.*, 2010; to name a few). The rationale for this choice of proxy is that the more tangible a firm's assets are, the harder it is for them to adjust their capital stock. Different from the depreciation rate and rental rate, asset tangibility reflects the relative level of the capital stock. Hence, this proxy is directly relating to the collateral level, a crucial loan contract term. Using asset tangibility alone as a proxy for investment flexibility may hinder our effort in addressing the research question of how investment flexibility affects loan contract terms.[9]

All things considered, we use the depreciation rate (*DEP*) as our main proxy for investment flexibility. The rental rate (*RENT*) and a composite index of the depreciation rate, rental rate and asset tangibility are used to test the robustness of our results. The composite index *COMP* is constructed using the set of coefficients suggested in Cao (2015). Specifically, it is calculated as $0.42lnDEP + 0.42lnRENT - 0.39lnTANG$ where the components are the natural logarithm of one plus the annual depreciation rate, one plus the rental rate and one plus the ratio of net fixed assets to total assets. As both the depreciation rate and the rental rate enters the calculation of *COMP* with a positive sign while the ratio of tangible physical assets carries a negative sign, *COMP*

[9] Another aspect of investment irreversibility is the liquidity of the markets for firm's assets (MacKay, 2003). This measure reflects the degree of capital redeployability of firms within an industry. For example, the more liquid second-hand asset market implies the more redeployable capital stock, hence higher investment flexibility. Our focus is on investment flexibility at firm-level, hence we do not use the liquidity of the physical or labor asset market as a proxy. We control for industry-level factors using industry dummies in our regression analysis.

reflects the degree of investment flexibility. The higher the value of *COMP*, the more flexible the firm is in adjusting the quality level of its capital stock.

2.3 Operational Gearing (*OPGEAR*)

We attempt to delineate the role of investment flexibility from that of operating leverage. Dating back to Lev (1974) and Mandelker and Rhee (1984), operating leverage is commonly associated with high fixed production costs. Novy-Marx (2011) provides a novel insight into the concept of operating leverage by decomposing it into (a) operational gearing of assets-in-place and (b) a lack of operational flexibility in the same sense as investment irreversibility in Zhang (2005). While the concepts of operating leverage and investment irreversibility tend to receive homogeneous treatment in some studies (*e.g.* Gulen *et al.*, 2008), Cao (2015) provides empirical evidence showing their starkly different impacts on the value premium.

The operational gearing of assets-in-place potentially amplifies the volatility of firms' earnings (Lev, 1983). Hence, in the context of Titman *et al.*'s (2004) model, operational gearing potentially affects loan spreads through the same channel that the volatility of firms' operating cash flow (σ_l and σ_L) does. In comparison, investment flexibility manifests itself through the depreciation rate (γ). To differentiate the potential impact of investment flexibility from operational gearing and control for the impact of the latter on loan spreads, we include Novy-Marx's (2011) measure of operational gearing, denoted as *OPGEAR*, in the set of borrower characteristics in equation (1).[10]

[10] Conceptually, operational gearing captures the ratio of the capitalized cost of operating to the value of assets-in-place. Assuming the capitalized cost of operating is proportional to the annual operating costs, Novy-Marx (2011) operationalize the concept of operational gearing as the ratio of operating costs (i.e. the sum of cost-of-goods-sold and selling and general administration expenses) scaled by total assets.

3 Data and Sample

The sample is constructed from two 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. Following Bharath *et al.* (2011), for every loan originated in calendar year *t*, if the loan is activated six months or more from the borrower's fiscal year end in calendar year *t*, the loan is matched with the accounting data in the fiscal year end in calendar year *t*. If the loan activation date is within six months from the borrower's fiscal year end in calendar year *t*, we match it with the accounting data in the fiscal year end in calendar year *t*-1.[12] This matching procedure ensures that the accounting information used to construct the variables is available at the time the firm makes the decision to activate its loans. We exclude loans extended to borrowers in the financial services sector (SIC codes between 6000 and 6999) due to their different balance sheet structure. Our final sample includes 24,021 loan facilities originated during the period from 1985 to 2015.

