Product Market Threats and Financial Contracting: Evidence from Performance-Sensitive Debt*

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Abstract

This paper examines how product market threats shape debt contracting. Bolton and Scharfstein (1990) suggest that while contract terms linked to borrower performance mitigate incentive misalignment between creditors and borrowers, they make a borrower more vulnerable to product market threats, which would decline its performance and make these performance-sensitive terms more likely to become binding. In line with this trade-off between product markets and financial markets, we provide evidence that high product market threats significantly moderate the use of performance sensitive terms in loan contracts, particularly when the benefit of doing so outweighs its cost in exacerbating borrower-creditor incentive conflicts.

Keywords: product market threats, financial contracting, product market fluidity, performance-sensitive debt, performance pricing

JEL: G20, G21, G30, G32, L10, L20

*We would like to thank Huining Cao, Daniel Chi, Brian Coulter, B. Espen Eckbo, Denis Gromb, Gerard Hoberg, Mark Huson, Michael Kisser, Mikko Leppamaki, Artashes Karapetyan, Naveen Khanna, Jianjun Miao, Gordon Phillips, Konrad Raff, Francisco Santos, Xuan Tian, Karin Thorburn, Wei Shi, Toni Whited, Gijsbert Zwart, and presentation participants at the Western Finance Association (Lake Tahoe), CKGSB-SAIF Summer Institute of Finance (Suzhou), China International Conference in Finance (Xiamen), Northern Finance Association (Quebec), Nordic Finance Network Young Scholar Workshop (Copenhagen), and of seminars at Gothenburg, Groningen, Nebraska, NHH, NTNU, Rochester, SUFE, and Texas A&M for comments and suggestions.

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1 Introduction

Information frictions and incentive problems between creditors and borrowers shape debt contracting. Both theoretical and empirical studies find that creditors, such as banks, employ contractual terms that are directly or indirectly linked to borrower performance to mitigate asymmetric information and incentive misalignments between the two parties.[1] Ex ante, these performance-sensitive terms help firms secure financing in the financial market.

In the product market, however, performance-sensitive terms make a firm more vulnerable to rivals' competitive threats. Rivals' threats could lower the firm's operating performance, and a declining performance makes performance-sensitive terms more likely to become binding, increasing the firm's cost of capital and even triggering inefficient liquidation. This intuition is first posited in Fudenberg and Tirole (1986) and Bolton and Scharfstein (1990). In particular, in a theoretical framework, Bolton and Scharfstein (1990) suggest that in the presence of high product market threats, an optimal response of financial contracting is to lower the sensitivity of contractual terms to firm performance. A lowered performance sensitivity reduces the adverse effects that rivals' competitive threats could carry out on a firm, and in turn helps the firm avoid precipitated financial distress and liquidation, benefiting both the firm and investors.

This theoretical prediction points to an important force arising from product markets that shape the design of debt contracting. While the existing empirical literature largely focuses on how information frictions and incentive problems in financial markets affect debt contracts, we study this alternative force from product markets.

We empirically examine the effect of product market threats on performance sensitivity of bank loan contracts, as well as the nuances of this effect based on interactions between product markets and financial markets. Following existing literature (e.g., Manso, Strulovici, and Tchistyi, 2010), we capture the performance sensitivity of bank loans by focusing on a widely used contractual term that makes a borrower more vulnerable to rivals' competitive threats in product markets – interest-increasing performance pricing. Interest-increasing

[1] See, e.g., Smith and Warner (1979), Aghion and Bolton (1992), Dewatripont and Tirole (1994), Rajan and Winton (1995), Jimenez, Salas, and Saurina (2006), Nini, Smith, and Sufi (2009), Roberts and Sufi (2009), Manso, Strulovici, and Tchistyi (2010).

performance pricing automatically raises loan interest rates upon borrowers' declining performance as measured by various financial ratios or debt ratings. In the presence of product market threats that would depress firm performance, performance pricing effectively puts a trigger to raise a borrower's indebtedness, which in turn exacerbates its cost of capital and financial distress (e.g., Hamilton, 2002; Manso, Strulovici, and Tchistyi, 2010).[2]

We measure product market threats a firm faces using product market fluidity, developed by Hoberg, Phillips, and Prabhala (2014). The fluidity measure builds on textual analyses of firms' product descriptions in 10-K filings, and captures changes in other firms' products relative to a firm's own products. The more others move in a firm's product markets, the more instable the firm's product market environment is, and the greater threats the firm faces. As a result, this firm-level measure identifies market threats that arise out of *rivals'* strategic actions in the product space – an important characteristic of product market threats conceptualized in Bolton and Scharfstein (1990). The fluidity measure therefore provides an empirical construct for this concept.

We study 17,819 bank loans borrowed by 4,742 industrial firms between 1997 and 2013. We find that product market threats significantly shape debt contracting. Loan contracts of borrowers facing greater product market threats are less likely to incorporate interest-increasing performance pricing, and use less steep performance pricing terms to make interest rates change less responsive to borrower performance deterioration. This evidence supports Bolton and Scharfstein (1990) and suggests that product market threats decrease the performance sensitivity of loan contracts. The economic magnitude of this effect is substantial, even after controlling for a comprehensive set of firm, loan, and industry characteristics. For instance, a one-standard-deviation increase in product market threats faced by a borrower makes the loan 18% less likely to incorporate an interest-increasing performance pricing term relative to the sample average.

More importantly, we test the nuances of this effect based on the trade-off that lowered contract performance sensitivity faces between product markets and financial markets. As suggested in Bolton and Scharfstein (1990), while lowered performance sensitivity mitigates

[2]As we discuss in detail in Section 2.4, in our sample, the average range of potential interest rate change in an interest-increasing performance pricing term amounts to 52% of the initial rate of a loan contract.

the adverse effects of product market threats, it exacerbates borrower-creditor interest conflicts in financial markets. An optimal contract balances the two forces. The effect of product market threats in lowering contract performance sensitivity should be more pronounced when the benefit of doing so is relatively more important than the cost.

Consistent with this intuition, we first show that product market threats play a more significant role in lowering loan performance sensitivity when incentive problems in financial markets are a less severe concern, so the *cost* of reduced performance sensitivity in exacerbating borrower-creditor conflicts is relatively low. This happens (1) when the borrower has an established relationship with its lenders (e.g., Petersen and Rajan, 1994; Puri, 1996; Boot, 2000; Bharath, Dahiya, Saunders, and Srinivasan, 2011), (2) when a borrower attains abundant pledgeable collateral (e.g., Chan and Thakor, 1987; Boot, Thakor, and Udell, 1991; Jimenez, Salas, and Saurina, 2006), or (3) when the borrower is able to access public debt markets (e.g., Diamond, 1984; Denis and Mihov, 2003); in all cases the creditor tends to face lower information asymmetry and conflicts of interests with the borrower. In contrast, when borrower-creditor incentive problems are more severe, loan contracts are less devoted to reducing performance sensitivity in response to product market threats.

Second, we show that product market threats play a more important role in lowering loan performance sensitivity when they are more detrimental for borrower business, so the *benefit* of mitigating their adverse effects is relatively high. This happens when a firm (1) is in deeper financial distress, and hence is more vulnerable to rivalry threats (e.g., Bhagat, Moyen, and Suh, 2005; Kaplan and Zingales, 1997; Cleary, 1999), or (2) has low research and development (R&D) investment, and hence a low capability of differentiating itself in the face of competitive threats (e.g., Sutton, 1991; Aghion, Bloom, Blundell, Griffith, and Howitt, 2005; Hoberg and Phillips, 2015).

Taken together, these cross-sectional findings point to the evident force in loan contracts that is designated to mitigate the adverse effects of product market threats, particularly when they are relatively more important. We further show that this force is warranted. Product market threats have a material negative impact on firm performance. Firms facing larger product market threats see substantial decline in future profitability, increase in indebtedness, and deterioration in credit quality. These negative developments justify our finding of lowered contract performance sensitivity in the face of high product market threats.

The cross-sectional analyses also help us rule out a few alternative explanations for our findings. For example, one may argue that high product market threats induce firms to improve corporate governance and other managerial monitoring efforts (e.g., Giroud and Mueller, 2011). The resulting increased firm value permits favorable loan contract terms, including less use of interest-increasing performance pricing. Hence, our results may simply reflect (unobservable) managerial monitoring, creating an endogeneity problem. If this is the case, however, the effect of product market threats in lowering performance sensitivity should be stronger when firms have more severe agency problems (e.g., for firms without access to public bond markets) – that is, when the improved governance and monitoring is needed the most (Giroud and Mueller, 2010, 2011). We find the opposite in the cross-sectional analyses. One may also argue that a firm's success in product markets invites rivals to follow the firm's lead, resulting in high product market fluidity. Meanwhile, the firm's success and lucrative prospects make lenders more lax in using interest-increasing performance pricing. However, if product market fluidity simply reflects firms' product market success, then its effect in lowering the use of performance pricing should be concentrated on successful firms in product markets – firms with lower financial distress or higher investment in intellectual capital. This is again opposite to what we find.[3]

Nonetheless, we use an instrumental variable approach to explicitly address the above endogeneity concerns. The instrument we use for a firm's product market threats is based on whether the firm's close rivals have deep pockets, as measured by their cash holdings. We identify a firm's close rivals based on the similarity of products they offer. Existing studies suggest that cash-rich rivals use their deep pockets to finance competitive strategies that challenge a firm's business and product market position (e.g., Fresard, 2010). Hence, if a firm's close rivals are deep-pocketed, it is more likely to face greater market threats. We therefore expect (and verify) that our instrument satisfies the relevance criterion. On the other hand, the cash richness of the firm's rivals is unlikely to be directly related to contract terms, in particular performance pricing, between the firm and its lender, unless through

[3]In addition, this possibility is not supported by Manso, Strulovici, and Tchistyi (2010), who suggest that successful firms should be *more* likely to use interest-increasing performance pricing as a signal of their better quality.

the channel of anticipated product market threats from rivals. Therefore, our instrument reasonably satisfies the exclusion criterion.[4] The instrumental variable analysis confirms our findings.

Although our main analyses focus on performance pricing provisions to capture loan performance sensitivity, our findings have broader implications regarding other aspects of contracting design related to performance sensitivity. For example, one may think of the use of performance pricing as a way to effectively shorten the maturity of debt, in which case the debt rolled over by a borrower will carry varying interest rates dependent on its performance (e.g., Manso, Strulovici, and Tchistyi, 2010). To this extent, our findings imply that product market threats can affect the performance sensitivity of debt contracts through affecting their *effective* maturity. Second, the majority of interest-increasing performance pricing terms are followed by financial covenants, which tend to cover the worst deterioration of performance pricing (e.g., Cai, Mattes, and Steffen, 2012). To this extent, one may think of covenants as a performance-sensitive term linked to borrowers' substantive decline. We therefore expect that product market threats have a similar effect on the design of financial covenants as for performance pricing. Indeed, we find that product market threats lowers the strictness of financial covenants, as measured in Murfin (2012).

We provide a number of additional tests to reinforce our main findings. First, we examine the effect of product market threats on the use of interest-decreasing performance pricing. Unlike interest-increasing performance pricing, interest-decreasing performance pricing lowers borrower interests in case of performance improvement, and hence do not make the borrower more vulnerable to rivals' competitive threats. As such, product market threats should be less relevant in shaping the use of these terms. This is indeed what we find. Second, some studies suggest that firms with highly interdependent investment opportunities with rivals are more likely to face rivalry strategies leading to competitive threats (e.g., Froot, Scharfstein, and Stein, 1993; Haushalter, Klasa, and Maxwell, 2007). We therefore estimate additional specifications where we control for the market threats arising from firms' interdependent investment opportunities. All our previous results remain.

[4]We further employ a host of supplementary tests to enhance the satisfaction of the exclusion criterion and to reinforce our baseline instrumental variable analysis. We discuss these tests in Section 3.3.3.

