Product Market Competition and Debt Choice[♣]

Sabri Boubaker
South Champagne Business School, France
IRG, Université Paris Est, Créteil, France
sabri.boubaker@get-mail.fr

Walid Saffar
School of Accounting and Finance,
The Hong Kong Polytechnic University, Hong Kong
walid.saffar@polyu.edu.hk

Syrine Sassi
South Champagne Business School, France
IRG, Université Paris Est Créteil, France
syrine.sassi@get-mail.fr

Abstract

Motivated by prior research on the informational and monitoring role of product market competition, we examine how competitive pressure affects firms' choice between bank debt and public debt. Using a sample of 3,675 U.S. firms over the period 2001–2013, we find that competitive pressure from the product market leads firms to rely less on bank debt financing. In a natural experiment setting, we also find that there is a significant decrease in firm reliance on bank debt after large import tariff reductions. In additional analyses, we show that the effect of competitive pressure on debt choice is more pronounced for firms with greater exposure to competition, higher financial constraints, and weaker governance practices. Moreover, we find that product market competition is associated with long-term maturity debt. Taken together, our study generates the important insight that external governance pressure from the product market acts as an alternate governance mechanism for bank debt monitoring.

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1. Introduction

Since debt has become the major source of external funds for U.S. firms, researchers place great emphasis on firms' debt composition, confirming that firms use multiple types of debt to fill their external financing needs (Rauh and Sufi, 2010; Colla et al., 2013).[1] More importantly, several papers focus on how cross-sectional heterogeneity determines the choice between public and private debt, showing the role of firm-level informational asymmetries and governance quality. First, with respect to information asymmetry, prior studies show that lower information quality is associated with greater reliance on less information-sensitive debt instruments, such as private debt (Krishnaswami et al., 1999; Hadlock and James, 2002), highlighting the comparative advantage of private lenders in alleviating information problems. Second, with respect to corporate governance quality, the existing evidence suggests that, when governance mechanisms are flawed, the resulting agency problems significantly affect the need for the monitoring benefits of private lenders, thus driving the optimal choice between private and public debt (Houston and James, 1996; Lin et al., 2013). While most prior research delves deeply into the understanding of firm-level determinants of debt composition, little attention has been paid to the effects of industry dynamics.[2] We aim to fill this gap in the literature by shedding new light on a much less studied factor, namely, product market competition.

Our paper is based largely upon advances gleaned from prior research on the effect of competition on firm information asymmetry and corporate governance quality. In particular, there are two competing theoretical views contributing to the debate on the implications of product market competition. First, according to the proprietary cost theory developed by Verrecchia (1983), competition exacerbates informational asymmetries, since it is considered a deterring force against transparency. The rationale is that firms operating in more competitive industries avoid revealing their private information to rivals as a way to protect their competitive advantage (e.g., Verrecchia and Weber, 2006; Dedman and Lennox, 2009). Indeed, any information conveyed to the public might be observed by competitors, which in turn creates

[1] According to recent statistics reported by the Federal Reserve, corporate debt issues are far more commonly used than equity issues. Indeed, the statistics indicate that, during the period from 2006 to 2013, U.S. firms have raised approximately $12.3 trillion of new external capital, with debt issues accounting for, on average, 89.4% of all public funds raised.

[2] Prominent examples of debt choice determinants include firm growth opportunities (e.g., Houston and James, 1996), credit quality (e.g., Denis and Mihov, 2003), corporate ownership structure (e.g., Lin et al., 2013; Boubaker et al., 2017), and accrual quality (e.g., Garcia-Teruel et al., 2014), among others.

incentives for them to strategically use it against the disclosing firm. For example, Verrecchia and Weber (2006) find that, when industry competition intensifies, firms redact proprietary information from their material contract filings so as to limit the flow of information to the public. Similarly, Bagnoli and Watts (2010) show that competition leads firms to mislead their rivals by biasing their financial reports in an attempt to maintain their competitive position.[3]

Second, product market competition has been shown to act as an external disciplinary mechanism that prevents managers from pursuing their private goals. Hart (1983) theoretically demonstrates that competition exerts pressure on managers to reduce slack, thus improving governance quality and alleviating agency problems arising from the divergence between manager and shareholder interests. The rationale behind this finding is that since firms in competitive industries share a large proportion of their industry-wide profits with rivals, they have less ability to realize high earnings, which increases their bankruptcy risk.[4] Hence, competition leaves managers with less opportunity to divert profits for their own use, leading them to operate efficiently in the best interests of shareholders.[5] In this vein, Shleifer and Vishny (1997, p. 738) point out that *"[…]product market competition is probably the most powerful force towards economic efficiency in the world."* Similarly, empirical evidence supports the disciplinary force of competition. For instance, Dyck and Zingales (2004) highlight the effectiveness of competition in curtailing the consumption of private benefits of control and Baggs and Bettingies (2007) show that competition is effective in mitigating agency conflicts. Our objective is to expand these arguments to the possibility that competitive pressure influences debt choice through its impact on firm information asymmetry and governance quality.

Based on previous studies on product market competition and financial contracting research, we face two competing views on the relation between competitive pressure and debt choice. According to the *first view*, competitive pressure is positively related to bank debt

[3] Bagnoli and Watts (2010) explain that, in anticipation of rivals' attention paid to the revealed financial information, firms facing higher competition are inclined to manage downward their production costs to expose their rivals to a competitive disadvantage.

[4] In contrast, firms with strong market power are better able to pass on idiosyncratic shocks to their customers, which is consistent with the Hicks (1935) hypothesis that *"[t]he best of all monopoly profits is a quiet life."*

[5] Schmidt (1997) sheds lights on managerial career concerns that increase manager willingness to expend more effort to reduce the likelihood of firm liquidation and retain their jobs. Holmström (1982) also posits that competition improves managerial incentives by providing shareholders with more information that might be used as a benchmark for relative performance evaluation.

reliance, based on two arguments that we refer to as "private information protection" and "financial distress avoidance." The private information protection argument emanates from the fact that banks are endowed with a comparative information advantage stemming from their ability to evaluate borrowers without causing private information to be leaked (e.g., Yosha, 1995).[6] By virtue of their closer contact with borrowers, banks are better informed than arm's length public debtholders (Fama, 1985; Hadlock and James, 2002). Hence, they require less disclosure of firm-specific information, thus keeping proprietary information confidential. According to the pecking order theory, which suggests that firms use costly financing only as a last resort, firms with more sensitive information would prefer bank debt over public debt. To the extent that the adverse impact of information leakage is most prevalent in competitive industries (Verrecchia, 1983), bank debt financing would be more valuable for firms facing higher competitive pressure. From this perspective, such firms should rely more on bank debt, since banks provide for a private channel of communication, allowing firms to protect their private information from being revealed. Consequently, these considerations suggest a positive relation between product market competition and bank debt reliance.

The financial distress avoidance argument is based on the superior flexibility of bank lenders in dealing with financial distress relative to bondholders. To the extent that the latter have much more diffuse ownership of debt than banks, they are unable to closely monitor borrowers (Diamond, 1984, 1991; Houston and James, 1996), resulting in them placing strict loan covenants on the borrower. In contrast, bank lenders are characterized by concentrated ownership of debt claims, endowing them with the ability to be much more flexible with their customers. Indeed, previous studies have shown that banks are more inclined to allocate resources to bring about efficient renegotiation of debt agreements and avoid inefficient liquidation decisions (e.g., Hoshi et al., 1990; Chemmanur and Fulghieri, 1994). More importantly, Bolton and Freixas (2000) emphasize that this re-contracting flexibility makes bank lenders more effective in helping firms through financial distress periods. Accordingly, firms facing higher liquidation risk arising from product market pressures should obtain financing from banks, as they are less likely to trigger more stringent covenants in the event of financial distress. This idea is based on Bolton and Scharfstein (1990), who document that the optimal

[6] Proprietary information models predict that disclosure of valuable private information is essential to show creditworthiness, but also harmful since such information loses value once disseminated (Yosha, 1995).

financial contract in the presence of predatory threats is one that minimizes the probability of terminating funding in case of default on debt payment. Since product market competition erodes profit margins and increases the likelihood of being driven out of the market (Froot et al., 1993; Akdogu and MacKay, 2012), it follows that firms facing higher competitive pressure should rely more on bank debt as a way of avoiding financial distress costs.

In contrast, the *second view* suggests that competition is negatively associated with bank debt reliance. The underlying argument behind this suggestion is that the disciplinary power of competition may substitute for the need to the monitoring comparative advantage of bank lenders, thus leading to lower reliance on bank debt. We label this view the "bank monitoring substitution" hypothesis. The literature abounds with arguments that banks are endowed with a superior ability to monitor and detect insider diversion of firm resources at the expense of other shareholders (e.g., Fama, 1985; Berlin and Loeys, 1988). This superiority is generally attributed to their ability to gather private information about their customers. Unlike public lenders, who rely on publicly available information, banks get direct access to borrowers' private information and transaction accounts (Fama, 1985; Rajan, 1992). In this case, they are better able to exert pressure on corporate insiders, thus mitigating moral hazard problems (Stiglitz and Weiss, 1983; Park, 2000). Moreover, the comparative advantage of bank debt in monitoring corporations stems from its concentrated ownership, which makes banks more willing to engage in costly and effective information production activities, thus leading to fewer free-rider problems (e.g., Houston and James, 1996).[7] Overall, the value of this monitoring comparative advantage is highly dependent on the marginal benefit it provides to the borrower when bank debt is used. Owing to the major governance role of product market competition, which is likely to substitute for other monitoring mechanisms (e.g., Giroud and Mueller, 2010, 2011; Chhaochharia et al., 2016), one can argue that firms facing higher pressure from the product market would exhibit less need for the strict monitoring provided by bank lenders. We therefore expect a negative association between product market competition and firm reliance on bank debt.

In a nutshell, given the two opposite views discussed above, the relation between product market competition and firm bank debt reliance is expected to be positive according to the private information protection and financial distress avoidance arguments, or negative based

[7] Prior research provides evidence on the uniqueness of bank loans in adding value to the borrowing firm by showing the positive market reaction to bank loan agreements (e.g., James, 1987).

on the bank monitoring substitution hypothesis. Thus, the effect of product market competition on debt choice is an empirical question that we explore in our empirical analysis below.

We test the role of product market competition in explaining the choice of debt source using product market fluidity (*FLUIDITY*) as the main measure of competition. Constructed by Hoberg et al. (2014), *FLUIDITY* captures competitive threats of rivals. It reflects the changing structure and evolution of a firm's product market space due to moves made by its rivals. Based on product descriptions found in firm 10–K filings, *FLUIDITY* measures the similarity between the product words of the incumbent firm and rivals' product words that change from one year to another. The more the firm's vocabulary overlaps with rivals' changing vocabulary, the higher the competitive pressure. Our empirical analysis is based on a sample of 3,675 U.S. listed firms for the period 2001 to 2013. Consistent with the bank monitoring substitution argument, we find evidence that firms facing intense competition, where external market discipline is most potent, tend to have a lower need for bank debt monitoring. In other words, when firms benefit from the disciplinary power of competition, the marginal impact of bank monitoring becomes smaller, resulting in less need to bank debt monitoring. To further test the soundness of our findings, we perform a battery of robustness checks using alternative estimation techniques, alternative product market competition proxies, and additional control variables.