[Insert table 1 here]

Table 1 provides the descriptive statistics of our sample. Panel A shows that during our sampling period, loan origination grew rapidly in the late 1990s and early 2000s and dropped considerably following the 2008 global financial crisis. Panel B reports the main loan purposes, the most common of which are general corporate purposes (35%), working capital and debt repayment (16-17% each) and takeover

[12] 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).

financing (14%). The industry concentration of borrowers is described in Panel C. Over half of the loan facilities are extended to borrowers from the manufacturing (SIC code between 2 and 3). Other dominating sectors include wholesale and retail (16%, SIC code 5) and services (11%, SIC code 7). Panel D displays the distribution of borrowers' credit rating status. Almost half (47%) of the loan facilities are extended to non-rated borrowers. Of the rated borrowers, the dominant ratings are A and BBB which together account for nearly a quarter of the whole sample. In general, our sample covers a wide range of loan purposes from multiple sectors and credit rating status.

[Insert table 2 here]

Table 2 reports the summary statistics of the key characteristics of the loan facilities and the borrowers. An average loan facility in our sample has the size of $US368 million extended over 4 years and is charged 171 basis points above LIBOR. Nearly half of the loan facilities are secured and about a third carries three or more types of covenant restrictions. About 60% of the sample are revolving loan facilities. In terms of borrower characteristics, an average borrower depreciates nearly 24% of its fixed assets annually, making the useful life of its assets approximating 4 years. Renting appears to be important given that on average, rental expense is over half of depreciation expense.

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 between 1% and 10% levels (the weakest being RENT).

[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 Contracting Imperfections

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 no statistical difference in the loan spreads between more and less flexible firms as shown in columns (3) and (4).

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. 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 5 shows investment flexibility has the strongest impact on loan maturity among the smallest firms and no impact on other 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.

[Insert table 5 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 6 here]

Table 6 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.[13]

The coefficient of investment flexibility is statistically significant and positive for the entire sample in column 1 and subsample of loans in columns 2-3. 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

[13] 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.

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 7.

[Insert table 7 here]

The Probit regression output shows that all four covenant types are adjusted in accordance with borrower investment flexibility. The probability of lenders employing Excess Cash Flow Sweep, Asset Sales Sweep, Debt Issuance Sweep and/or Equity Issuance Sweep in a loan contract increases significantly among borrowers with higher investment flexibility.

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 8 shows the result for both the first and second stage of this 2SLS estimation.

[Insert table 8 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 0.034 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 1% level. The coefficient of DEP is about 283 in the IV model, which is many 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 17.79 and F-test statistic of 17.75. Both tests carry a p-value of 0.000. This indicates that at the 1% level, we cannot reject the null hypothesis of endogeneity. The finding is consistent with our prior argument that in the 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 89.43 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 89.43 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%.[14] 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 89.43, indicating that we can reject the null hypothesis of weak instrument even under the second characterization.

8 Mitigating Factors on the Price Impact of Investment Flexibility

In the previous sections, we have established that borrowers with flexible investment options pay higher loan prices, receive shorter maturities, are more likely to pledge collaterals and accept more restrictive covenants. These effects are particularly strong among opaque and unrated borrowers. MacKay (2003) argues that non-price contractual terms such as covenants and collateral can mitigate risk shifting and asset substitution behaviors. In this section, we focus on unrated borrowers and explore whether the use of non-price loan terms can mitigate the effect of investment flexibility

[14] 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. These test results are available from the authors on request.

on loan prices for them. While MacKay (2003) focuses on the trade-off between non-price terms and the amount of credit available to borrowers at the firm level, our focus is on the trade-off between non-price terms and loan prices at the loan contract level. Arguably these are the most important aspects of firms' credit arrangements.