Related literature

Our findings contribute to several recent studies that explore explanations for the use of performance pricing in bank loans. Manso, Strulovici, and Tchistyi (2010) find that in a setting of asymmetric information, high-quality firms use performance-sensitive debt as a signaling device to distinguish themselves from low-quality firms. A more recent study by Begley (2012) further confirms this intuition. In a setting of moral hazard between banks and borrowers, Asquith, Beatty, and Weber (2005) and Tchistyi (2013) show that banks are more likely to use interest-increasing performance pricing to reduce borrower agency problems. In a setting of conflicts of interest between firm managers and shareholders, Tchistyi, Yermack, and Yun (2011) find that performance pricing provides a channel for managers to increase firms' financial risk and equity volatility, which in turn increases the value of stock options held by management. Performance-sensitive contracts hence enable executives to transfer value to themselves at the expense of shareholders. While these studies focus on incentive conflicts between creditors and borrowers or between management and shareholders – frictions in financial markets, we extend this line of literature by considering how product markets affect the performance sensitivity of debt contracts.

To this end, our paper is related to the broad literature that examines the linkage between product markets and financial markets. This literature investigates how interactions between product markets and financial markets influence firm competitive performance (e.g., Campello, 2003, 2006), corporate governance (e.g., Giroud and Mueller, 2010, 2011), cash holdings (e.g., Haushalter, Klasa, and Maxwell, 2007; Hoberg, Phillips, and Prabhala, 2014), product pricing and exit decisions (e.g., Khanna and Tice, 2005), firm leverage (e.g., MacKay and Phillips, 2005), and cost of financing (e.g., Valta, 2012), among others. We contribute to this literature by focusing on a new aspect – debt contracts, and examine how these interactions shape the design of bank loan contracts.

This contribution adds to the large literature that examines the determinants of various loan contract terms, including maturity, collateral requirement, cost of loans, and ownership structure, among others (e.g., Berger and Udell, 1995; Dennis and Mullineaux, 2000; Jimenez, Salas, and Saurina, 2006; Qian and Strahan, 2007; Sufi, 2007; Ivashina, 2009; Ivashina and Sun, 2011). In this paper, we focus on a widely used, yet less explored contract term –

performance pricing, to examine the performance sensitivity of loan contracts and its relation with product market threats, in the spirit of Bolton and Scharfstein (1990).

Our analyses benefit from recent developments in the literature that employs textual analyses of firms' product descriptions to study the dynamics of firms' product markets and their effects on firm financial policies. For example, Hoberg, Phillips, and Prabhala (2014) show that in the presence of high product market threats, firms become more conservative and hold more cash or cut payouts. Our results indicate that product market threats lead to more conservative debt contracts, as reflected in reduced performance sensitivity. To this extent, our findings echo the intuition in Hoberg, Phillips, and Prabhala (2014), as well as in a few related studies, including Fresard (2010) and Chi and Su (2015).

The rest of the paper proceeds as follows. Section 2 introduces our data sources, sample construction, and descriptive statistics. In Section 3, we report our main empirical analyses, and address potential endogeneity concerns. In Section 4, we provide additional tests to our main analyses. Section 5 concludes.

2 Data, sample construction and summary statistics

2.1 Data of bank loans and performance pricing

We obtain bank loan data from the Reuters Loan Pricing Corporation (LPC) DealScan database. This database contains comprehensive information on loan contracts, including whether a loan contains performance pricing terms and, if so, the detailed pricing grids that designate how interest rates change with changes in borrower performance.[5] In our main analyses, we focus on whether a performance pricing provision is present or not to capture the performance sensitivity of a loan contract. In later tests, we also use the range of interest change in response to borrower performance change to confirm our main results.

DealScan records loan deals at the facility (tranche) level. We focus on tranches of term loans and revolvers, and exclude tranches recorded as other instruments, including leases, notes, bridge loans, and bankers' acceptances. Following existing studies on performance

[5] See Asquith, Beatty, and Weber (2005) for examples of performance pricing provisions in bank loan contracts.

pricing (e.g., Manso, Strulovici, and Tchistyi, 2010), we perform our analyses at the loan level, which may include multiple tranches, and treat each loan as an individual observation. In the majority of cases, all tranches in a loan share the same characteristics. In a few cases otherwise, we take the characteristics of the largest tranche in terms of dollar value as the characteristics of the loan.

2.2 Measuring product market threats

To capture product market threats faced by each firm, we employ the firm's product market fluidity measure, developed by Hoberg, Phillips, and Prabhala (2014). This measure uses a textual analysis of firms' product descriptions in 10-K filings to the Securities and Exchange Commission, and gauges to what extent a firm's rivals change their products relative to the firm's own products at a given point in time. The more rivals move in a firm's product markets, the more instable the firm's product market environment is, and the greater threats the firm faces.

More specifically, the fluidity measure utilizes a product description vocabulary from all public firms' product descriptions to calculate a cosine similarity between the vector identifying a firm's own word usage and the vector identifying the aggregate change in the word usage of other firms. Following the notation in Hoberg, Phillips, and Prabhala (2014), let J_t be a scalar equal to the number of unique words used in all product descriptions in a given year t, $W_{i,t}$ be an ordered Boolean vector, with a length of J_t, identifying which of the J_t words are used by firm i in year t, and $N_{i,t}$ be the normalized $W_{i,t}$ (normalized to unit length). Define $D_{t-1,t}$ as $\mathrm{D}_{t-1,t} = |\sum_j (W_{j,t} - W_{j,t-1})|$, which captures the changes in the overall usage of the word j in year t. Product market fluidity is then calculated as

$$Fluidity_{i,t} = \left\langle N_{i,t} \cdot \frac{D_{t-1,t}}{\|D_{t-1,t}\|} \right\rangle.$$

Mathematically, it is the dot product (cosine similarity) between a firm's own word vector $N_{i,t}$ and the overall change in the word usage identified by vector $D_{t-1,t}$. A higher value of $Fluidity$ suggests that during the period between $t-1$ and t, other firms are adopting or dropping words used in firm i's product description at a higher rate. It therefore indicates higher product market instability and threats faced by firm i.

Hoberg, Phillips, and Prabhala (2014) verify that there is a direct link between product market fluidity and observed competitive threats. In particular, they document that product market fluidity is significantly correlated with the degree to which a firm is threatened by incoming venture-backed or IPO firms that offer competing product lines. Moreover, the information contained in fluidity seems to go beyond that of risk variables, such as volatility of firm performance. Hence, product market fluidity provides a unique perspective regarding the competitive landscape of a firm's product markets, which can play an important role in determining debt contract design.

It is worth noting that a few features of the fluidity measure are important to our context. First, different from the Herfindahl-Hirschman Index (HHI) – a static industry-level measure for concentration, product market fluidity offers a dynamic and firm-specific measure for market threats, which can be more suitably associated with the firm-specific loan contract design that we examine. Throughout our analyses, we control for HHI to take into account potential effects of industry concentration on our results. Second and more importantly, the fluidity measure identifies product market threats that arise out of *rivals'* strategic moves, which is an important characteristic of market threats as conceptualized in Bolton and Scharfstein (1990). Hence, the measure provides an empirical construct for this concept. Lastly, because the fluidity measure identifies product market strategies of other firms, rather than the firm itself, it is reasonably exogenous to the firm's own management decisions, which would be simultaneously correlated with the firm's competitive environment and loan contract terms. In Section 3.3, we more explicitly address other possibilities of endogeneity bias in our results.

2.3 Construction of sample and other variables

To construct our sample, we merge the Dealscan loan sample with quarterly Compustat data for firm accounting information using the link file based on Chava and Roberts (2008). We obtain the product market fluidity measure from Hoberg and Phillips' data library. This measure is available from 1997, one year after the inception of EDGAR, up to year 2013. We exclude loans to utility companies and financial institutions (firms with a two-digit SIC code of 49 and 60-69), because these firms' financial contracting and product market environment might be different from industrial firms. Lastly, we restrict our sample to only include observations with available product market fluidity measures and information on performance pricing. These steps result in a sample of $17,819$ loans, borrowed by $4,742$ industrial firms between 1997 and 2013.

We next construct a number of control variables for our analyses. Specifically, we measure firm size by the natural logarithm of a firm's book value of assets ($\log Assets$). We measure firms' growth opportunities by the market-to-book ratio (*Market-to-Book*), calculated as the sum of the market value of equity and book value of total debt, divided by book value of assets. *CashFlow* is defined as operating income before depreciation divided by total assets. *Leverage* is the ratio of total debt to total assets. Interest Coverage (*InterestCov*) is defined as the ratio of interest expenses to EBITDA. *Tangibility* is the ratio of net PP&E to the value of total book assets. To control for industry concentration, we use the Text-based Network Industry Classifications Herfindahl index as in Hoberg and Phillips (2015), which is calculated using a dynamic industry classification based on each firm's product descriptions from annual 10-K filings. In robustness tests, we also calculate HHI using conventional two-digit and three-digit SIC industry classifications. We find similar results using these alternatives in all analyses.

In terms of loan characteristics controls, we generate the natural logarithm of the deal amount to firm assets ($\log Amount$), the natural logarithm of the loan maturity ($\log Maturity$), an indicator for whether a loan is a secured loan (*Secured*), and an indicator for whether there are financial covenants in a loan (*FinCov*). In addition, we generate dummies for loan purposes. We categorize loan purposes into four groups according to the primary purpose reported in DealScan: General purposes (working capital and general corporate purpose), recapitalization (debt repayment/consolidation, recapitalization, and debtor-in-possession loans), acquisition (general or specific acquisition program and LBO loans), and others. The definitions of all firm and loan characteristics are summarized in Appendix I.

2.4 Summary statistics

Table 1 presents descriptive statistics of the key variables in our analyses. In Panel A, we first report statistics of the dummy variable, *Increasing PP*, indicating whether a loan contract includes an interest-increasing performance pricing provision. Among the 17,819 sample loans, 5,706 (approximately 32%) contain interest-increasing performance pricing.

This ratio is comparable with the one reported in Asquith, Beatty, and Weber (2005), and suggests that interest-increasing performance pricing is a commonly used contractual term in bank loans. In an interest-increasing performance pricing term, the range of potential interest rate change (that is, the difference between the maximum interest rate specified in the performance pricing and the initial interest rate charged at the inception of a loan contract) is on average 47 basis points. This range amounts to approximately 52% (median 33%) of the initial interest rate. It therefore suggests that interest-increasing performance pricing can have a substantial impact on borrowers' interest payments when it becomes binding due to borrowers' declining performance.

The second row of Panel A of Table 1 reports descriptive statistics for *Fluidity*. We multiply the fluidity measure by 100 for convenience. It has a mean (median) of 6.49% (5.81%), with a standard deviation of 3.34%. These statistics are comparable to those in Hoberg, Phillips, and Prabhala (2014). In terms of other firm characteristics, the average asset size of our sample borrowers is 5.7 billion U.S. dollars. The average market-to-book, cash-flow-to-assets, leverage, interest coverage, and tangibility are 1.74, 3%, 31%, 18%, and 32%, respectively. The *HHI* measure is on average 0.24, with a standard deviation of 0.21. In addition, our sample loans have an average amount of 487 million U.S. dollars, and a maturity of approximately 45.4 months. 72% of the loans are secured, and 62% have at least one financial covenant. These variables are similar in magnitudes to those in existing studies.

In Panel B of Table 1, we compare firm and loan characteristics between firms with low product market fluidity (below the sample median) and those with high product market fluidity (above the sample median). Notably, loans of borrowers with high product market fluidity are less likely to have interest-increasing performance pricing than the other group (0.30 versus 0.34). This difference is statistically significant at the 1% level. It is consistent with the prediction in Bolton and Scharfstein (1990) that greater product market threats decrease contract performance sensitivity. This pattern is further confirmed in Table 2, which shows that *Fluidity* and *Increasing PP* exhibit a negative correlation. These patterns provide support for our hypothesis in a univariate setting.

The rest of Panel B of Table 1 shows that firms with high product market fluidity exhibit different characteristics from those with low fluidity. For example, they are larger in size, and have higher growth opportunities, cash flow, and tangibility. They also tend to be in less concentrated industries. Their loans are larger on average, and more likely to be secured. In our following analyses, we control for these different characteristics.