One major factor that could severely damage the credibility of our results is endogeneity of product market competition. We address this potential concern using three approaches. First, we design a quasi-natural experiment using large tariff rate reductions as an exogenous shock that radically increases foreign competition (e.g., Fresard, 2010, Valta, 2012; Fresard and Valta, 2016). Indeed, according to the international trade literature, a fall in entry barriers following tariff rate reductions attracts foreign competitors, which in turn invites more imports to the domestic product market space. Using a difference-in-diference approach, our findings show that there is a significant decrease in bank debt reliance particularly in industries experiencing a large tariff reduction shock. We also check the validity of our difference-in-difference analysis using a parallel assumption test. In addition,we conduct a placebo test to ensure that the results of our quasi-natural experiment setting do not reflect the effect of factors that are captured by the tariff reduction dummy variable.

Second, in addition to the quasi natural experiment design, we employ an instrumental variable (IV) approach. In the spirit of Waisman (2013), we use, as an instrument for product market competition, the competition proxy of each firm in 2000, one year prior to the beginning of our sample period. This instrument is significantly related to competitive pressure, yet unlikely to influence corporate decisions except through the channel of competition, thereby meeting the relevance and exclusion conditions of instrument validity. Third, we estimate a change regression to examine the impact of changes in product market competition on changes in debt choice. This regression mitigates the endogeneity problem arising from potentially omitted time-invariant variables that may jointly affect product market competition and debt choice. Overall, our three approaches yield results consistent with our findings that competition decreases the fraction of bank debt in total debt.

Another issue that we address concerns whether the validity of the bank monitoring substitution hypothesis varies in the cross-section, depending on firm-specific characteristics. A careful examination of cross-sectional heterogeneity allows us to strengthen further our claim that the substitution away from bank borrowing is a direct result of the disciplinary force of competitive pressure. We therefore investigate whether the competition–debt choice relationship depends on the degree to which firms are sensitive to product market discipline. To the extent that competitive pressure disciplines firms by eroding profit margins and causing higher risk of failure, it should have a stronger disciplinary impact on risky firms that are most vulnerable to product market threats, as well as on poorly-governed firms.

Initially, we explore our bank monitoring substitution hypothesis by investigating whether the relation between competitive pressure and bank debt reliance is influenced by firms' exposure to competitive risk. The negative impact of product market governance pressure on bank debt should be particularly strong for risky firms that are more exposed to competition and less able to cope with industry dynamics. To the extent that such firms are not endowed with the ability to pass on cost shocks to customers, they generally have lower profit margins and poorer firm performance. As a consequence, any increase in competitive pressure, which would trigger a further decline in profit margins, results in a stronger disciplinary effect, leading to a more pronounced bank monitoring substitution effect. In line with our prediction, we find that the bank monitoring substitution effect is stronger for firms with weaker market share as well as firms operating in more competitive industries.

Additionally, we investigate the impact of the tightness of financial constraints on the effectiveness of product market governance pressure in substituting for bank monitoring. Financial constraints are recognized as capturing firm sensitivity to rivals' aggressive competitive behavior (Bolton and Scharfstein, 1990). Indeed, predation models, based on the long-purse view, explain that "deep-pocket" rivals have incentives to target prey that have vulnerable financial structures. Bolton and Scharfstein (1990) argue that cash-rich and less levered firms can drive their financially constrained competitors out of the market by taking actions to undercut market prices. As a consequence, firms with binding financial constraints are less able to fend off competition. Taken together, given that financial constraints increase firms' sensitivity to product market competition, the bank monitoring substitution effect associated with product market governance is expected to be magnified for financially constrained firms. Using several proxies of financial constraint, we find that intensification of competition yields a large substitution effect for bank monitoring in financially constrained firms.

Finally, since we have built our story on the disciplinary power of competition, a natural step would be to re-examine the impact of product market competition on debt choice conditional on the quality of firm governance practices. Previous studies provide strong evidence that competitive pressure acts as a substitute source of monitoring by showing that the governance pressure of the product market is more pronounced for firms that lack effective internal and external governance mechanisms (e.g., Giroud and Mueller, 2010, 2011; Tian and Twite, 2011; Chhaochharia et al., 2016). Accordingly, one would expect that, when firms are poorly monitored, competition imposes a more significant disciplinary effect, thus reducing further the need for bankers' tight control. Consistent with this prediction, our results show that the role of product market competition in decreasing the proportion of bank debt to total debt is more pronounced in poorly governed firms, confirming the idea that the observed bank monitoring substitution effect arises from the disciplinary force of competition.

In our final set of tests, we further analyze how the substitution effect of the disciplinary power of competition also relates to other contractual features that perform the same monitoring effect as bank scrutiny. In particular, we are interested in examining the impact of product market competitive pressure on debt maturity. Previous research on debt maturity structure shows that debt contracts with shorter maturities are likely to serve as an important monitoring device. Indeed, debtholders eager to protect their interests are more inclined to require frequent

reevaluation of borrower risk profiles through short-term debt contracts, which allows them to closely monitor managers and better assess their ability to service debt claims (Diamond, 1991; Barclay and Smith, 1995; Park, 2000).[8] Owing to the intensified monitoring associated with short-term debt contracts, we find that, when firms benefit from the external governance role of competition, they tend to have longer-maturity debt. This finding bolsters support for our previous conclusion on the substitution effect of product market competition, confirming that the disciplinary power of competition reduces demand for creditor monitoring.

Bringing together the literature on two important and emerging strands of research, namely, product market competition and debt choice, our study makes several contributions. With respect to the literature on debt source choice, it furthers our understanding of the determinants of the choice between bank debt and public debt. While a vast body of theoretical work has provided convincing explanations for debt structure choice (e.g., Rajan, 1992; Diamond, 1991; Yosha, 1995; Park, 2000), very little empirical research has been conducted to support these theoretical explanations, due to the scarcity of debt structure data. We contribute to this stream of research by taking advantage of a newly available database, S&P Capital IQ, which provides exhaustive debt structure data for a wide variety of companies worldwide (Colla et al., 2013; Li et al., 2015).

In addition, our study complements research that provides explanations for borrowing firms' choice between bank and public debt. In a setting of asymmetric information, prior studies emphasize that low-quality firms tend to rely on banks' ability to deal with information problems arising from firm-specific uncertainty (Krishnaswami et al., 1999), stock return volatility (Hadlock and James, 2002), and reduction in analyst coverage (Li et al., 2015), among other factors. In a setting of agency relationship, previous evidence in favor of the monitoring role of bank lenders shows that the choice of debt source is significantly related to firm governance quality, such as divergence between ownership and control rights (Lin et al., 2013), presence of multiple large shareholders (Boubaker et al., 2017), and quality of external governance mechanisms (Bharath and Hertzel, 2016). We extend this line of literature by looking

[8] This monitoring role is reflected in the signaling theory of Flannery (1986), which suggests that firms tend to subject themselves to the periodic scrutiny of short-term debt as a way of signaling to outsiders their commitment to reducing agency costs, especially when asymmetric information is high.

beyond these well established firm-level determinants of debt choice, and exploring industry dynamics effects, particularly the role of product market competition.

Our paper also relates to the broad literature on product market competition that investigates how the degree of competitive pressure impacts corporate decisions and firm financial policies. For instance, it complements previous work that links a firm's product market environment to its reporting practices, such as bad news disclosure (Dhaliwal et al., 2014), earnings management decisions (Datta et al., 2013), as well as corporate investment policies, such as venture capital investment (Kim et al., 2016) or capital expenditure investments (Fresard and Valta, 2016). Furthermore, our study provides more insight into recent developments in the literature that focus on the impact of competition on firm financial policies, such as hedging decisions (Haushalter et al., 2007), leverage decisions and equity issuance (e.g., Xu, 2012), and payout policies (e.g., Hoberg et al., 2014), among others. Our paper differs from those cited above in that it attempts to broaden our understanding of the role of competition in driving debt structure choices, which, to the best of our knowledge, has largely been overlooked.

More importantly, our findings that firms substitute away from bank debt when faced with intense market pressure echo the intuition in previous studies that the disciplinary force of competition substitutes for the need to discipline firms through other forms of governance. For example, Giroud and Mueller (2010) provide evidence that competition substitutes for the lack of effective governance mechanisms by mitigating the detrimental impact of business combination laws that reduce takeover threats. Furthermore, Chhaochharia et al. (2016) show that SOX has enhanced the operational efficiency of firms operating in concentrated industries than firms in competitive industries. Overall, these results show that corporate governance mechanisms become less critical when firms benefit from the external governance pressure of the product market. Consistently, our findings generate further evidence that the disciplinary power of competition acts as an alternate governance mechanism for bank monitoring.

The remainder of this paper proceeds as follows. In Section 2, we describe the sample and variables definitions. Section 3 discusses the empirical results and the robustness checks. Section 4 and 5 present the additional tests and corresponding results. Finally, Section 6 summarizes and describes our conclusions.

2. Sample, variable definitions, and summary statistics

2.1. Sample

To examine the effect of product market competition on debt choice, we consider a sample of U.S. firms appearing in the Compustat database during the period 2001 through 2013.[9] We confine our analysis to publicly listed firms since they are often faced with the choice between public and private debt. Our sample selection procedure starts by removing firm–year observations with missing and zero total debt and total assets, and excluding firms operating in the financial industry (SIC codes 6000–6999) and regulated utilities (SIC codes 4900–4999). We then merge the resulting sample with the debt structure data from the Capital IQ database, yielding a final sample comprising 25,450 firm–year observations for 3,675 U.S. firms.[10]

2.2. Regression variables

2.2.1. Debt structure

This study uses, as a dependent variable, the proportion of bank debt in a firm's debt structure. Following previous studies on the determinants of debt choice (e.g., Lin et al., 2013; Boubaker et al., 2017), we employ the ratio of bank debt to total debt to measure the firm's reliance on bank debt.

2.2.2. Product market competition

We proxy for the intensity of competition in product markets using product market fluidity, *FLUIDITY,* developed by Hoberg et al. (2014).[11] F*LUIDITY* is based on product descriptions found in firms' 10–K filings and captures the degree to which a firm's products are sensitive to the evolution of rivals' products. More specifically, it is defined as the similarity between a firm's vocabulary and the change in overall use of vocabulary by rivals in a given industry. A greater similarity in the business descriptions between rivals implies that a firm faces higher competitive threats, and thus a higher intensity of product market competition. The

[9] The sample period covered in this study ends in 2013 because the data on product market competition constructed by Hoberg et al. (2014) is available only up to 2013.
[10] Since 1996, when the SEC mandated electronic filings, S&P Capital IQ has been collecting information on debt composition, which firms are required to report under Regulations S-X and S-K of the Securities Act. For this reason, Capital IQ has only recently become available.
[11] We download the data from http://hobergphillips.usc.edu/.

use of *FLUIDITY* as a measure of competition is interesting in that it is highly representative of the competitive pressure imposed by rivals' threats, which are likely to expose firms to potentially large losses, therefore disciplining managers and improving governance quality. Additionally, *FLUIDITY* is considered an ideal proxy of competition to overcome endogeneity issues (Hoberg et al., 2014). Unlike traditional measures of product market competition (e.g., Herfindahl–Hirschman Index, firm-concentration ratios, and price-cost margins), *FLUIDITY* is a competitive pressure measure that pertains to the movement of firms' rivals and, therefore, is exogenous to the actions taken by firms. Recently, a number of empirical studies have used *FLUIDITY* as a proxy for the competitive threats that a firm faces. For instance, Hoberg et al. (2014) show that firms with higher fluidity tend to decrease dividend payouts and increase cash holdings as a way of managing the predation risk arising from rivals' predatory behavior. Alimov (2014) employs fluidity as an additional measure of firm product market dynamics and reports that competition increases the value of cash holdings. Therefore, in our analysis, we consider *FLUIDITY* as a proxy for the intensity of competition in a product market.