We first examine this substitution effect by testing whether the four specific covenants identified in section 6.3 can reduce the borrowing cost among firms prone to more severe agency problems. In Table 9, we restrict our sample to unrated borrowers who, according to our previous results, are more likely to face tighter loan contract terms when there are more flexible investment options. Of these firms, we identify those that accept one of the four specific covenants identified in section 6.3 and those that do not. We expect the investment flexibility coefficient on loan spreads to be less significant among firms that accept one of the four specific covenants.

[Insert table 9 here]

The results are overwhelmingly consistent. Panel A in table 9 shows the effect of investment flexibility on loan price among unrated borrowers who are willing to accept one of the four specific covenants. The coefficients of investment flexibility are insignificant at the 5% level in all four columns representing the four covenant types (with only one being weakly significant at 10%). These results indicate that among unrated borrowers who are willing to accept one of the four restrictive covenants, investment flexibility does not increase loan spreads. This reflects that the use of restrictive covenants helps substitute away higher loan prices associated with investment flexibility. In other words, restrictive covenants can be used by banks as a monitoring tool to mitigate the potential moral hazard problem. Panel B of table 9 shows the results for similar regressions among the same group of unrated borrowers

whose contracts do not include the four specific covenant types. All the coefficients of investment flexibility on loan spreads are strongly positively significant at the 1% level across all four covenant types. These results support our view on the substitution effect between loan covenants and loan price. They highlight a particular mechanism via which more informationally opaque firms can use covenants to signal their quality hence alleviate the pricing impact of the perceived agency costs that their technologies present.

In addition to covenants, a wide range of external factors can also affect the relationship between investment flexibility and loan price. In table 10, we highlight the effect of three such factors: lending relationship, lead bank reputation and external institutional ownership.

[Insert table 10 here]

Bharath *et al.* (2011) provide strong evidence that prior lending relationships can reduce information asymmetries and therefore lower loan price for repeated borrowers. Since information asymmetries between lender and borrower are the source of moral hazard problems which could be heightened by investment flexibility, we argue that prior lending relationships could help mitigate the effect of investment flexibility on loan price. Lenders understand borrower better when they have an existing relationship, therefore the potential moral hazard from investment flexibility can be better measure and monitored. So among borrowers who are more prone to moral hazard (i.e., unrated borrowers), prior relationships may offset the positive association between investment flexibility and loan prices. Column (1) in table 10 shows the regression output of loan spreads on investment flexibility, where the subsample in Panel A (B) consists of loans with (without) prior lead bank-borrower

relationships. The coefficient of investment flexibility in Panel A is insignificant while that in Panel B is 52.035 and strongly significant at the 1% level. The result from column (1) in Panel A and B indicates that prior lending relationships can offset the price impact of investment flexibility through reduced informational asymmetries.

Lead bank reputation can also be viewed as a mitigating factor on informational asymmetries and associated moral hazard problems, especially those between the borrower and participating banks. The presence of a reputable lead arranger could help mitigate this moral hazard problem. Sufi (2007) argues that more reputable banks could be more diligent in their monitoring efforts as they have a strong incentive to protect their reputation. Ross (2010) makes a similar argument and shows that loans led by more reputable arrangers carry lower spreads. He attributes this cost saving to other participating banks' willingness to accept lower spreads in exchange for diligent monitoring from a reputable lead arranger. We adopt similar reasoning and test whether the price impact of investment flexibility could be mitigated by lead bank reputation. Following Sufi (2007) and Ross (2010), we use the market share of lead arrangers from the historical league table to proxy for reputation. JP Morgan, Bank of America Merrill Lynch and Citigroup dominate about 50% the loan syndication market. Hence, any loan led by one of these top 3 banks is considered to have reputable lead banks. Column (2) in table 10 shows the result for this test, where panel A focuses on loans led by one of the top 3 banks and panel B on those led by banks outside the top 3. The results in panel A reveal that for loans led by one of the top 3 banks, investment flexibility is not associated with an increase in loan price, given the coefficient of investment flexibility is insignificant. In contrast, the coefficient of investment flexibility is strongly positively significant at the 1% level in panel B, among loans led by banks outside the

top 3. This finding is consistent with our prediction that lead bank reputation can offset the positive effect of investment flexibility on loan price.