3 The effect of product market threats on loan performance sensitivity

3.1 Baseline analyses

Bolton and Scharfstein (1990) suggest that in the presence of high product market threats, an optimal response of financial contracting is to lower the sensitivity of contractual terms to borrower performance, e.g., through reducing the use of interest-increasing performance pricing in bank loans. This prediction follows the intuition that a reduced use of interest-increasing performance pricing lowers the adverse effects that rivals' competitive threats could carry out on a borrower, which would otherwise depress the borrower's performance and raise the likelihood of performance-sensitive terms becoming binding. As a result, the lowered performance sensitivity helps borrowers avoid precipitated financial distress and inefficient liquidation, benefiting both borrowers and creditors.

To test this prediction, we start by examining the relation between product market fluidity and the use of interest-increasing performance pricing. Specifically, we estimate the following Probit model:

$$\begin{aligned} Pr(\textit{Increasing PP}_{i,t} = 1) = \Phi(\alpha + \beta_1 \cdot Fluidity_{i,t} + \Gamma \cdot \mathbf{X}'_{i,t} \\ + \Omega \cdot \mathbf{Y}'_{i,t-1} + \textit{Fixed Effects}) \end{aligned} \quad (1)$$

The dependent variable, $\textit{Increasing PP}_{i,t}$, equals 1 if a loan i, arranged in year t, has an interesting-increasing performance pricing, and 0 otherwise. $Fluidity_{i,t}$ is product market fluidity of the borrower of loan i in year t. It captures rivals' moves in the borrower's product markets between year $t-1$ and t, and identifies the extent of product market threats faced by the borrower during $t-1$ and t. Following the existing literature, we include two sets of characteristics controls. $\mathbf{X}_{i,t}$ is the set of loan characteristics, and $\mathbf{Y}_{i,t-1}$ is the set of borrower characteristics measured with a one-year lag. Both sets of controls are described in Section 2.3

and Appendix I. All characteristics are windsorized at the 1st and 99th percentiles. In various specifications, we also include year fixed effects and two-digit SIC industry fixed effects to control for potential time trends and industry patterns of product market competitiveness. We cluster standard errors at the firm level following Petersen (2009).

In Equation (1), the key variable of interest is $Fluidity$. We expect it to have a negative coefficient, β_1, which would suggest that loans of borrowers facing higher product market threats are less likely to incorporate interest-increasing performance pricing. Table 3 presents the regression results. We report marginal effects of estimated coefficients evaluated at the mean of each variable. In column (1), we report the most parsimonious specification, and include $Fluidity$ as the only dependent variable. Consistent with our hypothesis, $Fluidity$ is negatively related to the use of interest-increasing performance pricing, indicated by the coefficient -0.015. The effect is statistically significant at the 1% level, with a t-statistic of -3.65.

In columns (2) to (6), we include firm and loan characteristics controls, as well as year and industry fixed effects in the estimations. We consistently find a negative relation between product market fluidity and the use of interest-increasing performance pricing. The economic magnitude of this relation is sizable. For example, based on column (6), a one-standard-deviation increase in $Fluidity$ corresponds to a 5.3 percentage points decrease in the probability of observing interest-increasing performance pricing. In comparison, the average use of interest-increasing performance pricing in our sample is 32%, as shown in Table 1.[6]

Consistent with Manso, Strulovici, and Tchistyi (2010), larger and more established firms (proxied by a high *logAssets* and a low *Market-to-Book*), and firms with high cash flows and low leverage in the past tend to signal their more lucrative prospects by committing to linking interest payments to performance. These firms thus appear to see more frequent use of interest-increasing performance pricing. Consistent with Asquith, Beatty, and Weber (2005), loans with a longer maturity and larger amount, and unsecured loans are associated

[6]Note that column (6) has one fewer observation than columns (4) and (5). This is because the industry fixed effects in column (6) perfectly predict the dependent indicator variable in an industry that includes limited number of borrowers in our sample. Excluding observations in this industry from our analyses does not change the findings.

with more use of performance pricing, due to the potentially higher borrower agency problems that banks are subject to in these cases. Lastly, consistent with Cai, Mattes, and Steffen (2012) who document that interest-increasing performance pricing provisions are typically followed by financial covenants, we find a positive correlation between the occurrence of these two terms.

3.2 Cross-sectional analyses based on the interactions between product markets and financial markets

Bolton and Scharfstein (1990) suggest that lowering performance sensitivity of debt contracts faces a trade-off between product markets and financial markets: It mitigates the adverse effects of product market threats, but exacerbates borrower-creditor interest conflicts in financial markets. An optimal contract balances the two forces. Hence, the effect of product market threats in lowering contract performance sensitivity should not be random or uniform. It should be more pronounced when the benefit of doing so is relatively more important than the cost. We test cross-sectional variation of our findings based on this intuition.

Specifically, we separately consider the cost and benefit of lowered performance sensitivity in loan contracts. We predict that if a firm has less severe incentive problems in financial markets (that is, when the *cost* of reduced performance sensitivity in exacerbating borrower-creditor conflicts is relatively low), then the optimal contract should be more devoted to lowering performance sensitivity and avoiding the adverse effects of product market threats. Similarly, when product market threats are more detrimental for firm business (that is, when the *benefit* of mitigating the impact of these threats is high), then the optimal contract should concern more about lowering performance sensitivity in response to high product market threats.

3.2.1 The severity of incentive conflicts between creditors and borrowers

We start by examining whether the effect of product market threats on loan performance sensitivity varies with the severity of incentive conflicts between creditors and borrowers. We employ a combination of measures to capture the extent of borrower-creditor conflicts. First, we consider whether the borrower of a loan has an established relationship with the lending bank. Borrower-bank relationships alleviate information asymmetry between the two parties and hence result in lower adverse selection and incentive problems (e.g., Petersen and Rajan, 1994; Puri, 1996; Boot, 2000; Bharath, Dahiya, Saunders, and Srinivasan, 2011). For loans of relationship borrowers, we should therefore expect that product market threats have a stronger effect in lowering loan performance sensitivity. We trace each firm's borrowing history and calculate the frequency (i.e., the number of loans) of borrowing from the lead bank of the current loan in the past ten years (denoted as *Relationship*).[7] More frequent borrowing from the same bank indicates a stronger borrower-lender relationship.

Columns (1) to (3) of Table 4 present the analyses. In columns (1) and (2), we first partition our sample into two groups based on whether a firm has a relationship with the lead bank (i.e., *Relationship*>0 versus *Relationship*=0).[8] In all specifications we include, but do not tabulate, the same set of firm and loan characteristics controls as those in Table 3. Columns (1) and (2) suggest that the effect of *Fluidity* on the use of interest-increasing performance pricing is concentrated on loans of relationship borrowers, and is trivial for their counterparts. This contrast is economically sizable. For loans of relationship borrowers, a one-standard-deviation increase in *Fluidity* is associated with 5.7 percentage points decrease in the probability of observing interest-increasing performance pricing, while the magnitude is indistinguishable from zero for the other group. In column (3), we employ the full sample for estimation and augment Equation (1) by including an interaction term between *Fluidity* and *Relationship*. The negative and significant coefficient of this term suggests that the difference in the *Fluidity* effects between columns (1) and (2) is statistically significant.[9]

Interestingly, we find that the stand-alone coefficient of *Relationship* is positive. It suggests that as *Fluidity* converges to zero – that is, conditional on limited product market threats, and frictions in financial markets being the dominant force to consider, firms with lower conflicts of interest are associated with more use of interest-increasing performance pricing. This observation is consistent with Manso, Strulovici, and Tchistyi (2010),

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[7]If a loan is arranged by multiple lead banks, we use the borrowers' borrowing frequency with the most frequently used lead bank as the *Relationship* of the loan.

[8]In our sample, approximately 60% of loans are relationship loans.

[9]Note that the total number of observations in columns (1) and (2) is smaller than that of column (3). This is because compared to the full-sample analysis in column (3), each of the sub-sample analyses in columns (1) and (2) includes fewer borrowers in a given industry, increasing the chance that the combined fixed effects perfectly predict the dependent indicator variable, and hence an observation is dropped.

who predict that in the absence of complete information in financial markets, firms with lower conflicts of interests tend to use more performance pricing to signal their advantage. This positive relation, however, is significantly attenuated when product market threats are brought into consideration. As shown by the negative interaction, when product market threats become more important, loan contracts begin to use less performance pricing, given the same level of borrower-creditor conflicts of interest. This interaction effect points to the essence of Bolton and Scharfstein (1990) that product markets play an important role in determining contract performance sensitivity, beyond the frictions from financial markets.

Next, we consider whether a borrower has abundant pledgeable collateral at the time of borrowing to gauge the extent of borrower-creditor conflicts. Pledgeable collateral represents assets available to creditors when their interests are at risk, which are typically senior and secured. The existing literature shows that collateral helps align incentives between creditors and borrowers (e.g., Chan and Thakor, 1987; Boot, Thakor, and Udell, 1991; Jimenez, Salas, and Saurina, 2006). Hence, firms with ample pledgeable collateral are subject to less severe interest conflicts, and should see a stronger effect of market threats in lowering loan performance sensitivity. Following Roberts (2015), we measure firms' pledgeable collateral as the sum of property, plant, and equipment (PP&E), inventory, cash and equivalents, and receivables, scaled by total book assets.

Columns (4) to (6) of Table 4 present the analyses. Columns (4) and (5) separately examine loans borrowed by firms with a high level of pledgeable collateral (above the sample median) and a low level of pledgeable collateral (below the sample median). Consistent with our prediction, the effect of product market threats in lowering contract performance sensitivity is significant only for high-collateral firms, but indistinguishable from zero for the other group. The economic magnitude of this contrast is again sizeable. For high-collateral firms (column (4)), a one-standard-deviation increase in *Fluidity* corresponds to a 10 percentage points decrease in the probability of observing interest-increasing performance pricing, whereas this magnitude is less than 1 percentage point for low-collateral firms (column (5)). In column (6), we estimate a similar specification as in column (3), now including the interaction term between *Fluidity* and *Collateral*. The coefficient of this term is again negative and statistically significant. As before, the stand-alone coefficient of *Collateral* is positive, suggesting that with limited product market threats, firms with lower incentive problems tend to signal their advantage by using more performance sensitive terms. This effect is then countered by the presence of product market threats, as indicated by the negative interaction term.

Lastly, from a more general perspective, we consider whether a borrower is able to access public bond markets to measure the severity of incentive problems between borrowers and creditors. Firms that have access to public bond markets have lower information asymmetry and incentive problems in general (e.g., Diamond, 1984; Denis and Mihov, 2003; Sufi, 2007). These firms should therefore see a more pronounced relation between product market threats and loan performance sensitivity. Following Faulkender and Petersen (2006), we use whether a borrower has an S&P issuer credit rating to capture whether it has access to public bond markets (denoted as $BondAccess$).

Columns (7) to (9) report the analyses. They confirm our findings in columns (1) to (6): Product market threats play a more significant role in lowering performance sensitivity when firms are able to access bond markets, and hence when there are less severe borrower-creditor incentive problems. This interpretation is supported by both the sub-sample analysis in columns (7) and (8), and the full-sample estimation with the interaction term between $Fluidity$ and $BondAccess$ in column (9).

3.2.2 The extent of adverse effects of product market threats

Next, we examine whether the effect of product market threats on lowering loan performance sensitivity is stronger when borrowers are more prone to the adverse effects of product market threats, so the benefit of lowered performance sensitivity is relatively high. We employ several measures to capture how detrimental product market threats are for borrowers' prospective business.

First, we consider a borrower's financial status to measure its vulnerability to product market threats. Firm experiencing financial distress tend to be constrained in investment and have lower free cash flow and sales growth (e.g., Bhagat, Moyen, and Suh, 2005; Kaplan and Zingales, 1997; Cleary, 1999). These firms are therefore more susceptible to the adverse effects of product market threats. Thus, they should see a stronger effect of product market threats in reducing loan performance sensitivity. We capture the extent of financial distress using Altman's Z-Score. A higher value of *Z-Score* indicates a healthier financial condition, and a lower value indicates a higher degree of financial distress.