2.2.3. Control variables

Relying on prior studies, we control for a wide range of firm characteristics deemed to affect firms' choice between bank loans and publicly traded debt (e.g., Houston and James, 1996; Denis and Mihov, 2003; Lin et al., 2013). The inclusion of these controls aims to assess the net effect of product market competition on debt choice.

(i) *LEVERAGE* is measured as the ratio of total liabilities to total assets. On the one hand, since highly leveraged firms have acquired reputation in the credit markets, they exhibit lower demand for bank-monitored debt (Diamond, 1991). On the other hand, since leverage may act as an internal disciplinary device, firms with higher leverage are likely to issue more bank debt, since firm insiders have less incentive to insulate themselves from creditor control. Hence, the effect of leverage on bank debt use is expected to be either positive or negative.

(ii) *TANGIBILITY* is equal to the ratio of net property, plant, and equipment to total assets. Tangible assets serve as collateralization for debt, which mitigates lender risk. Therefore, firms with more fixed assets have better credit quality (Denis and Mihov, 2003) and exhibit preference for public debt. Consistent with models based on borrower reputation, we expect firms with tangible assets to issue more public debt than bank loans.

(iii) *ROA* measures firm profitability to proxy for project and credit quality (Denis and Mihov, 2003). This is the ratio of operating income before depreciation to total assets. More profitable firms have better reputation in credit markets and are, therefore, more inclined to issue public debt. Diamond (1991) argues that a decrease in profitability leads firms with a high credit rating to borrow from banks. As a consequence, profitability is expected to be negatively associated with firm reliance on bank debt.

(iv) *Q* measures firm growth opportunities and is defined as the sum of market value of equity plus book value of debt divided by total assets. Firms with higher growth opportunities are likely to be more successful and profitable in their business activities. Therefore, successful firms with more investment opportunities are more likely to insulate themselves from bank scrutiny as a way to avoid hold-up problems that may distort firms' investment incentives (Rajan 1992). We thus expect a negative relationship between Tobin's Q and bank debt.

(v) *SIZE* is defined as the natural logarithm of total assets. Large firms have a lower level of information asymmetry, which reduces their need for private lender monitoring (Houston and James, 1996). Moreover, larger firms have higher debt capacity, which enables them to realize large economies of scale by issuing more public debt (Blackwell and Kidwell, 1988). Accordingly, we expect *SIZE* to be negatively associated with bank debt.

(vi) *Z_SCORE* is a proxy for the financial health of a company and is computed using the Altman (1968) Z-score, calculated as follows: (1.2*working capital + 1.4*retained earnings + 3.3*earnings before interest and taxes + 0.999 sales) / total assets + 0.6*(market value of equity / book value of debt). For this measure, higher values imply lower distress risk. When firms are in financial distress, they are more likely to default on their debt payments. Models based on the efficiency of liquidation decisions (e.g., Chemmanur and Fulghieri, 1994) suggest that the flexibility of banks in restructuring debt agreements induces distressed firms to choose bank borrowing. Hence, we expect Z-score to be negatively related to firm reliance on bank debt.

(vii) *RATED* is a dummy variable that indicates whether a firm has an S&P long-term debt rating. Previous research on the choice of debt financing sources points to a strong positive relation between issuing public debt and having a credit rating (e.g., Cantillo and Wright, 2000), since rated firms enjoy better creditworthiness, and consequently an easier access to public debt markets. Consequently, we expect *RATED* to be negatively associated with bank debt use.

(viii) *INVGRADE* is a dummy variable that takes the value 1 if the firm has an investment-grade S&P long-term debt rating. According to Diamond (1991), credit quality is a major factor that determines firms' choice of debt source. Indeed, high quality firms have more to lose in case of default on debt repayment, and therefore rely primarily on arm's length debt rather than costly bank-monitored debt (Rauh and Sufi, 2010). Consistently, *INVGRADE* is expected to have a negative relation with the proportion of bank debt in total firm debt.

2.3. Descriptive statistics

Table 1 presents descriptive statistics for the main variables used in our empirical work. The reported statistics show that all firm characteristics are within reasonable levels and are largely in line with previous studies in terms of magnitude (e.g., Hoberg et al., 2014; Colla et al., 2013). For example, we find that bank debt use is prevalent in the U.S. context, since 42.2% of U.S. firms' total debt is borrowed from banks. Additionally, we find that the average value of product market fluidity for our sample firms is 6.662, which is close to the average value reported by Hoberg et al. (2014) (6.932).

Additionally, Table 1 presents descriptive statistics for our control variables. As shown in this table, our sample comprises firms with differing levels of leverage, varying from less than 0.4% to more than 61%, which makes this a good sample to study firm debt structures. Moreover, our sample is characterized by an average profitability ratio of 8.1%, average firm size of 6.365, average Tobin's Q of 1.892, and an average level of tangibility of 0.527.

[Insert Table 1 about here]

Table 2 provides Pearson's correlation coefficients between the explanatory variables in our main regression. From this correlation matrix, it is evident that multicollinearity between the independent variables is unlikely, since the correlation coefficients are relatively small. In addition, after computing the variance inflation factors (VIFs) for each of our regressions, we can surmise with some assurance that we do not have harmful multicollinearity, since the VIFs are within reasonable ranges and do not exceed the critical value of 10.

[Insert Table 2 about here]

3. Main analysis: Effect of product market competition on debt choice

3.1. Model specification

This section presents a multivariate analysis to better gauge the effect of product market competition on debt choice. We regress the ratio of bank-to-total debt on product market fluidity and other control variables using the following model:

$$BANK\_DEBT = a_0 + a_1\, FLUIDITY + a_2\, SIZE + a_3\, Q + a_4\, LEVERAGE + a_5\, ROA + a_6\, TANGIBILITY + a_7\, Z\_SCORE + a_8\, RATED + a_9\, INVGRADE + Industry\ dummies + Year\ dummies + \varepsilon \quad (1)$$

where *BANK_DEBT* is the proportion of bank debt in a firm's total debt and *FLUIDITY* is the proxy of product market competition. Control variables are a set of firm characteristics shown in previous research to be important determinants of debt choice. This set of variables includes *SIZE*, *Q*, *LEVERAGE*, *ROA*, *TANGIBILITY*, *Z_SCORE, RATED*, and *INVGRADE*. We finally include industry dummies and year dummies to control for determinants of debt choice that are fixed across industries and over time. Throughout all of our empirical analysis, we cluster the errors in the model by company to obtain standard errors that are robust to heteroskedasticity and cross-sectional correlation.

3.2. Results

Table 3 presents our main evidence on the relation between product market competition and firm reliance on bank debt. We begin our analysis by running an ordinary least squares (OLS) regression of the ratio of bank-to-total debt against product market fluidity (*FLUIDITY*) and other control variables, by adjusting standard errors for heteroskedasticity and clustering at the firm-level. The coefficient on our main variable of interest, *FLUIDITY*, identifies whether the proportion of bank debt in a firm's total debt is determined by product market competition. The results displayed in column (1) find support for a negative relation between competition and bank debt reliance. Specifically, the coefficient on *FLUIDITY* is negative and statistically significant at the 1% level, suggesting that firms consider product market competition as an external governance mechanism, as demonstrated by their lower demand for bank lender monitoring.

The coefficients of all control variables, except *TANGIBILITY* and *Z_SCORE,* are statistically significant at the 1% threshold level. We record evidence that a high proportion of bank debt in firms' total debt is observed in smaller firms, firms with lower growth opportunities, profitable firms, firms with no S&P long-term debt rating, and firms for which this rating is below BBB-. These findings are, to a large extent, consistent with the predictions of previous research on the determinants of debt source choice(e.g., Diamond, 1991; Houston and James, 1996; Rauh and Sufi, 2010; Lin et al., 2013). For example, the negative coefficient on *SIZE* is attributable particularly to higher monitoring needs of smaller firms, due to their exacerbated information asymmetries (Houston and James, 1996), and the lower gains from the reduced transaction costs of public debt, due to their lower debt capacity (Blackwell and Kidwell, 1988). Moreover, the positive effect of *LEVERAGE* on bank debt reliance is consistent with the disciplinary effect of leverage, which is likely to reduce manager incentives to avoid bank debt as a way of insulating themselves from bank monitoring.

[Insert Table 3 about here]

OLS coefficient estimates may be inconsistent, since our dependent variable is bounded by 0 and 1. We tackle this issue in specification (2) by estimating a Tobit regression. We find that the results remain unchanged. We also test the robustness of our main evidence to alternative methods of estimating standard errors. More specifically, we use the Prais-Winsten regression in column (3) and Newey–West in column (4). In another specification, and because the number of firms varies across industries, we estimate a weighted least squares regression where the weighting is the inverse number of firm–year observations per industry (Column (5)). The results indicate that *FLUIDITY* enters negatively and statistically significantly at better than the 1% level, implying that intensification of competition decreases firm reliance on bank debt.

Overall, our results lend support to the bank monitoring substitution effect associated with the disciplinary force of product market competition. To the extent that competitive pressure plays an important role as a disciplinary device forcing managers to reduce slack, it acts as a substitute for the monitoring provided by bank lenders, who are well positioned to access firms' private information (e.g., Fama, 1985; Berlin and Loeys, 1988).

3.3. Endogeneity of product market competition

3.3.1. A quasi-natural experiment

Notwithstanding the available evidence, note that our results could be driven by potential concerns pertaining to the endogeneity of product market competition. To address this issue, we use a quasi-natural experiment setting to further establish the causal effect of product market competition on bank debt reliance. In particular, we examine the reaction of firms' decision to rely on bank debt to the exogenous event of a large reduction in import tariff rates. The international trade literature offers arguments consistent with the idea that trade openness reduces the cost of entering domestic product markets, thus causing disruption for domestic firms. Indeed, when import tariff rates are low, foreign rivals have more incentive to enter the product market of the incumbent firm, thus intensifying foreign competitive pressure For example, Bernard et al. (2006) provide empirical evidence that a decline in trade costs, as measured by industry-level tariff rates, is associated with a significant increase in foreign competitive pressure. Therefore, large reductions in import tariff rates would offer an ideal setting to capture major changes in market structure and their effect on firm financing decisions. The significant impact of tariff rate reductions on firms is well established in the literature that examines the link between competition and cash holdings (Fresard, 2010), capital structure decisions (Xu, 2012), and investment decisions (Fresard and Valta, 2016), among others.

We follow prior studies in measuring reductions in import tariff rates, which are considered a proxy for intensification of foreign competition. To this end, we use U.S. tariff data available at the Harmonized System (HS) level on *Schott's International Economics Resource Page* (Schott, 2010).[12] We also employ the Schott (2010) *Trade Data and Concordances,* which provide a matching of 10–digit HS codes with SIC codes. We finally update tariff data up to 2012 using data on imports and exports. After merging tariff data with our sample firms, we obtain a final sample of 1,798 firms operating in 107 three-digit manufacturing industries. We calculate the ad valorem tariff rate as the ratio of the duties collected from each industry to the dutiable value of imports using the three-digit SIC industry classification. Following Fresard (2010) and Valta (2012), we characterize an industry-year experiencing an event of large tariff reduction through a dummy variable that takes the value 1 if the negative yearly change in tariff rates

[12] http://faculty.som.yale.edu/peterschott/sub_international.htm

exceeds three times the industry median tariff reduction, and 0 otherwise. Figure 1 illustrates the distribution of tariff reduction events through time. Similar to Giannetti and Yu (2016), we find a large number of tariff reductions occurring during our sample period spanning 2001 to 2012. More precisely, out of the 107 three-digit industries, we identify 43 three-digit industries experiencing at least one large tariff reduction event.