Finally, we test for the mitigating impact of institutional investor ownership. It has been well established in the corporate finance literature that institutional investors conduct their own monitoring of their holding firms. Some are even actively involved in the firm's business activities thorough their voting power. Hu and Lian (2016) show that the level of institutional investor holding is negatively associated with loan price. They attribute this cost reduction to the monitoring efforts of institutional investors which also benefit lenders. Once again, a similar argument can be applied in our setting, that is, the price impact of investment flexibility can be mitigated if informational asymmetries are alleviated through institutional investors' monitoring efforts. To test this hypothesis, we obtain the average institutional holding percentage of all the unrated borrowers, and split our loan sample based on the mean institutional holding. The results are presented in column (3) of table 10, where panel A focuses on loans whose borrowers have above-mean institutional ownership and panel B below-mean institutional ownership. As expected, the coefficient of investment flexibility on loan price is insignificant in panel A and strongly positively significant in panel B, which supports the argument that institutional investor ownership helps offset the price impact of investment flexibility.

Taken together, table 10 reveals that there are other channels for unrated borrowers to mitigate the moral hazard problems presented by a high level of investment flexibility. These factors along with collateral and covenants are options available for more opaque borrowers with high investment flexibility to reveal their true quality and mitigate borrowing cost increases.

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, have shorter maturities, and include various restrictive covenants when borrowers are highly flexible in making investment adjustments. Our results are most pronounced among smaller borrowers, suggesting that lenders associate investment flexibility with increased agency problems among smaller firms therefore adjust the non-price contract terms accordingly. The price impact of investment flexibility is mitigated through efficient monitoring channels, such as having prior lending relationships, having a reputable bank as lead arranger, and having high institutional ownership.

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	1168	4.86%
1986	15	Debt Repayment	4025	16.76%
1987	196	Commercial Paper Backup	1410	5.87%
1988	392	Takeover	3311	13.78%
1989	363	LBO, MBO	505	2.10%
1990	381	General Corporate Purposes	8390	34.93%
1991	302	Working Capital	3922	16.33%
1992	393	Other	1290	5.37%
1993	595			
1994	907	**Total**	**24,021**	**100%**
1995	879			
1996	1188	**Panel C: Number of facilities by borrower's industry**		
1997	1476			
1998	1320	SIC=0	132	0.55%
1999	1358	SIC=1	1341	5.58%
2000	1284	SIC=2	4854	20.21%
2001	1212	SIC=3	7757	32.29%
2002	1153	SIC=4	1983	8.26%
2003	1108	SIC=5	3794	15.79%
2004	1213	SIC=7	2647	11.02%
2005	1222	SIC=8	1380	5.74%
2006	1059	SIC=9	133	0.55%
2007	1078			
2008	586	**Total**	**24,021**	**100%**
2009	341			
2010	575	**Panel D: Number of facilities by borrower's credit rating**		
2011	888			
2012	736	AAA	102	0.42%
2013	803	AA	408	1.70%
2014	738	A	2156	8.98%
2015	256	BBB	3339	13.90%
		Other Rated	6686	27.83%
		Not Rated	11330	47.17%
Total	**24,021**	**Total**	**24,021**	**100%**