Columns (1) to (3) of Table 5 present the analyses. Columns (1) and (2) first report a sub-sample analysis for firms in lower financial distress (i.e., with a *Z-Score* above the sample median) and those in higher financial distress (i.e., with a *Z-Score* below the sample median). As expected, the effect of $Fluidity$ on the use of interest-increasing performance pricing is evident for the latter group, but not for the former. For firms in deeper financial distress, a one-standard-deviation increase in $Fluidity$ corresponds to a 7.3 percentage points decrease in the probability of observing interest-increasing performance pricing, but only 4 percentage points for their counterparts. The interaction term between $Fluidity$ and *Z-Score* in column (3) confirms that the contrast in the $Fluidity$ effects between the two groups is statistically significant.

Second, we consider firms' investments in intellectual capital. Firms that have limited R&D investment are less capable of differentiating themselves from rivals (e.g., Sutton, 1991; Aghion, Bloom, Blundell, Griffith, and Howitt, 2005; Hoberg and Phillips, 2015). These firms are therefore more vulnerable to product market threats, and should see a stronger effect of product market threats in lowering loan performance sensitivity. Following Chan, Lakonishok, and Sougiannis (2001) and Hirshleifer, Hsu, and Li (2013), we capture firms' investment in intellectual capital using R&D capital, calculated as the 5-year cumulative R&D expenses assuming an annual depreciation rate of 20%.[10]

Columns (4) to (6) of Table 5 present the analyses. Because of the recent debates on how to interpret R&D expenses recorded as missing values in standard data sources (e.g., Koh and Reeb, 2015), we drop observations where borrowers have zero R&D capital in a given year, and condition our analyses on borrower-years with positive observed R&D capital. As expected, columns (4) and (5) show that the effect of $Fluidity$ on loan performance sensitivity is stronger for firms with low R&D investment (albeit marginally significant at the 10% level, with a t-statistic of -1.32), compared to firms with high R&D investment. This

[10]Specifically, a firm's R&D capital in year t equals $(RD_t + 0.8 * RD_{t-1} + 0.6 * RD_{t-2} + 0.4 * RD_{t-3} + 0.2 * RD_{t-4})/Sales$, where RD and $Sales$ are this firm's research and development expenses and total sales as reported in Compustat, respectively.

finding is again confirmed in column (6), which shows a negative and significant coefficient for the interaction term between *Fluidity* and *R&D Capital*.

Overall, the cross-sectional analyses corroborate our baseline analyses in Section 3.1, and point to the important role of product market threats in shaping financial contracting, especially when they are relatively more important.

3.3 Addressing endogeneity concerns

3.3.1 The cross-sectional analyses

The cross-sectional analyses in Section 3.2 help us rule out a few alternative explanations for our findings. For example, it is possible that high product market threats induce firms to improve corporate governance and other managerial monitoring effort (e.g., Giroud and Mueller, 2011). The resulting lower agency problems and higher firm value in turn permit favorable contract terms from creditors, including the reduced use of interest-increasing performance pricing. Hence, our results may simply reflect the improved managerial monitoring (unobservable to econometricians), creating an endogeneity problem. If this is the case, however, the effect of product market threats in lowering loan performance sensitivity should be stronger for firms with more severe agency problems, e.g., smaller firms without access to public bond markets, because this is the case when better managerial monitoring is needed the most in solving agency problems (e.g., Giroud and Mueller, 2010, 2011). We instead find the opposite in the cross-sectional analyses (Table 4).

It is also possible that a firm may undergo notable success in the product market. The success invites rivals to follow the firm's lead and create similar product portfolios, generating high product market fluidity. Meanwhile, the firm's success makes lenders more comfortable in using lax loan terms, such as less performance pricing, due to the firm's lucrative prospects and lower likelihood of financial distress. However, if market fluidity merely reflects firms' product market success, then its effect in lowering the use of interest-increasing performance pricing should be concentrated on successful firms in product markets – firms with lower financial distress and more R&D investment. This is again opposite to what we find (Table 5). In addition, this concern is not supported by Manso, Strulovici, and Tchistyi (2010), who suggest that successful firms (firms with more lucrative prospects) should be *more* likely to use performance pricing so that they can signal their high quality.

3.3.2 Instrumental variable analyses – baseline results

In addition to the cross-sectional analyses, we explicitly address the endogeneity concerns using an instrumental variable analysis. The instrument we use for a firm's product market threats is based on whether the firm's close rivals have a deep pocket, measured by their cash holdings. Fresard (2010) document that cash-rich rivals take advantage of their deep pockets to finance competitive strategies that challenge a firm's future business and gain market share. Hence, if a firm's close rivals are deep-pocketed, the firm is more likely to face high product market threats. This intuition ensures that our instrument satisfies the relevance criterion.

On the other hand, because our instrument is based on the cash richness of a firm's rivals, rather than the firm itself, it is unlikely to have a direct relation with contract terms between the firm and its lender – in particular performance pricing, unless through the channel of product market threats. For example, it is reasonable to believe that a bank is not likely to consider cash holdings of a borrower's rivals, and accordingly determine the use of performance pricing for this borrower, unless through anticipated product market threats that would affect the borrower's ability to repay. It is also reasonable to argue that rivals' cash holdings affect cash policies of a firm itself, which would further affect the firm's loan contract terms, largely through anticipated market threats brought forth by its deep-pocketed rivals. See Chevalier and Scharfstein (1996) and Leary and Roberts (2014) for a similar argument regarding peer influence on firm capital structure decisions. Therefore, our instrument reasonably satisfies the exclusion criterion. In Section 3.3.3, we further consider several possibilities in which the satisfaction of the exclusion criterion argued here might be violated. There we provide robustness tests to exclude these possibilities and confirm the results of the baseline instrumental variable analysis.

To construct the instrument, we first select each firm's 10 closest rivals at the time of borrowing, based on the similarity of their products. The product similarity measure is from Hoberg and Phillips (2010, 2015). It identifies to what extent two firms use similar words to describe their products based on 10-K filings. At each point in time, if the words used by two firms' product descriptions have a large overlap, then the two firms are considered as having a high product similarity and as close rivals.[11]

After selecting each borrower's 10 closest rivals, we calculate these rivals' collective cash holdings, divided by their collective book value of assets, as the overall cash richness of the borrower's close rivals. This variable is used as our instrument. A higher value of the instrument indicates that rivals have a deeper pocket, and hence is associated with greater product market threats faced by the borrower. Alternatively, we also calculate each of the 10 rival's cash holdings scaled by its total assets respectively, and then take the mean of the 10 individual cash-holdings-to-asset ratios as the instrument. We only report results based on the collective cash-richness instrument. We find similar results using the alternative approach.

Table 6 presents the results of the baseline instrumental variable analysis. Columns (1) to (3) report the first-stage regressions, which correspond to specifications in the second-stage regressions in columns (4) to (6), respectively. In the first stage, we regress *Fluidity* on *Rival Cash Richness* (i.e., the instrument), as well as all other control variables used in the second stage. In all first-stage regressions, our instrument is positively and significantly correlated with product market fluidity, as expected. The coefficients of the instrument are significant at the 1% level. The F-statistics of the first-stage regressions range from 81 to 134. Therefore, our instrument is unlikely to be a weak instrument. The coefficient estimates in the second stage are hence likely unbiased and the inferences based on them are reasonably valid.

In the second stage, we repeat our analyses in Table 3, but replace the key independent variable with instrumented *Fluidity*. Its coefficients remain negative and significant at the 1% level in all specifications. The economic magnitudes of the effects are comparable to (and often larger than) the ones in Table 3. Overall, the baseline instrumental variable analyses confirm the effect of product market threats in shaping performance sensitivity of loan contracts.

[11] In unreported results, we also use the five and 50 closest rivals to construct our instrument. We find qualitatively similar results.

3.3.3 Instrumental variable analyses – further considerations of the exclusion criterion

Previously we have argued that in general, rivals' cash holdings are unlikely to affect contract terms between a borrower and its bank directly, or influence cash holdings of the borrower itself (which further affects its loan contracts), unless through the channel of product market threats. We now consider a few specific possibilities in which these arguments might be violated.

First, one may argue that a borrower and its close rivals might happen to borrow from the same bank. In this case, the bank may learn the borrower's credit quality through observing rivals' financial information (e.g., their cash holdings), which would in turn affect loan terms with the borrower (e.g., the use of performance pricing), without through the channel of product market threats. This case then violates the exclusion criterion.

To rule out this possibility, we apply an additional criterion when selecting a borrower's close rivals. We require that neither of the borrower's top 10 rivals has presently or historically (during the past five years) shared the same bank that arranges the borrower's current loan. Intuitively, this additional criterion forces the rivals to be unrelated with the borrower's current lending bank, and makes it unlike that the bank learns from these rivals and accordingly determines loan terms with the borrower. This criterion thus reinforces our instrument to satisfy the exclusion criterion.

The results of this analysis is presented in columns (1) to (3) in Panel B of Table 6, which correspond to the three specifications of the second-stage regressions in columns (4) to (6) in Panel A of Table 6. In unreported analyses, we verify that the instrument is highly correlated with $Fluidity$ in all first-stage specifications. The additional criterion reduces our sample size by approximately 75%. Nevertheless, we find results that are consistent with the baseline instrumental variable analyses, and they show comparable economic magnitudes (albeit that the coefficient of the instrumented $Fluidity$ in column (3) becomes marginally significant at the 10% level, with a t-statistic of -1.27).

Second, one may also argue that a borrower could learn from its peers and set financial policies similar to theirs. In this case, rivals' cash holdings might be directly correlated with the borrower's, which is in turn linked to the its loan terms, without through the channel of product market threats.

To rule out this possibility, we repeat our baseline instrumental variable analyses in a sub-sample in which a borrower has historically exhibited minimal co-movement with its close rivals in terms of cash holdings. Intuitively, this sub-sample diminishes the possibility of peer learning by imposing a low correlation among firms' observed cash holdings. It therefore reinforces the validity of our instrument.

For each loan in our sample, we calculate the absolute value of the correlation between a borrower's cash holdings and each of its closest 10 rivals' during the past five years. We then take the average correlation across the 10 rivals as the borrower's overall cash-holding co-movement with its close rivals. We form a distribution based on this co-movement for all sample loans, and keep the ones that fall into the lowest 25th percentile. In this sub-sample, the cash-holding co-movement between a borrower and its rivals is on average 3%, and is economically trivial. Columns (5) and (7) in Panel B of Table 6 report the second-stage regressions of instrumental variable analyses in this sub-sample. Our findings remain, with comparable economic magnitudes as those in Panel A of Table 6.

3.3.4 Reverse causality

Although the fluidity measure we employ identifies product market threats arising out of all other firms' strategic moves relative to a borrower, and hence captures the borrower's overall competitive environment, it is possible that part of these threats are induced by the presence of performance pricing. That is, anticipating that a declining performance could increase the borrower's cost of capital through binding interest-increasing performance pricing, rivals might adopt certain competitive strategies to make it happen. In this case, part of the product market threats we identify is caused by the use of performance pricing, engendering a reverse causality.

This reverse causality, however, would work against finding our results. If the use of performance-sensitive terms induces other firms to strategically impose high product market threats, then we should observe a positive correlation between product market fluidity and the use of interest-increasing performance pricing. This is opposite to the negative relation we document, and would hence strengthen the economic magnitude of our findings.

3.4 The range of interest change in performance pricing

Besides considering the presence of interest-increasing performance pricing to measure loan performance sensitivity, we use an alternative variable that captures the range of potential interests change due to borrowers' performance change. Specifically, we follow Asquith, Beatty, and Weber (2005) and Manso, Strulovici, and Tchistyi (2010), and calculate the difference between the maximum interest rate specified in a performance pricing term and the interest rate charged at the inception of a loan contract. This measure captures the maximal interest increase that can be set off by a firm's weakening performance. A higher range makes a firm more vulnerable to product market threats. Hence, in the face of higher market fluidity, we expect that loan contracts have a smaller range of interests change in performance pricing.