We evaluate the reaction of the choice between bank and public debt to the large import tariff rate reduction events using the Valta (2012) difference-in-difference approach. In particular, we replicate our baseline regressions using a dummy variable that takes the value 1 if there is a large reduction in import tariff rates, and 0 otherwise. This method allows us to compare the responses of a treatment group (i.e., firms experiencing a large tariff reduction in year t) to those of a control group, which includes all firms that experience no competitive shock event in year t.

The key identifying assumption in a difference-in-difference framework is the parallel trend. According to Roberts and Whied (2012), the parallel trend requires that the treated and control firms exhibit the same trend in outcomes (i.e., reliance on bank debt) prior to the treatment (i.e., tariff reduction). To conduct a parallel trend test, we run a model that regresses bank debt ratio on the treatment variable interacted with seven time dummies, T(-3) to T(3), that indicate a three-year event window surrounding the tariff reduction shock. This regression model allows us to check the difference between treated and control samples over the three years that precede the tariff reduction (Fresard and Valta, 2016). It also sheds light on the persistent effect of the tariff reduction shock over time after its occurrence. Our results, reported in Column (1) of Table 4, show that the coefficients on the interaction terms are not statistically significant before the event, suggesting that the treatment and control firms behave similarly. The difference is observed starting from the year of the tariff reduction event and grows bigger, implying that the effects of the tariff reduction do not disappear. Overall, these results suggest that there are no pre-trends present for bank debt reliance.[13]

[13] In untabulated tests, we further check whether the parallel trend assumption holds over a longer period prior to the tariff reduction shock, i.e., a seven-year period. Specifically, we use interaction terms between our main treatment variable and seven time dummies, T(-1) to T(-7). Consistent with our previous results, we find that none of the interaction terms is statistically significant, suggesting that our data satisfy the parallel trend assumption.

After verifying the parallel trend assumption, we conduct our main difference-in-difference analysis to examine the impact of the tariff reduction shock on debt choice. Column 2 of Table 4 shows that firms affected by a large tariff drop experience a more significant decrease in the proportion of bank debt in their total debt compared to unaffected firms. We supplement our analysis with an alternative measure for large tariff declines. Following Dasgupta et al. (2016), we aim to account for the persistent effect of the tariff reduction shock on the intensity of competition as well as for the potential lag in time between the incidence of the shock and the response of the incumbent firm. We therefore construct a variable that is set equal to 1 for the tariff reduction year as well as for three years later. Similar to our previous results, we show, in column 3, that there is a negative effect of the intensification of competition following tariff declines on the proportion of bank debt in total debt. This effect is economically significant given that firms respond to tariff reduction events by decreasing the proportion of their bank debt in total debt by approximately 4%. Overall, our results are consistent with our main hypothesis, which states that the disciplinary power of competition substitutes for the strict monitoring provided by bank lenders, which in turn leads firms to rely less on bank debt financing.

One major concern with our quasi-natural experimental design is that our results may be driven by unobserved factors that coincide with the tariff reduction shocks. To completely rule our this possibility, we perform a random placebo test. Specifically, we create a new dummy variable that represents a pseudo-tariff reduction event by randomly assigning a placebo treatment to each three-digit SIC industry, assuming that this treatment also increases the competitive threats of rivals. We then replicate our baseline regressions using our new dummy variable to examine firms' responses to the pseudo-event. The results of this random placebo test are displayed in Column 4 of Table 4. Not surprisingly, we find that the coefficients on the pseudo-event dummy are statistically insignificant and have a lower magnitude compared with those reported in Columns (2) and (3). Consequently, these results reject the possibility that our previous findings may be driven by unobserved shocks.

[Insert Table 4 about here]

As an additional analysis of the effects of our competition shocks, we re-estimate firms' bank debt response to the event of large tariff rate reduction individually for each of the 43 affected industries (Fresard and Valta, 2016). This test aims to investigate cross-industry

heterogeneity, allowing us to ensure that the negative impact of competition shocks on bank debt reliance results from a general effect and is not driven by specific industries. We report the results of our 43 regressions in Figure 2, which displays the magnitude of the estimated response to the tariff reduction event for each three-digit SIC affected industry. For the sake of clarity, we sort the estimated response in ascending order. In Figure 2, we observe that, despite the considerable cross-industry heterogeneity in the sensitivity of bank debt reliance to competition shocks, more than 60% of the affected industries display a negative coefficient for the large tariff reduction dummy, which is consistent with our baseline findings. That is, out of 43 affected industries, 26 decrease their reliance on bank debt when faced with higher foreign competitive pressure. In contrast, only 17 industries exhibit a positive response to foreign competition shocks. To the extent that these industries belong to diverse categories, it seems extremely unlikely that there are any systematic common factors that might trigger the observed positive response.

[Insert Figures 1 and 2 about here]

3.3.2. Instrumental variable approach

Although the quasi-natural experiment framework is efficient in solving endogeneity issues, we also adopt an instrumental variable approach. In the spirit of Waisman (2013), we instrument for product market competition using *FLUIDITY* one year prior to the beginning of our sample period (*FLUIDITY2000*). Indeed, the historical measure of product market competition reasonably satisfies both the relevance and exclusion conditions. On the one hand, this measure is positively related to the current intensity of competition in a given firm's industry. But on the other hand, it is not likely to be directly related to a firm's preference for private debt financing, unless through its impact on the current level of competition that the incumbent firm faces. Therefore, we conclude that *FLUIDITY2000* meets the necessary conditions for valid instruments.

The results of the instrumental variable regression are presented in Table 5.[14,15] In the first-stage regression, we show that *FLUIDITY2000* is positively and significantly related to

[14] The drop in the sample size (20,475) is attributable to the fact that data on product market fluidity in 2000 is missing for some firms.

FLUIDITY. The statistically significant coefficients corroborate that our instrument is a good predictor of the intensity of product market competition. Other noteworthy results include the F–statistic which is highly significant (1786.79), thus providing strong statistical support for the relevance of our instrument. In the second stage, we further confirm the significant and negative effect of competitive pressure on the ratio of bank debt to total debt. Indeed, the coefficient on the instrumented variable of competition is negative and statistically significant.[16]

3.3.3. Change regression

To further address endogeneity concerns, we also perform a change regression analysis to examine the effect of a change in the intensity of competition on the change in a firm's reliance on bank debt. Unlike a level regression, a change regression is less likely to suffer from omitted variable bias since it controls for unobservable time-invariant factors that might jointly affect product market competition and debt choice. In the same spirit of Lin et al. (2013), inclusion in the change regression sample requires that two main criteria be met. First, we include only firms that have two consecutive firm–year observations to calculate the year-to-year changes in our variables. Second, we require that all firms have a non-zero change in *FLUIDITY* between the two periods.

Column (3) of Table 5 reports the results of our change regression. The dependent variable in this table is calculated as the the year-to-year change in the ratio of bank debt to total debt for each borrowing firm. The key independent variable is the change in product market fluidity (*FLUIDITY*). Consistent with our baseline regression results, we find a negative and significant impact of the change in product market competition on the change in bank debt reliance. More specifically, our findings suggest that our evidence continues to hold after controlling for unobserved time-invariant effects that may influence a firm's debt choice. Overall, the change regression results further support the view that the disciplinary power of product market competition reduces the need for bank monitoring.

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[15] In untabulated tests, we show that all the results reported in Table 3 continue to hold when we use the smaller sample for which we have data on *FLUIDITY2000*.

[16] Our evidence remains robust to the use of an alternative instrument of the intensity of competition, i.e. tariff rates. Similar to the historical measure of competition, tariff rates meet the relevance condition since lower tariff rates encourage foreign competitive pressure. Tariff rates also meet the exclusion condition since they reflect moves made by foreign rivals rather than by the firm itself, and hence a direct relation between tariff rates and firm financial policies would not arise, except through the channel of competitive threats.

[Insert Table 5 about here]

3.4. Other robustness checks

3.4.1. Alternative competition-related variables

To further explore the reliability of our results, we re-estimate our original regression using alternative proxies for product market competition. We first use measures that capture a dimension of competition other than the predatory threats of rivals, that is, industry concentration. More specifically, we use the Herfindahl-Hircshman Index (*HHI*) calculated as the sum of the squared market shares of all firms operating in the same industry. We specifically use the time varying Text-based Network Industry Classification (TNIC) developed by Hoberg and Phillips (2016). In column (1) of Table 6, we find that the coefficient on *TNIC_HHI* is positive and statistically significant at the 1% level, suggesting that the proportion of bank debt in total debt is higher for firms operating in concentrated industries.[17] The results in column (2) remain qualitatively the same using the concentration ratio (*CR*), which is intended to capture the power of the largest firms operating in an industry. *CR* is calculated as the sum of the market shares of the four largest firms competing in each industry based on the three-digit industry classification.

Thus far, the alternative measures used in this section capture industry-specific attributes. We supplement our analysis by using other firm-specific proxies of market power, which measure the extent to which a firm is able to price above its marginal costs. We therefore compute the Excess Price-Cost Margin (EPCM), also called the Lerner Index (LI), which is based on the profit-to-sale ratio, calculated as operating income divided by firm sales. We first define *EPCM* as the industry-adjusted price-cost margin, computed as the profit-to-sales ratio minus the sales-weighted profit-to-sale ratio of all firms operating in the same industry (Datta et al., 2013). Second, we use *TNIC_LI*, defined as 1 minus the average profit-to-sales ratio of all firms operating in each TNIC industry based on the TNIC industry classification of Hoberg and Phillips (Kim et al., 2016). As an additional firm-level proxy of competition, we use the logarithm of the number of firms operating in a given firm's TNIC industry (Kim et al., 2016). The regression results using *EPCM*, *TNIC_LI*, and *LOG_NUM_FIRMS* as competition measures

[17] In unreported results, we find consistent estimates using *HHI* based on the Fixed Industry Classification developed by Hoberg and Phillips (2016) and the *HHI* based on the traditional 3-digit SIC.

are reported in columns (3), (4), and (5), respectively. We continue to find support for our evidence.[18] All in all, these findings indicate that our results are robust to the use of alternative proxies of industry competition.

[Insert Table 6 about here]

3.4.2. Additional control variables

We address the omitted-variable concern by taking great care to include a host of additional control variables that may drive our results. Our findings presented thus far show that firms are less likely to rely on private bank debt control when they face higher disciplinary pressure from the competitive threats of rivals. In this subsection, we address the question of whether our results are driven by other dimensions of product market competition. For this purpose, we include in our baseline regression additional control variables that proxy for industry concentration. In particular, we focus on the Herfindahl–Hirschman Index (HHI), which is an entropy measure that stresses the importance of larger firms by assigning them greater weight. In column (1) of Table 7, we report the results using *HHI* based on the fixed industry classification developed by Hoberg and Phillips (2016). We also present the results using *HHI* based on the traditional industry classifications, including two-digit SIC, three-digit SIC, and NAICS in columns (2), (3), and (4), respectively. Overall, we find that controlling for industry concentration measures does not alter the governance role of competitive pressure on the choice between bank and public debt.