Table 2
Descriptive statistics for key loan terms and borrower characteristics
This table reports the summary statistics for the key borrower characteristics, loan characteristics, and investment flexibility proxies. The variables are winsorized at 1% and 99% levels to remove extreme outliers. All variables are defined in section 2.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Loan characteristics					
AISD (bps)	23906	171	114	18	600
MAT (months)	23172	48	23	6	106
LOANSIZE ($ millions)	24019	368	607	2.6	3,800
SECURED	24021	0.4855	0.4998	0	1
STRICT	24021	0.3295	0.4700	0	1
REVOLVER	24021	0.6014	0.4896	0	1
Borrower investment flexibility					
DEP	24021	0.2349	0.1685	0.0415	0.9996
RENT	24021	0.1470	0.1902	0.0000	0.9997
COMP	24021	0.0463	0.1368	-0.1968	0.5414
Other borrower characteristics					
ASSETS ($ millions)	24021	14263	36930	47	264188
FINLEV	24021	0.3154	0.1954	0.0000	0.8997
CURRENT	23046	1.9804	1.0816	0.4058	6.6558
COVERAGE	23213	18.5659	46.0998	0.4153	355.9138
OPGEAR	24021	1.0581	0.7512	0.0452	4.8322
PROFIT	24002	0.1531	0.1058	0.0097	0.6028
MTB	23972	1.7000	0.8940	0.7275	6.0689

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	37.670***	--------	--------
	(9.080)	--------	--------
RENT	--------	12.832*	--------
	--------	(7.122)	--------
COMP	--------	--------	20.363**
	--------	--------	(8.084)
LNASSETS	-6.719***	-7.005***	-6.936***
	(1.206)	(1.220)	(1.212)
FINLEV	47.031***	46.811***	47.326***
	(7.836)	(7.850)	(7.827)
CURRENT	-2.760***	-2.837***	-2.982***
	(0.895)	(0.901)	(0.903)
LNCOVERAGE	-18.948***	-18.623***	-18.672***
	(1.511)	(1.506)	(1.507)
PROFIT	-60.977***	-59.373***	-57.717***
	(13.927)	(14.128)	(14.084)
MTB	-3.667***	-3.350***	-3.513***
	(1.161)	(1.161)	(1.166)
OPGEAR	-5.243***	-5.627***	-5.509***
	(1.756)	(1.778)	(1.770)
LNLOANSIZE	5.938***	5.830***	5.887***
	(1.252)	(1.253)	(1.252)
LNMAT	46.968***	47.260***	47.207***
	(2.153)	(2.159)	(2.156)
SECURED	11.971***	12.160***	12.050***
	(2.086)	(2.088)	(2.091)
STRICT	-27.491***	-27.606***	-27.573***
	(1.355)	(1.358)	(1.359)
REVOLVER	-6.719***	-7.005***	-6.936***
	(1.206)	(1.220)	(1.212)
Constant	422.671***	432.655***	433.048***
	(27.367)	(27.872)	(27.796)
Year dummies	YES	YES	YES
Rating dummies	YES	YES	YES
Industry dummies	YES	YES	YES
Loan purpose dummies	YES	YES	YES
Observations	21,375	21,375	21,375
Adj R-squared	0.580	0.579	0.579