Table 7 reports regression results using this alternative measure as the dependent variable. It has a positive value for loans with an interest-increasing performance pricing term, and is zero for loans that do not have interest-increasing performance pricing. Because it is bounded by zero, we estimate a Tobit model. Columns (1) and (2) report baseline specifications corresponding to columns (5) and (6) in Table 3. Column (3) reports the second-stage regression of the instrumental variable analysis, corresponding to column (6) of Table 6 Panel A. Columns (4) to (13) report cross-sectional analyses based on the severity of incentive conflicts and the extent of adverse effects of market threats on firm business, as in Table 4 and Table 5.

The results in Table 7 corroborate our previous findings. First, in the baseline analyses, product market fluidity has a significant effect in lowering the range of potential interests change in performance pricing, and hence, the performance sensitivity of a loan contract. According to column (2), a one-standard-deviation increase in *Fluidity* is associated with a 12.3-basis-point decrease in the range of interests change, representing 26% of the sample mean. Second, this effect is confirmed using an instrumental variable analysis, assuring a causal relation. Third, this effect is particularly strong when the incentive problems between creditors and borrowers are a less important concern (columns (4) to (9)), and when market threats have a more detrimental impact on borrowers' business (columns (10) to (13)). These cross-sectional findings are indicated by the mostly significant coefficients of the interaction terms associated with *Fluidity*. They are consistent with the trade-off framework in Bolton and Scharfstein (1990) based on interactions between product markets and financial markets.

3.5 The real effects of product market threats on firm performance

Our results so far document a notable force in loan contracts that is designated to mitigate the adverse effect of product market threats faced by borrowers. Is this force warranted? That is, does high product market fluidity indeed lead to a materialized decline in borrowers' future performance? We answer this question by examining the real effects of product market threats.

Specifically, we analyze whether high product market fluidity is associated with deterioration in firm future performance. We consider three aspects of performance: profitability, indebtedness, and credit worthiness. These aspects constitute the most common specifications in performance pricing terms (e.g., Asquith, Beatty, and Weber, 2005). Therefore, they represent the most relevant aspects to uncover whether product market fluidity warrants the moderated use of performance pricing.

We measure firm profitability using return on assets, and indebtedness using the total amount of debt to total assets. We use firms' S&P issuer credit ratings to measure firm credit worthiness. Following the existing literature, we convert credit ratings to numerical numbers, and let a AAA rating equal 1, a AA+ rating equal 2, and so forth. Hence, a higher number indicates a higher probability of default and lower credit quality. For each firm-year, we calculate the change in these variables in the next one, two, and three years, respectively. We then estimate the following regression specification:

$$Change_{i,t} = \beta_0 + \beta_1 \cdot Fluidity_{i,t} + \Omega \ \cdot \mathbf{Y}'_{i,t-1} + Fixed\ Effects + \epsilon_{i,t}. \quad (2)$$

Different from Equation (1) that is estimated at the loan level, Equation (2) is estimated using panel data that consist of all firm-years of firms that have borrowed a loan during our sample period between 1997 and 2013. This equation therefore examines the real effects of product market threats from a more general perspective. $Change_{i,t}$ is the one-, two-, or three-year change in one of the three performance measures, for each firm i in year t. $\mathbf{Y}_{i,t-1}$ is the set of firm characteristics, measured with a one-year lag. In all specifications, we include year fixed effects, two-digit SIC industry fixed effects, and S&P credit rating fixed effects. The coefficients of interest are again the coefficients of *Fluidity*, which captures whether product market fluidity is associated with material changes in firm future performance. As before, we windsorize all control variables at the 1st and 99th percentiles, and cluster standard errors at the firm level.

Table 8 reports the results. Firms with higher product market fluidity see significant decline in profitability, increase in indebtedness, and deterioration in credit worthiness. The economic magnitudes of these effects are substantial. Taking the one-year horizon as an example, a one-standard-deviation increase in *Fluidity* responds to a decrease in profitability that amounts to 30% of the sample mean, an increase in indebtedness that amounts to 30% of the sample mean, and 0.2 notch downgrades in credit ratings (i.e., a one-notch downgrade for one out of five firms).[12] Importantly, the economic magnitudes are persistent in longer horizons, suggesting that the effect of *Fluidity* on performance is not reverted immediately.

Overall, product market threats appear to have real effects on firm future performance. These real effects warrant the force to mitigate the adverse effects of product market threats in debt contracting, and justify the lowered performance sensitivity in response to market threats.

4 Additional and robustness analyses

4.1 Interest-decreasing performance pricing

In this subsection, we consider the effect of product market threats on the use of interest-decreasing performance pricing in loan contracts. Different from interest-increasing performance pricing that would raise borrowers' interest payments, interest-decreasing performance pricing offers borrowers an option to lower interests in case of performance improvement, and hence does not make them more vulnerable to rivals' competitive threats. As such, product market fluidity should be less relevant in shaping the use of these terms.

Table 9 examines this intuition. In column (1), we first perform a baseline analysis

[12] A one-notch downgrade is a downgrade from, e.g., AA to AA-.

similar to Equation (1), but replace the dependent variable with an indicator for whether there is an interest-decreasing performance provision in a loan contract. This column shows that the effect of product market threats is trivial, both statistically and economically. A one-standard-deviation increase in $Fluidity$ is associated with 1.6 percentage points decrease in the probability of observing interest-decreasing performance pricing, representing only about 4% of the average use in our sample.

In columns (2) to (5), we perform cross-sectional analyses similar to those in Tables 4 and 5. To conserve space, we only report analyses using the borrower-bank relationship to represent the severity of interest conflicts between borrowers and creditors, and analyses using borrowers' financial conditions to represent to what extent product market threats adversely affect borrower business. We find similar results using other measures. These columns show that the influence of market threats on the use of interest-decreasing performance pricing is not significant in any specifications, either statistically or economically.

In column (6), we employ the alternative measure that captures the range of potential interest decline in interest-decreasing performance pricing. We calculate the difference between the interest rate charged at the inception of a loan and the minimum interest rate specified in performance pricing. This variable is positive for loans with an interest-decreasing performance pricing term, and is zero otherwise. We estimate a Tobit model and find that product market threats do not seem to moderate the range of interests change.

4.2 Interdependence of firms' investment opportunities

Some studies suggest that if a firm has large interdependent investment opportunities with industry rivals, it is more likely to face rivalry strategies that lead to competitive threats (e.g., Froot, Scharfstein, and Stein, 1993; Haushalter, Klasa, and Maxwell, 2007). We therefore examine to what extent our results are driven by the market threats arising from firms' interdependent investment opportunities.

Specifically, we repeat our previous analyses, now including the level of interdependence of firm investment opportunities with industry rivals as additional controls. Following Haushalter, Klasa, and Maxwell (2007), we measure the interdependence of investment opportunities using a firm's industry stock beta ($IndBeta$). Specifically, we regress each firm's monthly stock returns on the monthly CRSP equal-weighted market returns, as well as the monthly equal-weighted returns of the firm's industry classified by two-digit SIC codes, in the period between 1997 and 2013. Industry stock beta is then defined as the regression coefficient of the industry returns.[13]

Table 10 reports the results. Column (1) presents the baseline analysis corresponding to column (6) of Table 3. Column (2) presents the instrumental variable analysis corresponding to column (6) of Table 6 Panel A. In columns (3) to (6), we report cross-sectional analyses that resembles those in Table 4 and Table 5, now including $IndBeta$ and its interactions with the severity of borrower-creditor conflicts of interests (represented by borrower-bank relationships) and the extent of the adverse effects of market threats (represented by the extent of financial distress).[14]

In most specifications, we find that the coefficients of $IndBeta$ (and the associated interaction terms) have the same signs as those of $Fluidity$, a result that is in line with Bolton and Scharfstein (1990). Importantly, the effect of $Fluidity$ in reducing loan performance sensitivity remains significant, and has a similar economic magnitude as in Table 3. Like before, this effect is more pronounced when borrower-creditor incentive problems are more severe, and when product market threats have a more detrimental impact on firm future business. These results confirm that our findings are not driven by the market threats arising from firms' interdependent investment opportunities.

4.3 Strictness of financial covenants

Existing studies, including Cai, Mattes, and Steffen (2012), document that the majority of interest-increasing performance pricing is followed by financial covenants, which are in place to cover the worst deterioration in borrower performance. To this extent, financial covenants can be viewed as a performance sensitive term written upon substantive changes in borrower performance. As such, we expect that product market threats have a similarly effect on the design of financial covenants as for interest-increasing performance pricing.

To examine this intuition, we calculate the strictness of financial covenants in each

[13]We require that a firm has CRSP return data for at least 24 months to perform this regression.

[14]Using other measures as in Table 4 and Table 5 generates qualitatively similar results.

loan contract following the methodology in Murfin (2012).[15] This measure captures the distance of a borrower's financial ratios at loan origination to the thresholds specified in the corresponding covenants. It measures the ex-ante probability that a borrower will violate loan covenants, taking into account the correlation and interaction of various covenant terms in the same contract. The larger the value is, the stricter the set of covenants is, and the more likely a borrower's declining performance will trigger covenant violation. Therefore, we expect that product market threats lower the strictness of covenants.

We regress covenant strictness on product market fluidity following similar specifications as in the previous analyses.[16] Because the covenant strictness measure is bounded by zero (indicating no financial covenants in a contract), we estimate a Tobit model. The results are reported in Table 11. Columns (1) and (2) present a baseline test and an instrumental variable analysis. The negative coefficients on $Fluidity$ (and instrumented $Fluidity$) suggest that product market threats lowers the strictness of financial covenants. These results, however, appear to be weaker than those for interest-increasing performance pricing. It implies that product market threats tend to have a limited role in compromising contract terms that are designated to protect creditors' interests when borrowers experience substantive deterioration and technical default.

In columns (3) to (6), we analyze cross-sectional effects of product market threats on covenant strictness, as those in Table 4 and Table 5. Similar to Table 10, we use borrower-bank relationships to represent the severity of conflicts of interest, and the extent of financial distress to represent how much negative impact market threats would have for firm future business. The variables of interest are the interaction terms associated with $Fluidity$. We observe consistent, albeit slightly weaker, results as those in Table 4 and Table 5. Taken together, these results lend further support to the effect of product market threats in shaping contract performance sensitivity, as well as the nuances of this effect based on interactions between product markets and financial markets.

[15]We thank Justin Murfin for generously sharing his source codes for calculating the strictness measure.

[16]In these specifications, however, we do not include $FinCov$ (the indicator for whether a loan contract has financial covenants) as a control variable because it is highly correlated with covenant strictness. Instead, we include indicator variables for the types of financial covenants following Murfin (2012), which are based on the financial ratios used in a covenant term, such as EBITA-to-Debt ratio, Leverage ratio, etc.

5 Conclusion

In this paper, we examine whether and how product market threats shape financial contracting. Our analyses build on the theoretical framework of Bolton and Scharfstein (1990), who document that in order to mitigate the adverse effects of product market threats for a borrower, an optimal response of financial contracting is to lower the sensitivity of contractual terms to borrower performance.

We focus on a widely used performance-sensitive term in bank loan contracts, interest-increasing performance pricing, which make a firm more vulnerable to rivals' competitive threats. We capture product market threats faced by a firm using the firm's product market fluidity, which identifies the firm's product market instability and threats arising out of rivals' moves in the product space. We find strong empirical support for the predictions in Bolton and Scharfstein (1990). Loan contracts of firms facing greater product market threats have significantly lower performance sensitivity: They are less likely to incorporate interest-increasing performance pricing, and use less steep performance pricing terms to make interest rates change less responsive to firm performance decline.

Furthermore, we find that the effect of product market threats in shaping loan performance sensitivity varies with the severity of incentive conflicts between borrowers and creditors, as well as borrowers' vulnerability to product market threats. The effect is more pronounced when borrower-creditor incentive problems are less severe, and when product market threats are more detrimental for borrower business. These results point to the trade-off that lowered performance sensitivity faces between product markets and financial markets, as suggested in Bolton and Scharfstein (1990). That is, while lowered contract sensitivity mitigates the adverse effects of product market threats, it exacerbates interest conflicts between creditors and borrowers in financial markets; the effect of product market threats on performance sensitivity varies with these two forces depending on their relative importance.