[Insert Table 7 about here]

4. Additional analysis: Cross-sectional heterogeneity

Notwithstanding the robustness of our results thus far, we perform additional tests to delve more deeply into the nature of the competition–debt choice relationship. Our earlier findings suggest that firms facing higher competition tend to rely less on the monitoring role of bank lenders, confirming the bank monitoring substitution effect associated with the disciplinary role of competition. Let us now examine how the relation between competitive

[18] We also use an additional firm-specific proxy, similarity index, which measures the similarity between a firm's product descriptions and those of industry peers using the TNIC industry classification. The untabulated tests show that the results remain the same as those reported in Table 6.

pressure and borrowing firms' reliance on bank debt varies in the cross section. Arguably, the strength of this relation may differ across firms with different sensitivities to product market discipline. We specifically consider two main factors that influence firm sensitivity to market discipline, namely firm risk and governance quality. A potential explanation for the moderating role of firm risk is that the disciplinary power of competition might be significant for risky firms that are more exposed to liquidation risk and predation threats caused by increased competition. Similarly, the disciplinary role of competition is likely to have a more pronounced effect for firms with weaker governance, thus resulting in a higher bank monitoring substitution effect.

4.1. Role of exposure to competitive risk

The impact of competitive pressure on firm decisions should depend on how sensitive a firm is to product market dynamics. We test our hypothesis that the effect of external governance pressure of competition on borrowing firm reliance on bank debt varies cross-sectionally with a firm's exposure to competitive risk. As discussed above, exposure to competitive risk increases firm sensitivity to product market discipline. Therefore, one can expect that the bank monitoring substitution effect related to the disciplinary force of competition should be more pronounced for firms that are more exposed to higher competition. We are particularly interested in two factors that determine exposure to competition, that is, firm position in the product market and the degree of concentration in the industry in which it operates.

Following previous studies (e.g., Valta, 2012; Li and Zhan, 2016), we rely on a set of proxies for exposure to competition. First, we employ firm-level measure *MARKET_SHARE* to proxy for firm competitive position in the product market. *MARKET_SHARE* is calculated as the proportion of firm sales in total industry sales. Additionally, to capture the degree of industry concentration, we rely on two industry-level measures, Herfindahl–Hirschman Index (*HHI2*) and concentration ratio (CR). *HHI2* is defined as the sum of the squared market shares of all firms operating in each industry. *CR* is calculated as the sum of the four largest firms in terms of firm sales in each industry.

Table 8 reports our regression results for the impact of competitive pressure on debt choice conditional on firm exposure to competition. In these regressions, we include our proxies

for competition exposure as well as interaction terms with product market fluidity (*FLUIDITY*). We find that the negative relation between fluidity and the proportion of bank debt in total debt is stronger for firms having a weaker market position (column 1). This is consistent with the idea that, unlike firms with strong market power, firms having disadvantaged positions in the product market are more subject to rivals' competitive threats, which makes them more sensitive to the disciplinary effect of competition. Moreover, we find that the effect of fluidity on bank debt is more pronounced for firms operating in less concentrated industries (columns 2 and 3), suggesting that such firms are more sensitive to the governance pressure of product market comeptition. Overall, our findings corroborate the notion that the bank monitoring substitution effect increases with firms' exposure to competition.

[Insert Table 8 about here]

4.2. Role of exposure to financing risk

It has long been recognized that firms with higher financing risk (i.e., financially constrained firms) are more subject to rivals' aggressive predation threats (e.g., Bolton and Scharfstein, 1990), which impose greater competitive risk on incumbent firms and, as a consequence, increase their sensitivity to product market discipline. For example, as suggested by Fresard and Valta (2016), the impact of competition on firm decisions is more pronounced when firms face tighter financial constraints. This would imply that, unlike unconstrained firms, financially constrained firms are more sensitive to the competitive threats of rivals, which may in turn affect more significantly their decisions. More relevant to our research, we expect tighter financial constraints to result in greater sensitivity to the disciplinary effect of competition, implying a more pronounced bank monitoring substitution effect.

To better gauge the impact of firm financing risk on the relation between competition and debt choice, we use interaction terms of product market fluidity and a variety of measures that proxy for firm financial constraints. First, we consider a dummy variable (*DIVIDEND_PAYER*), which indicates whether firms pay dividends. Indeed, firms that do not pay dividends are considered more financially constrained than other firms (e.g., Denis and Sibilkov, 2010), since such firms tend to save more cash for precautionary motives instead of distributing dividends. Second, we categorize financially constrained and unconstrained firms

based on two indices: the Kaplan-Zingales Index (*KZ*) according to Kaplan and Zingales (1997), and the Whited-Wu Index (*WW*) following Whited and Wu (2006). These two indices increase with the severity of firms' financial constraints.

Table 9 reports the results of the impact of financial constraints on the relation between competition and debt choice. Consistent with the arguments above, we find, in column (1), that the negative relation between product market fluidity and firm reliance on bank debt is more pronounced when firms pay lower dividends. More specifically, the coefficient on *FLUIDITY*DIVIDEND_PAYER* is positive and statistically significant, suggesting that the bank monitoring substitution effect is stronger when firms are more financially constrained. Similar conclusions are reached using the Kaplan-Zingales Index and the Whited-Wu Index. Indeed, the interaction terms have the same negative sign as the coefficient on *FLUIDITY*, which means that the role of competition in provoking higher substitution away from bank monitoring is stronger when firms have tighter financial constraints.

[Insert Table 9 about here]

4.3. Role of corporate governance quality

Besides testing the role of firm exposure to competitive risk and financing risk, we also consider the impact of corporate governance quality on the relation between product market competition and debt choice. Since competition plays a major governance role that decreases the need for bankers' tight control, it is worth noting that this governance effect might be influenced by the effectiveness of firm monitoring mechanisms. The crux of the argument here is that firms with different governance qualities should react differently to the disciplinary effect of competition. In other words, if a firm's monitoring mechanisms are deeply flawed, competition may act as a substitute source of monitoring, thus having a more pronounced disciplinary effect on poorly governed firms. This substitutability is highlighted in a number of empirical studies examining the joint impact of competition and governance practices on firm efficiency (Giroud and Mueller, 2010; Giroud and Mueller, 2011; Tian and Twite, 2011). Accordingly, we expect the bank monitoring substitution effect of competition to be stronger for firms where governance practices are relatively weak.

To capture the quality of corporate governance, we employ three specific proxies. First, we use long-term institutional investment horizon (*LONG_IO*). Recent studies show that institutional investors exhibit significant heterogeneity in their investment horizon preference, which might influence their monitoring function. As documented in prior research, long-term institutional investors provide superior monitoring since they have a longer horizon to learn about the firm and a significant influence on management decisions, thus increasing shareholder value in the long-run (e.g., Gaspar et al., 2005; Attig et al., 2013). We proxy for long-term institutional investment using the percentage of firm stock held by institutional investors with long investment horizon. Second, we use board independence (*BIDP*). Indeed, independent directors are more willing to meet their fiduciary responsibility, as they are less subject to potential conflicts of interest (e.g., Nguyen and Nielsen, 2010), which makes them better monitors of managerial discretion. We measure *BIDP* as the percentage of board members classified as independent. Third, we use analyst following (*ANALYSTS*). The literature points to evidence that the role of financial analysts in intermediating private information to the public is considered an effective governance mechanism likely to prompt action on agency concerns (e.g., Chen et al., 2015). Specifically, we define *ANALYSTS* as the natural logarithm of 1 plus the number of I/B/E/S analysts following a firm.

To better gauge the impact of governance quality on the relation between product market competition and debt choice, we run a regression model that includes interaction terms between our main competition variable (*FLUIDITY*) and the above-mentioned proxies that capture corporate governance quality. Table 10 presents the results of our regression analysis using institutional investment horizon (*LONG_IO*), board independence (*BIDP*), and analysts following (*ANALYSTS*) in Columns (1), (2), and (3), respectively. The results show that the negative relation between competition and bank debt reliance is stronger for firms with lower proportions of shares owned by long-term institutional investors, firms with a lower proportion of independent directors on the board, and firms followed by fewer analysts.[19] These findings corroborate our previous inferences that the disciplinary role of competition plays a higher monitoring substitution effect in firms with weaker governance practices (i.e., firms where

[19] Our resuls remain qualitatively unchanged when we interact *FLUIDITY* with an additional proxy of corporate governance quality, i.e., institutional ownership measured as the percentage of shares held by institutional investors.

agency problems are severe). Overall, our analysis provides insights on the disciplinary channel through which the relation between competition and debt choice operates.

[Insert Table 10 about here]

5. Product market competition and debt maturity

We have shown that product market competition is negatively associated with firm reliance on bank debt, consistent with the bank monitoring substitution hypothesis. This section extends our analysis of the substitution effect of product market competition by examining another important feature of a lending contract, namely, debt maturity. To the extant that bank debt often has shorter maturity than bonds (e.g., Johnson, 1997) and that debt maturity is an important determinant of lender monitoring incentives, we also expect the substitution effect of competition to be related to debt maturity.

The banking literature abounds with arguments advocating that short-term maturity loans play a major role in monitoring insiders and forcing them to efficiently run their firms. Indeed, short-term debt requires borrowers to continuously return to their lenders to renew their debt contracts. As a consequence, lenders have the ability to frequently assess borrowers' creditworthiness, and accordingly implement conditions for refinancing (Barclay and Smith, 1995). These frequent renewals and renegotiations of short-term debt contracts are likely to subject insiders to heightened scrutiny and efficient monitoring by bank lenders (Park, 2000). A resulting implication of the monitoring role of short-term debt is that firms exhibiting higher monitoring needs rely more strongly on debt contracts with shorter maturities. For instance, El Ghoul et al., (2015) provide evidence that firms exposed to the strict monitoring of Big Four auditors enjoy longer debt maturities, suggesting a substitution relation between audit quality and short-term debt. In light of these arguments, and given our previous results that competition reduces the need for bank monitoring, we would also expect that the disciplinary role of competition substitutes for short-term debt monitoring.

Table 11 presents the results of our regressions on the impact of product market competition on debt maturity. In columns (1) and (2), we estimate OLS regressions where the dependent variables are defined as the proportion of total debt maturing within two (*DMAT2*) and four years (*DMAT4*), respectively. In columns (3) and (4), we estimate logit regressions in

which the binary dependent variables take the value 1 if more than 50% of a firm's debt structure is composed of long-term debt maturing in two (*DMAT2D*) and four years (*DMAT4D*), respectively, and zero otherwise. The results presented in Table 11 show that all coefficient estimates on *FLUIDITY* are positive and statistically significant at the 1% level, suggesting that firms facing higher competitive pressure are more likely to rely on debt contracts with longer maturities. Reflecting the economic importance of our results, we find that moving from the 25th to the 75th percentile of product market fluidity translates into a 2.1% (2.2%) increase in the proportion of long-term debt maturing within 2 years (4 years). We interpret this result as consistent with the view that the external governance pressure of the product market reduces firms' monitoring needs, leading to lower reliance on the frequent monitoring of debt markets through short-term debt. Overall, these findings further substantiate our previous conclusions that the disciplinary power of competition substitutes for other forms of monitoring, such as bank monitoring and short-term debt monitoring.