Table 4
OLS regression of loan yield spreads on investment flexibility across different degrees of information asymmetries
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	54.627***	50.604**	-7.020	19.382
	(12.759)	(20.726)	(15.056)	(15.407)
LNASSETS	-20.261***	-13.864***	-7.432	5.065**
	(2.668)	(5.113)	(5.037)	(2.302)
FINLEV	61.627***	66.113***	46.513***	15.618
	(12.822)	(13.874)	(17.047)	(16.799)
CURRENT	-4.746***	-1.998	-3.067	0.403
	(1.365)	(1.593)	(2.062)	(2.042)
LNCOVERAGE	-14.815***	-21.510***	-16.374***	-22.021***
	(2.249)	(2.804)	(3.559)	(3.535)
PROFIT	-42.166	-84.924***	-59.004**	-31.492
	(31.330)	(25.627)	(27.558)	(23.354)
MTB	-2.189	-5.329**	-4.313	-1.454
	(1.965)	(2.151)	(2.803)	(2.082)
OPGEAR	-8.755***	-8.578**	-2.116	2.014
	(3.023)	(3.333)	(3.072)	(4.030)
LNLOANSIZE	-6.164***	-9.770***	-13.194***	-13.150***
	(1.666)	(1.807)	(1.849)	(1.905)
LNMAT	0.372	-2.998	14.918***	11.532***
	(2.216)	(2.714)	(2.573)	(2.725)
SECURED	34.689***	45.775***	44.689***	52.036***
	(3.228)	(3.423)	(4.556)	(5.989)
STRICT	8.575**	19.626***	9.853***	11.437**
	(3.681)	(4.320)	(3.803)	(5.065)
REVOLVER	-20.541***	-36.919***	-32.651***	-25.513***
	(2.265)	(2.734)	(2.788)	(3.071)
Constant	403.833***	470.223***	322.745***	337.208***
	(36.153)	(63.926)	(49.738)	(43.507)
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	5,301	5,401	5,402	5,271
Adj R-squared	0.444	0.539	0.617	0.673

Table 5
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	-0.115**	-0.251***	-0.083	-0.030	0.078
	(0.047)	(0.084)	(0.075)	(0.097)	(0.095)
LNASSETS	-0.029***	-0.058***	-0.091***	-0.028	-0.006
	(0.008)	(0.017)	(0.030)	(0.027)	(0.016)
FINLEV	0.256***	0.178**	0.206**	0.294***	0.270***
	(0.044)	(0.073)	(0.083)	(0.080)	(0.100)
CURRENT	0.008	0.013	-0.019*	0.029**	0.022
	(0.006)	(0.008)	(0.010)	(0.012)	(0.014)
LNCOVERAGE	0.019**	-0.009	0.033**	0.035**	0.020
	(0.008)	(0.013)	(0.015)	(0.016)	(0.021)
PROFIT	0.215**	0.459***	0.098	0.126	0.140
	(0.084)	(0.175)	(0.160)	(0.137)	(0.144)
MTB	-0.018**	-0.027**	-0.019	-0.023	-0.018
	(0.007)	(0.012)	(0.012)	(0.015)	(0.015)
OPGEAR	-0.014	0.017	-0.043**	-0.009	-0.017
	(0.012)	(0.018)	(0.021)	(0.022)	(0.029)
LNLOANSIZE	0.056***	0.120***	0.127***	0.075***	-0.058***
	(0.007)	(0.012)	(0.012)	(0.012)	(0.014)
SECURED	0.154***	0.019	0.092***	0.214***	0.348***
	(0.014)	(0.024)	(0.025)	(0.026)	(0.035)
STRICT	0.092***	0.137***	0.134***	0.053**	-0.062**
	(0.013)	(0.023)	(0.023)	(0.023)	(0.029)
REVOLVER	0.247***	-0.133***	0.084***	0.312***	0.617***
	(0.015)	(0.022)	(0.022)	(0.023)	(0.032)
Constant	2.330***	2.406***	2.241***	2.674***	3.825***
	(0.445)	(0.367)	(0.374)	(0.301)	(0.454)
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	21,478	5,325	5,420	5,421	5,312
Adj R-squared	0.227	0.169	0.191	0.329	0.448