Overall, our findings show that product markets play an important role in shaping debt contracting. While existing studies find that information frictions in financial markets affect the design of debt contracts, we extend this line of research by considering how product markets, and the interactions between product markets and financial markets, affect financial contracting.

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Appendix I: Variable Definitions

Variable	Definition
Increasing PP	Dummy variable that equals one if a loan contract incorporates an interest-increasing performance pricing term, and zero otherwise.
Fluidity	A measure of product market instability and threats faced by a firm, constructed by Hoberg, Phillips, and Prabhala (2014) based on firm product descriptions in 10-K filings. It measures the cosine similarity between the vector identifying a firm's own word usage and a vector identifying the aggregate change in the word usage of other firms. Let J_t be a scalar equal to the number of unique words used in all product descriptions in a given year t, $W_{i,t}$ be an ordered Boolean vector, with a length of J_t, identifying which words are used by firm i in a given year t, and $N_{i,t}$ be the normalized $W_{i,t}$ (to unit length). Product market fluidity is defined as $Fluidity_{i,t} = \left\langle N_{i,t} \cdot \frac{D_{t-1,t}}{\|D_{t-1,t}\|} \right\rangle$, where $D_{t-1,t}$ is defined as $D_{t-1,t} = \lvert \sum_i (W_{i,t} - W_{i,t-1}) \rvert$.
logAssets	The natural logarithm of total assets measured in million U.S. dollars, i.e., $log(atq)$.
Market-to-Book	The market-to-book ratio, i.e., $(atq - (atq - ltq + txditcq) + (prccq * cshoq))/atq$.
Leverage	Total liabilities scaled by total assets, i.e., $(dlcq + dlttq)/atq$.
CashFlow	EBITDA scaled by total assets, i.e., $oibdpq/atq$.
Tangibility	PP&E (property, plant, and equipment) scaled by total assets, i.e. $ppentq/atq$.
InterestCvg	Interest coverage, defined as interest expenses over EBITDA, i.e., $xintq/oibdpq$.
HHI	Text-based Network Industry Classifications Herfindahl index as in Hoberg and Phillips (2015), calculated using a dynamic industry classification based on each firm's product descriptions from annual 10-K filings. See Hoberg and Phillips (2015) for more details.
Relationship	The number of loans a borrower of a given loan has borrowed from the same lead bank that arranged this loan in the past ten years. If a loan is arranged by multiple lead banks, we use the borrower's borrowing frequency with the most frequent lead lender as the *Relationship* of the loan.

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Variable	**Definition**
Collateral	A borrower's pledgable collateral at the time of borrowing, defined as the sum of PP&E (property, plant, and equipment), inventory, cash and equivalents, and receivables, scaled by total book assets, i.e., $(ppentq + invtq + cheq + rectq)/atq$.
Access to Bond	A dummy variable that equals 1 if a firm has an outstanding S&P issuer credit rating during a certain year, and 0 otherwise.
Z-Score	Altman's Z-Score calculated as *1.2*Working Capital/Total Assets + 1.4*Retained Earnings/Total Assets + 3.3*Earnings Before Interest & Tax/Total Assets + 0.6*Market Value of Equity/Total Liabilities +1.0*Sales/Total Assets.*
R&D Capital	The 5-year cumulative R&D expenses, scaled by sales, assuming an annual depreciation rate of 20%. A firm's R&D capital in year t equals $(RD_t + 0.8 * RD_{t-1} + 0.6 * RD_{t-2} + 0.4 * RD_{t-3} + 0.2 * RD_{t-4})/Sales$, where RD and $Sales$ are a firm's research and development expenses and total sales as reported in Compustat.
logMaturity	The natural logarithm of the loan maturity measured in months.
logDealAmount	The natural logarithm of the loan amount scaled by firm total assets.
Secured	Dummy variable that equals 1 if a loan is secured, and zero otherwise.
FinCov	Dummy variable that equals 1 if a loan has financial covenants, and zero otherwise.
Industry Beta	We regress each firm's monthly stock returns on the monthly CRSP equal-weighted market returns as well as the monthly equal-weighted returns of all firms in the firm's industry, as classified by the 2-digit SIC codes. The firm's industry beta is defined as the coefficient of the industry returns.
Covenant Strictness	The strictness of financial covenants in a loan contract, calculated following Murfin (2012).

Table 1: Summary Statistics

This table presents the loan-level summary statistics for the sample of 17,819 loans borrowed by 4,742 industrial firms between 1997 and 2013. Panel A reports statistics for all sample loans, and Panel B reports statistics for loans borrowed by firms that have low market fluidity (below the sample median) and high market fluidity (above the sample median), respectively. Descriptions of each variable are in Appendix I. In Panel B, The statistical significance testing the difference of the means between the two sub-samples is denoted by ***, **, and * to indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: All Loans

Variable	Obs.	Mean	p25	p50	p75	S.D.
Increasing PP	17,819	0.32	0	0	1	0.47
Fluidity	17,819	6.49	4.06	5.81	8.28	3.34
Assets	17,819	5,667	231	849	3,231	20,529
Market-to-book	15,808	1.74	1.07	1.39	1.95	1.21
CashFlow	16,614	0.03	0.02	0.03	0.05	0.04
Leverage	17,090	0.31	0.15	0.29	0.43	0.21
InterestCvg	15,061	0.18	0.05	0.13	0.27	0.50
Tangibility	17,719	0.32	0.12	0.25	0.46	0.24
HHI	17,816	0.24	0.09	0.16	0.30	0.21
Loan Amount	17,446	487	50	175	500	1,126
Maturity	16,830	45.38	26	48	60	24.45
Secured	12,336	0.72	0	1	1	0.45
FinCov	17,819	0.62	0	1	1	0.49

Panel B: Low v.s. High-Fluidity Borrowers

	Low-Fluidity Borrowers			High-Fluidity Borrowers			Diff.
Variable	Obs.	Mean	S.D.	Obs.	Mean	S.D.	
Increasing PP	8,915	0.34	0.47	8,904	0.30	0.46	-0.03***
Assets	8,915	4,696	16,482	8,904	6,645	23,874	1,977***
Market-to-book	7,656	1.61	0.97	8,152	1.86	1.40	0.25***
CashFlow	8,245	0.03	0.03	8,369	0.03	0.05	0.01***
Leverage	8,575	0.30	0.19	8,515	0.31	0.22	0.01***
InterestCvg	7,633	0.18	0.46	7,428	0.19	0.54	0.01
Tangibility	8,873	0.28	0.20	8,846	0.35	0.28	0.07***
HHI	8,915	0.28	0.22	8,904	0.19	0.18	-0.09***
Loan Amount	8,732	445	976	8,714	528	1,257	85.8***
Maturity	8,434	45.05	23.07	8,396	45.71	25.77	0.68*
Secured	5,976	0.67	0.47	6,360	0.77	0.42	0.10***
FinCov	8,915	0.62	0.49	8,904	0.62	0.49	-0.00

Table 2: Pairwise Correlations between the Main Variables

This table reports the pairwise correlations of key variables from the sample of 17,819 loans borrowed by 4,742 industrial firms between 1997 and 2013. Descriptions of each variable are in Appendix I.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Increasing PP											
(2) Fluidity	-0.0369										
(3) Assets	-0.0131	0.0813									
(4) Market-to-book	-0.0175	0.1056	-0.0457								
(5) CashFlow	0.1203	-0.1424	0.0218	0.0966							
(6) Leverage	-0.0536	0.0835	-0.0028	-0.1508	-0.0287						
(7) Tangibility	0.0069	0.1669	-0.0015	-0.1310	0.0999	0.2380					
(8) HHI	-0.0193	-0.2749	-0.0346	-0.0310	0.0050	-0.0181	-0.1878				
(9) Maturity	0.1069	0.0338	-0.0323	-0.0727	0.0964	0.1892	0.0739	-0.0047			
(10) DealAmount	0.0750	0.0775	0.5145	-0.0235	0.0585	0.0739	0.0283	-0.0553	0.0631		
(11) Secured	-0.2778	0.1202	-0.1894	-0.0781	-0.1741	0.1515	0.0087	0.0382	0.0751	-0.2007	
(12) FinCov	0.4257	-0.0049	-0.1470	-0.0055	0.0570	-0.0412	-0.0219	0.0368	0.0829	-0.0652	-0.0643

Table 3: Baseline Analyses of the Effect of Product Market Threats on the Use of Interest-Increasing Performance Pricing

This table presents Probit regressions to examine the effect of product market threats on the use of interest-increasing performance pricing in bank loan contracts. Marginal effects of estimated coefficients evaluated at the mean of each variable are reported. The dependent variable is a dummy variable that equals 1 if a loan contract incorporates interest-increasing performance, and 0 otherwise. *Fluidity* measures product market threats faced by a firm, and is developed by Hoberg, Phillips, and Prabhala (2014) based on a textual analysis of firms' product descriptions in 10-K filings to capture changes in other firms' products relative to the firm's own products. Detailed descriptions for *Fluidity*, as well as for other dependent variables are in Appendix I. *Loan Purpose FE* are indicator variables for the four loan purposes: acquisition, recapitalization, general purpose, and others, as classified in the DealScan database. Year and two-digit SIC industry fixed effects are denoted as *Year FE* and *Industry FE*, respectively. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Fluidity	-0.015***	-0.008*	-0.020***	-0.019***	-0.021***	-0.016**
	(-3.65)	(-1.66)	(-3.63)	(-3.55)	(-3.62)	(-2.29)
logAssets		0.089***	0.242***	0.243***	0.247***	0.252***
		(8.81)	(18.29)	(18.21)	(17.01)	(16.80)
Market-to-Book		-0.039***	-0.009	-0.007	-0.007	0.003
		(-2.67)	(-0.54)	(-0.45)	(-0.40)	(0.19)
CashFlow		4.837***	2.988***	3.229***	3.315***	3.298***
		(8.92)	(4.91)	(5.31)	(5.37)	(5.42)
Leverage		-0.419***	-0.575***	-0.557***	-0.596***	-0.504***
		(-5.53)	(-6.26)	(-5.97)	(-6.28)	(-5.20)
InterestCvg		-0.036	-0.014	-0.010	-0.007	-0.009
		(-1.40)	(-0.44)	(-0.33)	(-0.21)	(-0.29)
Tangibility		-0.107*	-0.062	-0.077	-0.067	-0.129
		(-1.69)	(-0.85)	(-1.04)	(-0.89)	(-1.14)
HHI		-0.071	-0.111	-0.136	-0.172**	-0.149*
		(-0.93)	(-1.31)	(-1.59)	(-1.97)	(-1.66)
logMaturity			0.188***	0.185***	0.207***	0.238***
			(6.56)	(6.40)	(6.92)	(7.76)
logDealAmount			0.222***	0.250***	0.264***	0.251***
			(9.80)	(10.79)	(11.14)	(10.42)
Secured			-0.493***	-0.487***	-0.519***	-0.526***
			(-11.38)	(-11.13)	(-11.56)	(-11.57)
FinCov			1.062***	1.059***	1.025***	1.064***
			(19.08)	(19.13)	(18.23)	(19.10)
Loan Purpose FE	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes
Industry FE	No	No	No	No	No	Yes
N	17,819	11,853	7,938	7,938	7,938	7,937
pseudo R^2	0.001	0.028	0.181	0.185	0.198	0.210

Table 4: Cross-sectional Analyses Based on the Severity of Incentive Conflicts between Borrowers and Creditors