[Insert Table 11 about here]

6. Conclusion

A large body of literature highlights the role of product market competition in driving corporate decisions and policies, such as financing decisions (Xu, 2012) and payout policies (Hoberg et al., 2014). Some studies argue that competitive pressure impinges on firms' information environments by discouraging them from disclosing their private information to rivals (Verrecchia, 1983). However, other studies imply that competition plays an effective governance role by increasing the likelihood of bankruptcy, and hence by forcing managers to work hard and to reduce self-serving expenditures (Hart, 1983; Shleifer and Vishny, 1997; Giroud and Mueller, 2010, 2011). The objective of the present study is to extend this line of research by focusing on the impact of product market competition on firms' reliance on bank debt.

To address this issue, we use a sample of 25,450 observations covering 3,675 U.S. firms over the 2001–2013 period. Consistent with the bank monitoring substitution hypothesis, we find that firms facing intense competitive pressure have a lower propensity to rely on bank debt financing, suggesting that the disciplinary power of competition substitutes for the tight monitoring provided by bank lenders. These results stand up to a battery of robustness checks,

including addressing endogeneity issues through a difference-in-difference analysis, an IV approach, and a change regression, using alternative proxies of product market competition and additional control variables. Our additional analysis further reveals that the role of competitive pressure in decreasing the need for bank-monitored debt is more pronounced for firms that are more likely to be sensitive to product market discipline, particularly firms that are exposed to competition, firms with more binding financial constraints, and firms with weaker governance practices. To substantiate our inferences, we also examine whether the substitution effect of competition extends to debt maturity, which is another aspect of debt that reflects lenders' monitoring incentives. The results confirm that the disciplinary power of competition reduces the need for other forms of monitoring that have similar disciplinary effects. Our results suggest that the disciplinary power of competition acts as an alternate governance mechanism for bank lenders' strict monitoring. In other words, firms substitute away from the tightened control of bank lenders to the loosened control of bonds when they face the pressure of the product market competition.

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APPENDIX

Variable definitions and sources

Variable	Definition	Source
Dependent variable		
BANK_DEBT	The ratio of bank debt to total debt	Capital IQ
Competition variables		
FLUIDITY	Cosine Similarity between a firm's own words vector and the change in rivals' words vector.	Hoberg and Philips Data Library
TNIC_HHI	The Herfindahl-Index calculated as the sum of the squared market shares using firm sales, based on TNIC industry classification of Hoberg and Phillips.	As above
CR	Concentration ratio measured as the sum of market shares of the four largest firms in terms of net sales in each industry (based on 3-digit industry classification).	Authors' calculation based on Compustat data
EPCM	The excess price-cost margin or industry-adjusted price-cost margin calculated as the profit-to-sale ratio minus the sales-weighted price-cost margin of all firms operating in the same industry.	As above
TNIC_LI	The Lerner Index calculated as one minus the average profit-to-sales ratio of all firms operating in the same TNIC industry of Hoberg and Phillips.	Authors' calculation based on Hoberg and Philips Data Library and Compustat data
LOG_NUM_FIRMS	The number of firms operating in each firm's industry, based on TNIC industry classification of Hoberg and Phillips.	Authors' calculation based on Hoberg and Phillips Data Library
Control variables		
SIZE	Firm size measured as the natural logarithm of total assets.	Compustat data
Q	Tobin's Q defined as the sum of market value of equity plus book value of debt divided by total assets.	As above
LEVERAGE	Firm leverage measured as the ratio of total liabilities to total assets.	As above
ROA	Firm profitability defined as the ratio of operating income before depreciation to total assets.	As above
TANGIBILITY	Asset tangibility calculated as the ratio of net property, plant and equipment to total assets.	As above
Z_SCORE	Firm's distress risk proxied by Altman's (1968) z-score, calculated as follows: (1.2*working capital + 1.4*retained earnings + 3.3*earnings before interest and taxes + 0.999*sales)/total assets + 0.6*(market value of equity / book value of debt).	As above
RATED	Dummy variable that takes one if for firms having an S&P long-term debt rating.	Capital IQ
INVGRADE	Dummy variable that takes one for firms having an investment grade S&P long-term rating.	Capital IQ
Variables used in robustness tests		
Tariff Rate	The ad valorem tariff rate calculated as the ratio of the duties collected from each industry to the dutiable value of imports using the 3-digit SIC industry classification.	Authors' calculation based on Schott's International Economics Resource

		Page
Tariff-Reduction	Dummy variable that takes one if the 3-digit SIC industry has experienced a large tariff reduction that is larger than 3 times the median reduction, and 0 otherwise.	As above
FIC_HHI	The Herfindahl-Index calculated as the sum of the squared market shares using firm sales, based on FIC industry classification of Hoberg and Phillips.	Hoberg and Philips Data Library
HHI2	Herfindahl-Hirschman Index calculated as the sum of the squared market shares using firm sales, based on 2-digit (SIC) Industry classification.	Authors' calculation based on Compustat data
HHI3	Herfindahl-Hirschman Index calculated as the sum of the squared market shares using firm sales, based on 3-digit (SIC) Industry classification.	As above
HHInaics	Herfindahl-Hirschman Index calculated as the sum of the squared market shares using firm sales, based on NAICS Industry classification.	As above
MARKET_SHARE	Firm market share defined as firm sales divided by industry sales.	As above
DIVIDEND_PAYER	Dummy variable that takes one if common stock dividends are positive.	As above
WW	Whited and Wu (2006) financial constraint index calculated as follows: –0.091*CashFlow – 0.062*Dummy-Dividend + 0.021*Leverage – 0.044*log(Assets) + 0.102IndustrySalesGrowth + 0.035*FirmSalesGrowth	As above
KZ	Kaplan and Zingales (1997) financial constraint index calculated as follows: -1.001909* CashFlow + 3.139193*Long-termDebt – 39.36780*Dividend – 1.314759*Cash + 0.2826389*Q	As above
LONG_IO	The fraction of firm stock held by institutional investors with long investment horizon.	Thomson Financial database
BIDP	The percentage of board members classified as independent.	IRRC Governance
ANALYSTS	Natural logarithm of one plus the number of analysts following a firm.	I/B/E/S
DMAT2	The ratio of long-term debt maturing in 2 years to total debt.	Authors' calculation based on Compustat data
DMAT4	The ratio of long-term debt maturing in 4 years to total debt.	As above
DMAT2D	Dummy variable that equals one if more than 50% of total debt is composed of long-term debt maturing in 2 years.	As above
DMAT4D	Dummy variable that equals one if more than 50% of total debt is composed of long-term debt maturing in 4 years.	As above

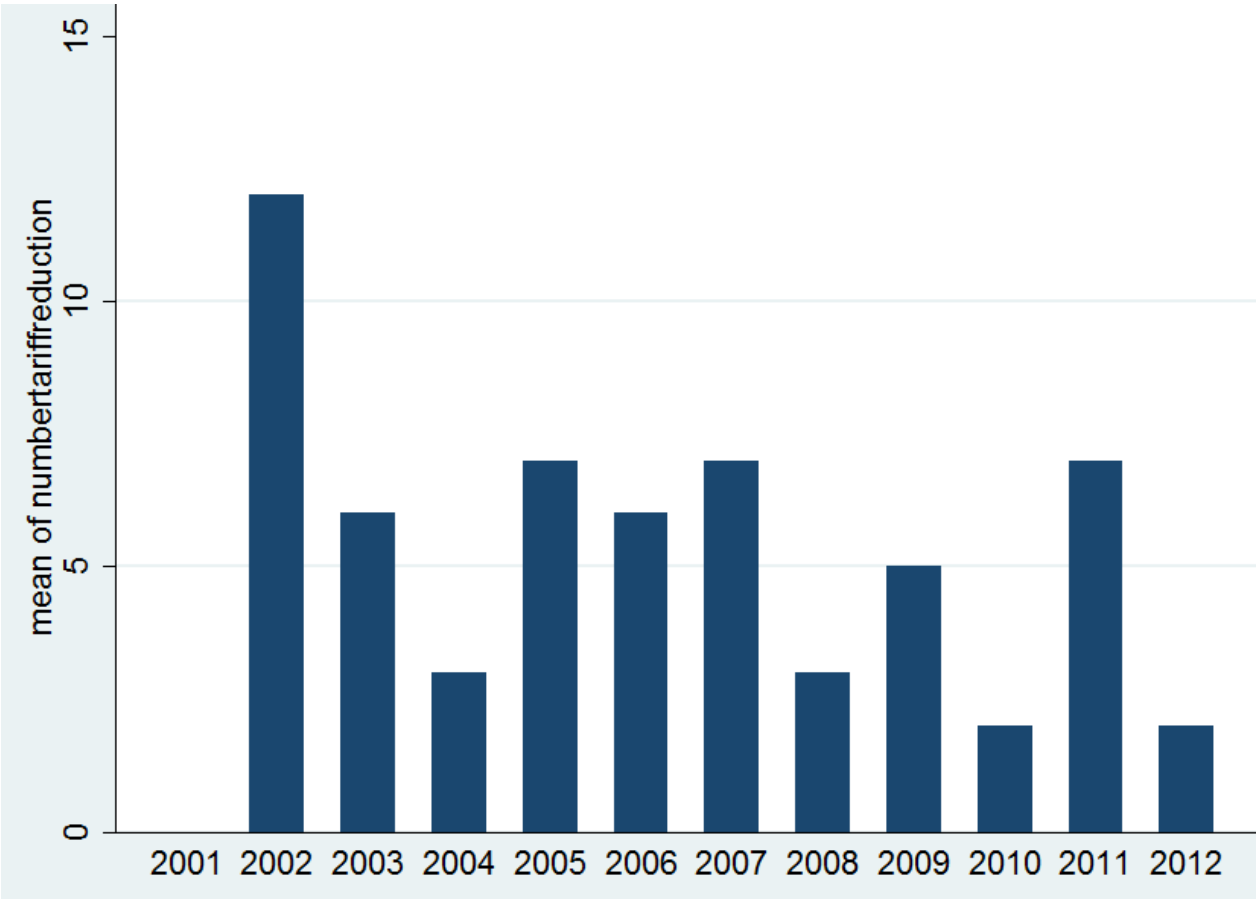

Figure 1
Number of tariff rate reductions in a given year
This figure shows the number of tariff rate reductions that occur in all three-digit SIC affected industries each year from 2002 to 2012.