Table 6
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	0.567***	0.423*	0.902***	0.433	0.057
	(0.145)	(0.220)	(0.234)	(0.352)	(0.422)
LNASSETS	-0.199***	-0.369***	-0.138*	-0.278***	-0.016
	(0.021)	(0.050)	(0.081)	(0.092)	(0.063)
FINLEV	0.331***	0.282	0.485**	0.401	0.373
	(0.128)	(0.210)	(0.239)	(0.266)	(0.356)
CURRENT	-0.010	-0.046**	0.014	0.040	0.002
	(0.016)	(0.023)	(0.029)	(0.039)	(0.051)
LNCOVERAGE	-0.197***	-0.192***	-0.154***	-0.175***	-0.296***
	(0.024)	(0.034)	(0.044)	(0.060)	(0.088)
PROFIT	-0.286	-0.505	-0.362	0.258	-0.124
	(0.249)	(0.441)	(0.480)	(0.471)	(0.609)
MTB	-0.071***	-0.001	-0.101***	-0.204***	-0.044
	(0.022)	(0.033)	(0.038)	(0.056)	(0.064)
OPGEAR	0.045	-0.045	0.079	0.193***	-0.075
	(0.032)	(0.045)	(0.058)	(0.064)	(0.101)
LNLOANSIZE	-0.115***	-0.074**	-0.114***	-0.012	-0.119***
	(0.017)	(0.029)	(0.030)	(0.034)	(0.037)
LNMAT	0.255***	0.045	0.175***	0.400***	0.575***
	(0.023)	(0.040)	(0.047)	(0.052)	(0.062)
STRICT	0.989***	0.731***	1.091***	1.316***	1.090***
	(0.037)	(0.066)	(0.066)	(0.081)	(0.108)
REVOLVER	-0.108***	-0.042	-0.121***	-0.140***	-0.267***
	(0.025)	(0.042)	(0.044)	(0.052)	(0.061)
Constant	3.414***	5.900***	2.570**	0.574	0.786
	(0.391)	(0.713)	(1.064)	(1.184)	(1.027)
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	21,474	5,318	5,418	5,413	5,279
Pseudo R-squared	0.366	0.218	0.278	0.434	0.483
Chi-squared	3336	689.2	860.5	1126	948.0
Probability > $\chi 2(1)$	0.00	0.00	0.00	0.00	0.00

Table 7
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	0.433***	0.266*	0.334**	0.363**
	(0.168)	(0.154)	(0.157)	(0.155)
LNASSETS	-0.099***	-0.129***	-0.125***	-0.144***
	(0.021)	(0.019)	(0.020)	(0.020)
FINLEV	0.528***	0.233*	0.393***	0.371***
	(0.142)	(0.129)	(0.131)	(0.137)
CURRENT	-0.024	-0.014	-0.039**	-0.034*
	(0.018)	(0.017)	(0.017)	(0.018)
LNCOVERAGE	0.006	-0.040*	0.004	-0.014
	(0.027)	(0.023)	(0.024)	(0.025)
PROFIT	-0.666**	0.050	-0.181	-0.319
	(0.260)	(0.232)	(0.240)	(0.253)
MTB	0.010	-0.013	-0.029	-0.019
	(0.023)	(0.021)	(0.021)	(0.022)
OPGEAR	-0.084***	-0.063**	-0.094***	-0.068**
	(0.033)	(0.031)	(0.031)	(0.032)
LNLOANSIZE	0.159***	0.179***	0.190***	0.184***
	(0.018)	(0.017)	(0.017)	(0.018)
LNMAT	0.251***	0.148***	0.112***	0.081***
	(0.025)	(0.024)	(0.024)	(0.024)
SECURED	0.835***	0.932***	0.835***	0.741***
	(0.039)	(0.039)	(0.037)	(0.038)
REVOLVER	-0.211***	-0.180***	-0.200***	-0.157***
	(0.022)	(0.022)	(0.022)	(0.022)
Constant	-5.462***	-4.132***	-4.386***	-4.965***
	(0.442)	(0.413)	(0.453)	(0.419)
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	20,289	20,657	19,610	19,610
Pseudo R-squared	0.316	0.282	0.245	0.255
Chi-squared	2709	2493	2363	2274
Probability > $\chi 2(1)$	0	0	0	0