This table presents Probit regressions to examine cross-sectional variation in the effect of product market threats on the use of interest-increasing performance pricing in bank loan contracts, based on the severity of incentive conflicts between borrowers and creditors. Marginal effects of estimated coefficients are reported. The dependent variable is a dummy variable that equals 1 if a loan contract incorporates interest-increasing performance, and 0 otherwise. Columns (1) to (3) consider whether a borrower of loan has an established relationship with the lead bank of the current loan during the past ten years. Column (4) consists of loans whose borrowers have a relationship with the lead bank of the current loan, and column (5) consists of loans whose borrowers do not have a relationship with the lead bank of the current loan. Column (6) consists of the full sample, and includes an interaction term between *Fluidity* and *Relationship*, where *Relationship* is defined in Appendix I. Columns (4) to (6) consider whether a borrower has abundant pledgeable collateral at the time of borrowing. Column (4) consists of borrowers whose pledgeable collateral at the time of borrowing is above the sample median, and column (5) consists of borrowers whose pledgeable collateral at the time of borrowing is below the sample median. A borrower's pledgeable collateral is defined in Appendix I. Column (6) consists of the full sample, and includes an interaction term between *Fluidity* and *Collateral*. Columns (7) to (9) consider whether a borrower is able to access to public debt markets. Column (7) consists of borrowers that have an S&P issuer credit rating at the time of borrowing, and column (8) consists of borrowers that do not have an S&P issuer credit rating at the time of borrowing. Column (9) consists of the full sample, and includes an interaction term between *Fluidity* and *BondAccess*, where *BondAccess* is defined in Appendix I. *Loan Purpose FE* are indicator variables for the four loan purposes: acquisition, recapitalization, general purpose, and others, as classified in the DealScan database. Year and two-digit SIC industry fixed effects are denoted as *Year FE* and *Industry FE*, respectively. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Lending Relationship		Full	Collateral		Full	Access to Public Debt		Full
	With	Without		High	Low		With	Without	
Fluidity	-0.017**	-0.009	-0.006	-0.031***	-0.001	0.045**	-0.017*	-0.009	-0.002
	(-1.98)	(-0.82)	(-0.72)	(-3.28)	(-0.05)	(2.34)	(-1.72)	(-0.82)	(-0.18)
Fluidity * Relationship			-0.005**						
			(-2.23)						
Relationship			0.039**						
			(2.11)						
Fluidity * Collateral						-0.088***			
						(-3.50)			
Collateral						0.359*			
						(1.70)			
Fluidity * Bond Access									-0.024**
									(-2.23)
Bond Access									0.199**
									(2.38)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,564	3,237	7,802	3,845	3,836	7,695	3,584	4,070	7,663
pseudo R^2	0.200	0.228	0.210	0.237	0.204	0.212	0.202	0.229	0.210

Table 5: Cross-sectional Analyses Based on the Extent of Adverse Effects of Product Market Threats on Firm Business

This table presents Probit regressions to examine cross-sectional variation in the effect of product market threats on the use of interest-increasing performance pricing in bank loan contracts, based on the extent of adverse effects of product market threats on firms' future business. Marginal effects of estimated coefficients are reported. The dependent variable is a dummy variable that equals 1 if a loan contract incorporates interest-increasing performance, and 0 otherwise. Columns (1) to (3) consider whether a firm is in financial distress, as measured by Altman's Z-score. Column (1) consists of borrowers that have a *Z-Score* below the sample median at the time of borrowing, and column (2) consists of borrowers that have a *Z-Score* above the sample median at the time of borrowing. *Z-Score* is defined in Appendix I. Column (3) consists of the full sample, and includes an interaction term between *Fluidity* and *Z-Score*. Columns (4) to (6) consider whether a borrower has large investments in R&D capital, where R&D capital is defined in Appendix I. Only borrower-years with positive observed R&D capital are included in the estimation. Column (4) consists of borrowers with R&D capital above the sample median at the time of borrowing, and column (5) consists of borrowers with R&D capital below the sample median at the time of borrowing. Column (6) consists of the full sample, and includes an interaction term between *Fluidity* and *R&D Capital*. Loan Purpose FE are indicator variables for the four loan purposes: acquisition, recapitalization, general purpose, and others, as classified in the DealScan database. Year and two-digit SIC industry fixed effects are denoted as Year FE and Industry FE, respectively. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Z-Score		Full	R&D Capital		Full
	High	Low		High	Low	
Fluidity	-0.012	-0.022**	-0.022***	-0.006	-0.025	-0.018
	(-1.13)	(-2.23)	(-2.87)	(-0.33)	(-1.32)	(-1.41)
Fluidity ∗ Z-Score			0.003*			
			(1.81)			
Z-Score			-0.010			
			(-0.72)			
Fluidity ∗ R&D Capital						0.097***
						(3.76)
R&D Capital						-1.447***
						(-3.65)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3,750	3,747	7,503	1,272	1,266	2,548
pseudo R^2	0.228	0.191	0.209	0.311	0.233	0.265

Table 6: Instrumental Variable Analyses

This table presents Probit instrumental variable regressions. Marginal effects of estimated coefficients are reported. We instrument *Fluidity* using the collective cash holdings of a borrower's ten closest rivals, divided by the collective book value of assets of these 10 rivals (*Rival Cash Richness*). A borrower's 10 closest rivals are the 10 firms that have highest product similarity with the borrower at the time of borrowing, where product similarity is obtained from Hoberg and Phillips (2010, 2015), which measures the cosine similarity between two firms' product descriptions in their 10-K filings. Panel A reports the baseline instrumental variable analysis. Columns (1) to (3) report the first-stage regressions. In the first stage, the dependent variable is *Fluidity*, and the independent variables include the instrument, as well as the same control variables as in the corresponding second-stage regressions. The first-stage F-statistics are reported at the bottom of each column. Columns (4) to (6) report the second-stage regressions. In the second stage, the dependent variable is a dummy variable that equals 1 if a loan contract incorporates interest-increasing performance, and 0 otherwise. The independent variables include the instrumented *Fluidity*, predicted using the first-stage regression estimates, as well as the same set of control variables as in Table 3. The second-stage *Wald Chi-squared* and its p-values are reported at the bottom of each column. Panel B reports two sets of sub-sample instrumental variable analyses. Only second-stage regressions are reported. Columns (1) to (3) include observations in which neither of a sample loan borrower's closest 10 rivals has presently or historically (during the past five years) shared the same bank that arranges this borrower's current loan. Columns (4) to (6) include observations in which a sample loan borrower's cash-holding co-movement with its closest 10 rivals' fall into the lowest 25th percentile. To calculate a borrower's cash-holding co-movement with the closest 10 rivals', we first calculate the absolute value of the correlation between a borrower's cash holdings and each of the closest 10 rivals' during the past five years, and then take the average correlation across the 10 rivals. In both panels, standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

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Panel A: Baseline analyses

	(1)	(2)	(3)	(4)	(5)	(6)
	First Stage			Second Stage		
Y-variable	Fluidity			Increasing PP		
Rival Cash Richness	4.755***	4.733***	4.697***			
	(11.52)	(11.59)	(12.20)			
Instrumented Fluidity				-0.102***	-0.112***	-0.088**
				(-3.35)	(-3.70)	(-2.55)
logAssets	0.310***	0.252***	0.221***	0.258***	0.257***	0.262***
	(7.64)	(5.56)	(6.31)	(19.18)	(17.58)	(17.30)
Market-to-Book	0.448***	0.459***	0.309***	0.038	0.045*	0.031
	(10.82)	(10.93)	(8.93)	(1.63)	(1.85)	(1.43)
CashFlow	-10.696***	-10.238***	-8.963***	2.158***	2.165***	2.535***
	(-8.02)	(-7.72)	(-7.94)	(2.89)	(2.89)	(3.51)
Leverage	0.768***	0.906***	0.343	-0.490***	-0.505***	-0.482***
	(2.59)	(3.07)	(1.49)	(-5.03)	(-5.00)	(-4.89)
InterestCvg	-0.082	-0.065	-0.033	-0.017	-0.012	-0.011
	(-0.99)	(-0.80)	(-0.50)	(-0.56)	(-0.41)	(-0.36)
Tangibility	2.684***	2.668***	0.790***	0.103	0.132	-0.085
	(1.03)	(1.32)	(-0.74)	(9.81)	(10.02)	(2.77)
HHI	-3.739***	-3.865***	-2.750***	-0.457***	-0.540***	-0.363***
	(-17.02)	(-17.46)	(-13.43)	(-3.12)	(-3.60)	(-2.69)
logMaturity	-0.018	-0.014	-0.054	0.179***	0.198***	0.230***
	(-0.25)	(-0.19)	(-0.90)	(6.10)	(6.55)	(7.41)
logDealAmount	0.018	-0.006	-0.046	0.239***	0.248***	0.241***
	(0.31)	(-0.11)	(-0.95)	(9.85)	(9.84)	(9.61)
Secured	1.289***	1.223***	0.874***	-0.356***	-0.379***	-0.448***
	(10.66)	(10.09)	(8.90)	(-5.19)	(-5.51)	(-7.40)
FinCov	0.163	0.211**	-0.011	1.036***	1.003***	1.044***
	(1.53)	(1.97)	(-0.12)	(17.92)	(17.21)	(18.07)
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes
N	7,936	7,936	7,936	7,936	7,936	7,936
First Stage *F*-Stat.	134.40	85.27	80.98			
Second Stage Wald χ^2				1,476.7	1,582.4	1,690.5
p-value of χ^2				0.00	0.00	0.00

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Panel B: Further considerations of the exclusion criterion

	(1)	(2)	(3)	(4)	(5)	(6)
	Unrelated Lenders			Low Cash-Holding Co-movement		
Instrumented Fluidity	-0.099**	-0.121***	-0.068	-0.174***	-0.203***	-0.165**
	(-2.34)	(-2.87)	(-1.27)	(-3.15)	(-3.71)	(-2.34)
logAssets	0.258***	0.258***	0.265***	0.247***	0.243***	0.268***
	(11.87)	(11.51)	(10.76)	(10.04)	(8.05)	(9.57)
Market-to-Book	0.063*	0.071**	0.052	0.085	0.110**	0.059
	(1.89)	(2.10)	(1.59)	(1.56)	(1.96)	(1.15)
CashFlow	3.679***	3.569***	4.515***	2.262	2.240	3.075**
	(2.96)	(2.79)	(3.53)	(1.56)	(1.48)	(2.15)
Leverage	-0.497***	-0.458***	-0.507***	-0.390*	-0.358	-0.574***
	(-3.40)	(-3.04)	(-3.44)	(-1.89)	(-1.54)	(-2.86)
InterestCvg	0.033	0.034	0.028	-0.082	-0.088*	-0.056
	(0.82)	(0.82)	(0.63)	(-1.60)	(-1.71)	(-1.01)
Tangibility	0.087	0.138	-0.377**	0.214	0.246	-0.199
	(0.57)	(0.90)	(-1.96)	(1.18)	(1.37)	(-0.90)
HHI	-0.593***	-0.697***	-0.426**	-0.482*	-0.683**	-0.371
	(-2.94)	(-3.43)	(-2.11)	(-1.66)	(-2.23)	(-1.19)
logMaturity	0.146***	0.141***	0.213***	0.186***	0.212***	0.233***
	(3.06)	(2.94)	(4.01)	(3.63)	(3.80)	(3.92)
logDealAmount	0.232***	0.230***	0.231***	0.197***	0.195***	0.220***
	(6.01)	(5.84)	(5.73)	(3.59)	(3.27)	(3.80)
Security	-0.420***	-0.425***	-0.518***	-0.098	-0.095	-0.227*
	(-3.74)	(-3.80)	(-4.76)	(-0.70)	(-0.66)	(-1.73)
FinCov	1.059***	1.030***	1.103***	0.824***	0.768***	0.865***
	(11.16)	(10.82)	(11.95)	(6.29)	(5.86)	(6.89)
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes
N	2,859	2,859	2,857	1,967	1,967	1,952
First Stage F-Stat.	51.05	32.81	30.32	34.34	23.27	22.73
Second Stage Wald χ^2	529.10	602.03	827.25	416.03	499.72	491.47
p-value of χ^2	0.00	0.00	0.00	0.00	0.00	0.00

Table 7: Analyses using the Range of Potential Interests Change in Interest-Increasing Performance Pricing