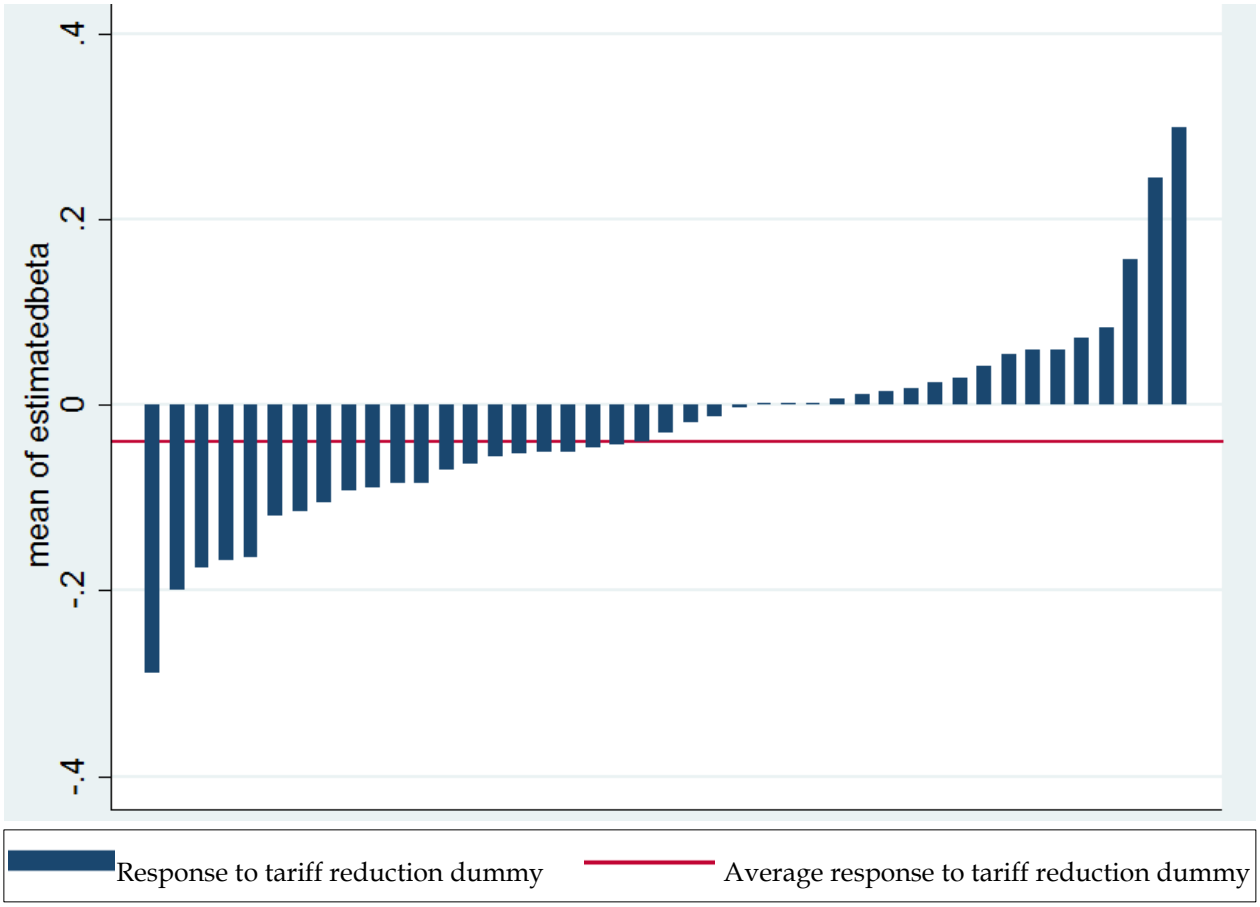

Figure 2
Cross-industry heterogeneity of bank debt reliance response
This fugure illustrates the difference-in-difference regression coefficients for each of the 43 industries that experience a large tariff reduction event.

Table 1
Summary Statistics

Variable	N	Mean	STD	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
BANK_DEBT	25,450	0.422	0.411	0	0	0.290	0.917	1
FLUIDITY	25,450	6.662	3.681	2.126	3.994	5.903	8.493	14.126
SIZE	25,450	6.365	1.956	3.192	4.924	6.362	7.683	9.735
Q	25,450	1.892	1.248	0.834	1.147	1.505	2.162	4.307
LEVERAGE	25,450	0.237	0.190	0.004	0.083	0.207	0.344	0.611
ROA	25,450	0.081	0.176	–0.263	0.059	0.114	0.166	0.263
TANGIBILITY	25,450	0.527	0.394	0.069	0.215	0.423	0.758	1.283
Z_SCORE	25,450	3.341	3.930	–1.787	1.721	2.895	4.659	9.569
RATED	25,450	0.357	0.479	0	0	0	1	1
INVGRADE	25,450	0.161	0.368	0	0	0	0	1

Notes: This table presents summary statistics for the variables used in our regressions. The sample comprises 24,450 observations covering 3,675 unique firms for the period spanning 2001 through 2013. The list of variables, definitions, and sources are provided in the Appendix.

Table 2
Correlations

	FLUIDITY	*SIZE*	*Q*	*LEVERAGE*	*ROA*	*TANGIBILITY*	*Z_SCORE*	*RATED*	*INVGRADE*
FLUIDITY	1.000								
SIZE	–0.077***	1.000							
Q	0.222***	–0.154***	1.000						
LEVERAGE	0.017***	0.244***	–0.136***	1.000					
ROA	–0.356***	0.374***	–0.172***	0.063***	1.000				
TANGIBILITY	–0.098***	0.064***	–0.160***	0.204***	0.194***	1.000			
Z_SCORE	–0.110***	0.041***	0.356***	–0.384***	0.424***	–0.127***	1.000		
RATED	–0.075***	0.688***	–0.117***	0.353***	0.230***	0.109***	–0.086***	1.000	
INVGRADE	–0.090***	0.542***	0.080***	–0.005	0.181***	0.018***	0.076***	0.479***	1.000

Notes: This table presents correlation coefficients between product market competition and other control variables. The sample comprises 25,450 observations covering 3,675 unique firms for the period spanning 2001 through 2013. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 3: The impact of product market competition on debt choice

Variables	OLS	Tobit	Prais Winsten	Newey West	WLS
FLUIDITY	–0.005***	–0.009***	–0.004***	–0.005***	–0.004***
	(–3.16)	(–3.39)	(–3.79)	(–3.76)	(–4.71)
SIZE	–0.045***	–0.064***	–0.030***	–0.045***	–0.044***
	(–10.76)	(–9.16)	(–8.26)	(–13.34)	(–22.78)
Q	–0.024***	–0.046***	–0.010***	–0.024***	–0.023***
	(–5.67)	(–5.78)	(–3.40)	(–6.51)	(–9.70)
LEVERAGE	0.114***	0.248***	0.194***	0.114***	0.120***
	(3.79)	(4.86)	(7.31)	(4.49)	(7.55)
ROA	0.261***	0.413***	0.102***	0.261***	0.282***
	(7.14)	(5.96)	(3.82)	(8.28)	(14.01)
TANGIBILITY	–0.009	0.021	–0.004	–0.009	–0.012
	(–0.51)	(0.77)	(–0.31)	(–0.64)	(–1.51)
Z_SCORE	–0.000	–0.000	–0.003**	–0.000	–0.001
	(–0.15)	(–0.07)	(–1.96)	(–0.17)	(–0.93)
RATED	–0.157***	–0.225***	–0.165***	–0.157***	–0.162***
	(–10.32)	(–9.28)	(–12.20)	(–12.55)	(–21.43)
INVGRADE	–0.082***	–0.076***	–0.066***	–0.082***	–0.081***
	(–5.61)	(–3.07)	(–4.92)	(–6.85)	(–9.24)
Intercept	0.921***	1.104***	0.749***	0.921***	0.921***
	(8.82)	(6.60)	(7.96)	(12.18)	(20.66)
Year_FE	Yes	Yes	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes	Yes	Yes
Observations	25,450	25,450	25,450	25,450	25,450
Adjusted R^2	0.170		0.124	0.170	0.177
Pseudo R^2		0.069			

Notes: This table provides the results of the regressions of the bank debt ratio on product market competition and other firm characteristics using different estimation techniques. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 4: The quasi-natural experiment

Variables	(1) Parallel Trend test	(2) Tariff reduction for year t	(3) Tariff reduction for 3 years later	(4) Placebo test
*Treatment*T(–3)*	0.026			
	(0.95)			
*Treatment*T(–2)*	–0.006			
	(–0.28)			
*Treatment*T(–1)*	–0.025			
	(–1.27)			
*Treatment*T(0)*	–0.034*			
	(–1.70)			
*Treatment*T(1)*	–0.035*			
	(–1.80)			
*Treatment*T(2)*	–0.039*			
	(–1.86)			
*Treatment*T(3)*	–0.048**			
	(–2.30)			
Tariff-Reduction		–0.030**	–0.038**	–0.016
		(–2.07)	(–2.37)	(–0.98)
SIZE	–0.052***	–0.047***	–0.047***	–0.047***
	(–7.83)	(–7.82)	(–7.82)	(–7.84)
Q	–0.013	–0.020***	–0.020***	–0.020***
	(–1.49)	(–3.47)	(–3.50)	(–3.55)
LEVERAGE	0.051	0.011	0.012	0.013
	(0.97)	(0.24)	(0.26)	(0.29)
ROA	0.444***	0.292***	0.292***	0.289***
	(6.61)	(6.23)	(6.29)	(6.21)
TANGIBILITY	0.015	0.040	0.042*	0.039
	(0.54)	(1.62)	(1.70)	(1.60)
Z_SCORE	–0.006*	–0.002	–0.002	–0.002
	(–1.73)	(–0.91)	(–0.86)	(–0.84)
RATED	–0.133***	–0.138***	–0.137***	–0.138***
	(–5.15)	(–5.82)	(–5.76)	(–5.82)
INVGRADE	–0.088***	–0.077***	–0.077***	–0.076***
	(–3.83)	(–3.54)	(–3.56)	(–3.51)
Intercept	0.854***	0.614***	0.799***	0.804***
	(14.10)	(7.54)	(15.97)	(15.99)
Year_FE	Yes	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes	Yes
Observations	9,598	12,218	12,218	12,218
Adjusted R^2	0.190	0.157	0.158	0.157

Notes: This table provides the results of the difference-in-difference analysis. Column (1) presents regression results using the parallel trend assumption test. Columns (2) and (3) present regression results on the impact of the tariff reduction shock of the bank debt ratio. Column (4) presents the regression results of the pseudo-event test. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 5: Addressing endogeneity

Variables	*Instrumental variable approach*		*Change regression*
	First stage	**Second stage**	
FLUIDITY		–0.018***	–0.002**
		(–5.55)	(–1.97)
SIZE	0.153***	–0.043***	0.050***
	(6.08)	(–8.82)	(4.53)
Q	0.122***	–0.022***	–0.001
	(4.23)	(–4.28)	(–0.31)
LEVERAGE	0.407**	0.065*	0.229***
	(1.97)	(1.89)	(6.29)
ROA	–2.766***	0.214***	–0.048
	(–10.97)	(4.73)	(–1.54)
TANGIBILITY	–0272**	0.014	0.047**
	(–2.53)	(0.77)	(2.26)
Z_SCORE	0.032***	0.001	–0.002**
	(2.83)	(0.38)	(–2.53)
RATED	–0.164*	–0.162***	–0.022***
	(–1.68)	(–9.46)	(–6.69)
INVGRADE	–0.221*	–0.081***	0.001
	(–1.94)	(–5.14)	(0.35)
IV of FLUIDITY	0.659***		
	(42.27)		
Constant	0.296	0.976***	0.005***
	(0.37)	(8.73)	(2.69)
Year_FE	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes
Observations	20,475	20,475	20,925
Adjusted R^2	0.637	0.199	0.013

Notes: This table provides the regression results of the two stages of the instrumental variable approach and the change regression of the relation between product market competition and bank debt ratio. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 6: Alternative PMC-related variables