Table 8
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	-----	283.389***
	-----	(72.737)
LNASSETS	-0.013***	-3.544***
	(0.001)	(1.067)
FINLEV	-0.020	57.353***
	(0.013)	(5.310)
CURRENT	-0.000	-2.347***
	(0.002)	(0.602)
LNCOVERAGE	0.013***	-21.656***
	(0.002)	(1.185)
OPGEAR	-0.008**	-3.868***
	(0.003)	(1.209)
PROFIT	-0.060**	-51.268***
	(0.029)	(9.114)
MTB	0.011***	-6.566***
	(0.002)	(1.183)
LNLOANSIZE	-----	-13.398***
	-----	(0.644)
LNMAT	-----	6.956***
	-----	(0.997)
SECURED	-----	43.087***
	-----	(1.722)
STRICT	-----	10.359***
	-----	(1.485)
REVOLVER	-----	-26.567***
	-----	(1.269)
Constant	0.146**	450.882***
	(0.060)	(23.557)
Year dummies	NO	YES
Industry dummies	YES	YES
Rating dummies	NO	YES
Loan purpose dummies	NO	YES
Defence expenditure	0.034***	-----
	(0.008)	-----
Observations	21,688	20,830
Adj R2	0.153	0.524
Chi-squared	-----	25409
Probability > $\chi 2(1)$	-----	0.00

Table 9
OLS regression of loan yield spreads on investment flexibility for unrated borrowers
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, for loans made to unrated borrowers. Other determinants include loan characteristics and borrower characteristics. Column (1) to (4) present the results for unrated borrowers, partitioned according to the presence of the following covenants: Excess Cash Flow Sweep, Asset Sales Sweep, Debt Issuance Sweep and Equity Issuance Sweep. Panel A is for loan observations with the restrictive covenant; Panel B is for loan observations without the restrictive covenant. 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)				
Panel A: Loans made to unrated borrowers with key covenant restriction				
	(1)	(2)	(3)	(4)
DEP	5.085	27.943	22.278	32.990*
	(20.020)	(17.028)	(18.469)	(19.303)
Other Controls	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES
Observations	2,579	3,462	3,093	2,959
Adj R-squared	0.564	0.497	0.515	0.520
Panel B: Loans made to unrated borrowers without key covenant restriction				
	(1)	(2)	(3)	(4)
DEP	39.223***	37.645***	37.758***	34.167***
	(12.055)	(12.988)	(12.613)	(12.375)
Other Controls	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Loan purpose dummies	YES	YES	YES	YES
Observations	7,452	6,569	6,938	7,072
Adj R-squared	0.464	0.461	0.467	0.466

Table 10
OLS regression of loan yield spreads on investment flexibility across different mitigating factors
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, for loans made to unrated borrowers. Other determinants include loan characteristics and borrower characteristics. Column (1) to (3) present the results for unrated borrowers, partitioned according to the presence of prior lending relationships, lead bank reputation and average institutional ownership. 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)			
Panel A: Loans with prior relationships (1); lead bank in the top 3 (2); and high percentage of institutional ownership (3)			
	(1)	(2)	(3)
DEP	22.411	5.355	9.544
	(14.626)	(28.654)	(13.036)
Other Controls	YES	YES	YES
Year dummies	YES	YES	YES
Rating dummies	NO	NO	NO
Industry dummies	YES	YES	YES
Loan purpose dummies	YES	YES	YES
Observations	4,218	1,098	5,406
Adj R-squared	0.500	0.524	0.502
Panel B: Loans without prior relationships (1); lead bank not in the top 3 (2); and low percentage of institutional ownership (3)			
	(1)	(2)	(3)
DEP	52.035***	42.048***	67.044***
	(15.041)	(11.635)	(16.541)
Other Controls	YES	YES	YES
Year dummies	YES	YES	YES
Rating dummies	NO	NO	NO
Industry dummies	YES	YES	YES
Loan purpose dummies	YES	YES	YES
Observations	5,268	8,388	4,625
Adj R-squared	0.489	0.494	0.473