This table presents Tobit regressions to examine the effect of product market threats on the range of potential interest change of interest-increasing performance pricing in bank loan contracts. The dependent variable is the difference between the maximum interest rates as specified in an interest-increasing performance pricing term and the interest rates charged at the inception of a loan contract. It is positive for loans with interest-increasing performance pricing, and 0 for loans that do not have interest-increasing performance pricing. Columns (1) and (2) report baseline analyses, and correspond to columns (5) and (6) in Table 3. Column (3) reports instrumental variable analyses, and corresponds to column (6) in Panel A of Table 6. Columns (4) to (9) report cross-sectional analyses based on the severity of incentive conflicts between creditors and borrowers as measured in Table 4. Columns (10) to (13) report cross-sectional analyses based on the extent of adverse effects of product market threats on firms' business as measured in Table 5. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
				Relationship		Collateral		Bond Access		Z-Score		R&D Capital	
Fluidity	-0.047***	-0.036**		-0.022	-0.016	0.056	0.133***	0.001	-0.002	-0.058***	-0.046**	-0.027	-0.041
	(-3.16)	(-2.01)		(-1.10)	(-0.71)	(1.22)	(2.72)	(0.06)	(-0.07)	(-3.27)	(-2.19)	(-1.00)	(-1.31)
Instrumented Fluidity			-0.278***										
			(-2.73)										
Fluidity∗Relationship				-0.012**	-0.011*								
				(-2.07)	(-1.79)								
Relationship				0.094**	0.062								
				(2.09)	(1.39)								
Fluidity∗Collateral						-0.146**	-0.248***						
						(-2.34)	(-3.76)						
Collateral						1.298**	1.081*						
						(2.48)	(1.93)						
Fluidity∗Bond Access								-0.081***	-0.058**				
								(-2.72)	(-1.98)				
Bond Access								0.462**	0.413*				
								(2.04)	(1.85)				
Fluidity∗Z-Score										0.004	0.005		
										(1.17)	(1.17)		
Z-Score										0.022	0.010		
										(0.57)	(0.24)		
Fluidity∗R&D Capital												0.228***	0.229***
												(3.23)	(3.19)
R&D Capital												-3.573***	-3.553***
												(-3.50)	(-3.32)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	7,937	7,937	7,937	7,804	7,804	7,697	7,697	7,530	7,530	7,505	7,505	2,570	2,570
pseudo R^2	0.076	0.089		0.076	0.089	0.076	0.090	0.075	0.088	0.077	0.089	0.099	0.113

Table 8: Analyses of the Real Effects of Product Market Threats on Firm Future Performance

This table report ordinary least squared regressions to examine the real effects of product market fluidity on firm future performance. The sample consists of all firm-years of firms that have borrowed a bank loan during our sample period between 1997 and 2013. In columns (1) to (3), the dependent variable is the change in borrower profitability (measured as return to assets) in the next one, two, and three years, respectively. In columns (4) to (6), the dependent variable is the change in borrower indebtedness (measured as the total book value of debt to total assets) in the next one, two, and three years, respectively. In columns (7) to (9), the dependent variable is the change in borrower S&P issuer credit ratings in the next one, two, and three years, respectively. S&P issuer credit ratings are converted to numerical values such that AAA=1, AA+=2, AA=3, AA-=4, and so forth. *Fluidity* measures product market threats faced by a firm, and is developed by Hoberg, Phillps, and Prabhala (2014) based on a textual analysis of firms' product descriptions in 10-K filings to capture changes in other firms' products relative to the firm's own products. Detailed descriptions for the *Fluidity*, as well as for all other dependent variables are in Appendix I. Year and two-digit SIC industry fixed effects are denoted as *Year FE* and *Industry FE*, respectively. Rating FE are indicators for each of S&P issuer rating category. Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Change in Profitability			Change in Indebtedness			Change in Credit Ratings		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
Fluidity	-0.001***	-0.001***	-0.001**	0.001***	0.001**	0.002*	0.005**	0.008**	0.006
	(-4.11)	(-2.76)	(-2.04)	(3.00)	(2.26)	(1.95)	(2.28)	(2.36)	(1.23)
logAssets	-0.001	-0.003***	-0.004***	-0.002**	-0.001	0.001	-0.046***	-0.080***	-0.102***
	(-1.45)	(-3.36)	(-3.05)	(-2.03)	(-0.48)	(0.56)	(-7.48)	(-7.35)	(-6.74)
Market-to-Book	0.006***	0.006***	0.005**	-0.002	-0.001	-0.003	-0.042***	-0.067***	-0.068***
	(2.91)	(2.62)	(2.40)	(-0.80)	(-0.40)	(-0.73)	(-5.81)	(-5.73)	(-4.83)
CashFlow	-0.300***	-0.537***	-0.614***	-0.053**	-0.018	0.030	-1.185***	-1.630***	-1.925***
	(-7.65)	(-18.85)	(-23.21)	(-2.09)	(-0.52)	(0.78)	(-9.85)	(-9.28)	(-8.75)
Leverage	0.035***	0.055***	0.051***	-0.102***	-0.202***	-0.284***	0.438***	0.508***	0.461***
	(5.90)	(7.21)	(5.22)	(-12.76)	(-14.91)	(-15.36)	(9.98)	(8.04)	(5.36)
InterestCvg	0.000	-0.005**	-0.004	-0.002	-0.007	-0.005	-0.005	0.006	0.065
	(0.13)	(-2.20)	(-1.43)	(-0.62)	(-1.48)	(-0.94)	(-0.24)	(0.19)	(1.55)
Tangibility	0.007	0.024***	0.028***	0.020***	0.027**	0.036**	0.086**	0.059	0.030
	(1.63)	(3.83)	(3.45)	(3.22)	(2.52)	(2.49)	(2.10)	(0.88)	(0.32)
HHI	0.006**	0.009**	0.011*	0.001	0.004	0.011	0.009	0.023	-0.048
	(2.04)	(1.97)	(1.86)	(0.26)	(0.52)	(0.99)	(0.28)	(0.44)	(-0.65)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	10,921	10,148	8,998	10,922	10,146	8,995	10,549	9,305	8,155
adj. R^2	0.141	0.287	0.331	0.075	0.124	0.175	0.089	0.121	0.131

Table 9: Analyses of the Effect of Product Market Threats on the Use of Interest-Decreasing Performance Pricing

This table presents the analyses of the effect of product market threats on the use of interest-decreasing performance pricing in bank loan contracts. In columns (1) to (5), the dependent variable is a dummy variable that equals 1 if a loan contract incorporates an interest-decreasing performance term, and zero otherwise. Marginal effects of estimated coefficients are reported. Column (1) reports baseline analyses, and corresponds to column (6) in Table 3. Columns (2) and (3) report cross-sectional analyses based on the severity of incentive conflicts between creditors and borrowers, and correspond to columns (1) and (2) in Table 4, respectively. Columns (4) and (5) report cross-sectional analyses based on the extent of adverse effects of product market threats on firm business, and correspond to columns (1) to (2) in Table 5, respectively. Column (6) presents the Tobit regression, and the dependent variable is the range of potential interest change in interest-decreasing performance pricing, calculated as the difference between the interest rates charged at the inception of a loan contract and the minimum interest rates as specified in the interest-decreasing performance pricing. It is positive for loans with interest-decreasing performance pricing, and equals zero for loans that do not have an interest-decreasing performance pricing. This column corresponds to column (2) of Table 7. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Dummy	Relationship		Z-Score		Interest Range
		With	Without	Low	High	
Fluidity	-0.005	-0.008	0.003	-0.011	0.002	-0.004
	(-0.72)	(-0.88)	(0.31)	(-1.03)	(0.18)	(-0.27)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	7,937	4,558	3,233	3,740	3,740	7,941
pseudo R^2	0.240	0.237	0.254	0.270	0.239	0.094

Table 10: Analyses of the Interdependence of Firm Investment Opportunities

This table examines the effects of the market threats arising from firms' interdependent investment opportunities with industry rivals.It presents specifications analogous to those in Table 3 to 6, now including the measure for the interdependence of firm investment opportunities, as well as its interaction with proxies for the severity of conflicts of interest and for the extent of adverse effects of market threats, as additional control variables. The interdependence of the firm investment opportunities with industry rivals is measured using a firm's industry stock beta. The detailed definition of industry stock beta is in Appendix I. The dependent variable is a dummy variable that equals 1 if a loan contract incorporates an interest-decreasing performance term, and zero otherwise. Marginal effects of estimated coefficients are reported. Columns (1) and (2) report the baseline analysis and the instrumental variable analysis, corresponding to column (6) of Table 3 and column (6) of Panel A of Table 6, respectively. Columns (3) and (4) report cross-sectional analyses based on the severity of incentive conflicts between creditors and borrowers, and correspond to columns (1) and (2) in Table 4, respectively. Columns (5) and (6) report cross-sectional analyses based on the extent of adverse effects of product market threats on firms' business, and correspond to columns (1) to (2) in Table 5, respectively. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Full	IV	Relationship		Z-Score	
Fluidity	-0.015**		-0.009	-0.006	-0.026***	-0.022***
	(-2.24)		(-1.33)	(-0.77)	(-4.06)	(-2.87)
Instrumented Fluidity		-0.080**				
		(-2.10)				
IndBeta	-0.094***	-0.074**	-0.078**	-0.087**	-0.071**	-0.090***
	(-3.06)	(-2.36)	(-2.12)	(-2.31)	(-2.07)	(-2.60)
Fluidity ∗ Relationship			-0.005**	-0.005**		
			(-2.28)	(-2.04)		
IndBeta ∗ Relationship			-0.008	-0.005		
			(-0.51)	(-0.33)		
Relationship			0.053**	0.042*		
			(2.50)	(1.83)		
Fluidity ∗ Z-Score					0.003*	0.003**
					(1.94)	(1.99)
IndBeta ∗ Z-Score					-0.005	-0.003
					(-0.69)	(-0.39)
Z-Score					-0.003	-0.012
					(-0.22)	(-0.76)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose FE	Yes	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	No	Yes	No	Yes
Industry FE	Yes	Yes	No	Yes	No	Yes
N	7,644	7,642	7,510	7,509	7,215	7,214
pseudo R^2	0.197		0.168	0.197	0.167	0.196

Table 11: Analyses of the Strictness of Financial Covenants

This table reports Tobit regressions to examine the effect of product market threats on the strictness of financial covenants. The dependent variable is the strictness of financial covenants. It is measured following Murfin (2012), which captures the probability that a borrower might violate loan covenants ex ante. The dependent variable is zero if there are no financial covenants in a loan contract. Columns (1) and (2) report the baseline analyses and the instrumental variable analysis, corresponding to column (6) of Table 3 and column (6) of Panel A of Table 6, respectively. Columns (3) and (4) report cross-sectional analyses based on the severity of incentive conflicts between creditors and borrowers, and correspond to columns (1) and (2) in Table 4, respectively. Columns (5) and (6) report cross-sectional analyses based on the extent of adverse effects of product market threats on firms' business, and correspond to columns (1) to (2) in Table 5, respectively. *Covenant Type FE* are indicator variables for the types of financial covenants following Murfin (2012), based on the financial ratios used in a covenant term, such as EBITA-to-Debt ratio, Leverage ratio, etc. Other variables are defined the same way as in Table 3 to 6. The pseudo R^2 is calculated as McFadden's (adjusted) R^2 from McFadden (1974). Standard errors are clustered at the firm level and corrected for heteroskedasticity. t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Full	IV	Relationship		Z-Score	
Fluidity	-0.200*		0.155	-0.151	-0.231	-0.365***
	(-1.85)		(1.01)	(-1.17)	(-1.44)	(-2.74)
Instrumented Fluidity		-1.367**				
		(-2.08)				
Fluidity ∗ Relationship			-0.112**	-0.028		
			(-2.15)	(-0.86)		
Relationship			1.280***	0.474*		
			(3.24)	(1.83)		
Fluidity ∗ Z-Score					0.090**	0.071**
					(2.45)	(2.25)
Z-Score					-1.193***	-1.736***
					(-3.35)	(-5.78)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Covenant Type FE	Yes	Yes	No	Yes	No	Yes
Loan Purpose FE	Yes	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	No	Yes	No	Yes
Industry FE	Yes	Yes	No	Yes	No	Yes
N	5,945	5,944	5,843	5,843	5,637	5,637
pseudo R^2	0.118		0.011	0.117	0.012	0.121