Variable	Alternative PMC-related variables				
	(1)	(2)	(3)	(4)	(5)
TNIC_HHI	0.095***				
	(4.61)				
CR		0.098***			
		(3.08)			
EPCM			0.001**		
			(2.19)		
TNIC_LI				–0.001***	
				(–2.79)	
LOG_NUM_FIRMS					–0.029***
					(–6.86)
SIZE	–0.043***	–0.046***	–0.046***	–0.046***	–0.041***
	(–10.45)	(–11.11)	(–10.73)	(–23.70)	(–9.93)
Q	–0.025***	–0.025***	–0.026***	–0.025***	–0.021***
	(–5.82)	(–5.92)	(–5.50)	(–10.86)	(–4.96)
LEVERAGE	0.109***	0.115***	0.136***	0.114***	0.097***
	(3.64)	(3.83)	(4.28)	(7.14)	(3.24)
ROA	0.277***	0.279***	0.343***	0.279***	0.238***
	(7.71)	(7.69)	(8.45)	(14.41)	(6.61)
TANGIBILITY	–0.004	–0.003	–0.004	–0.006	–0.007
	(–0.21)	(–0.19)	(–0.23)	(–0.71)	(–0.43)
Z_SCORE	–0.000	–0.000	–0.002	–0.000	–0.001
	(–0.20)	(–0.11)	(–0.87)	(–0.34)	(–0.38)
RATED	–0.157***	–0.157***	–0.166***	–0.157***	–0.159***
	(–10.33)	(–10.28)	(–10.55)	(–20.27)	(–10.48)
INVGRADE	–0.079***	–0.079***	–0.077***	–0.076***	–0.086***
	(–5.48)	(–5.43)	(–5.24)	(–8.56)	(–5.89)
Constant	0.846***	0.812***	0.916***	0.902***	0.935***
	(8.05)	(7.61)	(8.51)	(18.40)	(8.88)
Year_FE	Yes	Yes	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes	Yes	Yes
Observations	25,440	25,440	23,660	25,440	25,440
Adjusted R^2	0.171	0.170	0.178	0.169	0.175

Notes: This table provides the regression results of our baseline model using alternative proxies for product market comeptition. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 7: Additional control variables

Variable	Concentration variables			
	(1)	(2)	(3)	(4)
FLUIDITY	–0.004***	–0.005***	–0.004***	–0.004***
	(–2.82)	(–3.15)	(–2.84)	(–2.72)
SIZE	–0.044***	–0.045***	–0.044***	–0.044***
	(–10.63)	(–10.76)	(–10.73)	(–10.70)
Q	–0.024***	–0.024***	–0.024***	–0.024***
	(–5.67)	(–5.68)	(–5.67)	(–5.60)
LEVERAGE	0.113***	0.114***	0.116***	0.113***
	(3.77)	(3.80)	(3.86)	(3.77)
ROA	0.259***	0.261***	0.259***	0.258***
	(7.09)	(7.12)	(7.07)	(7.06)
TANGIBILITY	–0.009	–0.008	–0.008	–0.008
	(–0.51)	(–0.50)	(–0.46)	(–0.47)
Z_SCORE	–0.000	–0.000	–0.000	–0.000
	(–0.13)	(–0.14)	(–0.13)	(–0.14)
RATED	–0.157***	–0.156***	–0.157***	–0.156***
	(–10.29)	(–10.28)	(–10.30)	(–10.25)
INVGRADE	–0.084***	–0.082***	–0.084***	–0.083***
	(–5.72)	(–5.62)	(–5.71)	(–5.69)
FIC_HHI	0.059**			
	(2.45)			
HHI2		0.146		
		(1.27)		
HHI3			0.092**	
			(2.36)	
HHInaics				0.879***
				(8.22)
Constant	0.902***	0.869***	0.894***	0.859***
	(8.51)	(7.66)	(8.54)	(8.66)
Year_FE	Yes	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes	Yes
Observations	25,419	25,440	25,440	25,440
Adjusted R^2	0.170	0.170	0.171	0.170

Notes: This table presents the impact of the use of additional control variables on the relation between product market competition and debt choice. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 8: The impact of product market competition on debt choice – The role of exposure to competition

Variable	Exposure to competition variables		
	(1)	(2)	(3)
FLUIDITY	–0.006***	–0.009***	–0.012***
	(–3.86)	(–4.26)	(3.51)
MARKET_SHARE	–0.158**		
	(–2.55)		
*FLUIDITY*MARKET_SHARE*	0.041***		
	(3.94)		
HHI2		–0.239	
		(–1.50)	
*FLUIDITY*HHI2*		0.058***	
		(3.30)	
CR			–0.136
			(–1.38)
*FLUIDITY*CR*			0.021**
			(2.47)
SIZE	–0.046***	–0.044***	–0.044***
	(–10.78)	(–10.74)	(–10.71)
Q	–0.024***	–0.024***	–0.024***
	(–5.59)	(–5.54)	(–5.59)
LEVERAGE	0.117***	0.113***	0.114***
	(3.92)	(–3.75)	(3.81)
ROA	0.254***	0.253***	0.251***
	(6.94)	(6.93)	(6.85)
TANGIBILITY	–0.008	–0.010	–0.009
	(–0.48)	(–0.61)	(–0.57)
Z_SCORE	–0.000	–0.000	–0.000
	(–0.10)	(–0.15)	(–0.09)
RATED	–0.157***	–0.158***	–0.158***
	(–10.32)	(–10.39)	(–10.37)
INVGRADE	–0.086***	–0.082***	–0.083***
	(–5.73)	(–5.58)	(–5.68)
Constant	0.932***	0.932***	0.986***
	(8.94)	(8.24)	(7.58)
Year_FE	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes
Observations	25,450	25,450	25,440
Adjusted R^2	0.171	0.171	0.171

Notes: This table reports regression results on the impact of a firm's exposure to competition on the relation between product market competition and debt choice. As proxies for the exposure to competition, we use *MARKET_SHARE, HHI2,* and *CR*. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 9: The impact of product market competition on debt choice – The role of financial constraints

Variable	Financial constraints variables		
	(1)	(2)	(3)
FLUIDITY	–0.008***	–0.005***	–0.006***
	(–4.36)	(–2.79)	(–3.57)
DIVIDEND_PAYER	–0.063***		
	(–3.22)		
*FLUIDITY*DIVIDEND_PAYER*	0.011***		
	(4.31)		
KZ		0.014***	
		(2.72)	
*FLUIDITY*KZ*		–0.001***	
		(–2.61)	
WW			0.025***
			(3.09)
*FLUIDITY*WW*			–0.001***
			(–3.10)
SIZE	–0.045***	–0.043***	–0.044***
	(–10.54)	(–10.11)	(–10.52)
Q	–0.023***	–0.022***	–0.024***
	(–5.48)	(–5.11)	(–5.66)
LEVERAGE	0.113***	0.099***	0.112***
	(3.77)	(3.09)	(3.72)
ROA	0.250***	0.270***	0.267***
	(6.82)	(7.25)	(7.27)
TANGIBILITY	–0.009	–0.009	–0.008
	(–0.53)	(–0.51)	(–0.46)
Z_SCORE	–0.000	–0.001	–0.000
	(–0.14)	(–0.62)	(–0.22)
RATED	–0.157***	–0.163***	–0.157***
	(–10.34)	(–10.52)	(–10.28)
INVGRADE	–0.083***	–0.084***	–0.082***
	(–5.42)	(–5.48)	(–5.58)
Constant	0.942***	0.915***	0.927***
	(9.11)	(8.22)	(8.86)
Year_FE	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes
Observations	25,440	24,077	25,324
Adjusted R^2	0.171	0.169	0.171

Notes: This table reports regression results on the impact of a firm's financial constraints on the relation between product market competition and debt choice. As proxies for the financial constraints, we use *DIVIDEND_PAYER, KZ index,* and *WW index*. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 10: The impact of product market competition on debt choice – The role of governance quality

Variables	Governance variables		
	(1)	(2)	(3)
FLUIDITY	–0.011***	–0.020***	–0.008***
	(–4.05)	(–4.77)	(–3.68)
LONG_IO	–0.417***		
	(–3.86)		
*FLUIDITY*LONG_IO*	0.038***		
	(2.69)		
BIDP		–0.178***	
		(–4.16)	
*FLUIDITY*BIDP*		0.021***	
		(3.80)	
ANALYSTS			–0.049***
			(–5.59)
*FLUIDITY*ANALYSTS*			0.002**
			(2.16)
SIZE	–0.048***	–0.044***	–0.043***
	(–9.65)	(–13.73)	(–14.06)
Q	–0.023***	–0.004	–0.012***
	(–4.53)	(–0.83)	(–4.22)
LEV	0.069**	–0.041	0.029
	(2.04)	(–1.59)	(1.64)
ROA	0.269***	0.430***	0.259***
	(6.15)	(9.54)	(11.62)
TANG	–0.013	–0.049***	–0.047***
	(–0.70)	(–3.62)	(–4.52)
ZSCORE	–0.003	–0.010***	–0.005***
	(–1.28)	(–5.34)	(–4.63)
RATED	–0.138***	–0.123***	–0.133***
	(–8.39)	(–13.01)	(–16.24)
INVGRADE	–0.069***	–0.069***	–0.071
	(–4.37)	(–6.81)	(–7.37)**
Constant	1.031***	1.109***	0.894***
	(7.82)	(15.15)	(15.33)
Year_FE	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes
Observations	20,699	13,540	21,904
Adjusted R^2	0.176	0.254	0.222

Notes: This table reports regression results on the impact of a firm's governance quality on the relation between product market competition and debt choice. As proxies for governance quality, we use *LONG_IO*, *BIDP*, and *ANALYSTS*. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.

Table 11: The impact of product market competition on debt maturity

Variable	Dependent variables			
	DMAT2	DMAT4	DMAT2D	DMAT4D
FLUIDITY	0.005***	0.005***	0.050***	0.029***
	(4.39)	(3.67)	(5.45)	(3.71)
SIZE	–0.042***	–0.036***	–0.340***	–0.229***
	(–14.76)	(–10.41)	(–14.65)	(–10.19)
Q	0.012***	0.010***	0.087***	0.050**
	(3.41)	(2.84)	(3.69)	(2.15)
LEVERAGE	–0.418***	–0.278***	–4.080***	–1.462***
	(–19.40)	(–11.07)	(–17.73)	(–8.98)
ROA	–0.180***	–0.076**	–0.547***	–0.098
	(–6.69)	(–2.58)	(–2.91)	(–0.53)
TANGIBILITY	0.004	0.019	–0.132	0.068
	(0.36)	(1.49)	(–1.44)	(0.84)
Z_SCORE	0.004***	0.003**	0.010	0.013
	(3.18)	(1.96)	(1.14)	(1.38)
RATED	–0.064***	–0.145***	–0.699***	–0.766***
	(–7.94)	(–12.90)	(–6.93)	(–11.21)
INVGRADE	0.051***	0.032**	0.056	–0.008
	(5.52)	(2.51)	(0.43)	(–0.09)
Constant	0.549***	0.705***	0.952	1.012**
	(8.71)	(10.22)	(1.19)	(2.36)
Year_FE	Yes	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes	Yes
Observations	21,874	21,744	21,692	21,743
Adjusted R^2	0.246	0.193		
Pseudo R^2			0.237	0.144
Chi-square statistic			5,647.28***	4,330.51***

Notes: This table provides the regression results of the impact of product market competition on debt maturity. In the first two columns, the dependent variables are the proportion of total debt maturing in 2 and 4 years, respectively. In the second two columns, the dependent variables are dummy variables that take one if more than 50% of total debt is long-term debt maturing in 2 and 4 years, respectively. All reported t–values in parentheses are based on robust standard errors adjusted for heteroskedasticity and clustered by firm. The list of variables, definitions, and sources are provided in the Appendix. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively.