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Three Essays in Firm Financing Decision

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ABSTRACT

This dissertation is composed of three essays on financing decisions by firms. The first essay examines the cost of borrowing in the syndicated loan market for recent IPO firms. We find evidence of informational rent extraction by IPO underwriters that lend to firms after going public. The (informed) lender affiliated to the IPO underwriter on average earns a 5% higher abnormal payoff (interest) than an unaffiliated lender. When these loans commence trading on the secondary market, loans originated by affiliated lenders increase by 97 bps more than loans originated by unaffiliated lenders. Thus, the primary and secondary market evidence supports the hypothesis of informed lenders extracting informational rents from borrowers.

The second essay explores the IPO decisions and the pricing of equity. In a difference-in-difference (DD) framework, I provide causal evidence on the role of financial constraints on the IPO decision and the associated underpricing. I use the adoption of interstate banking laws as an exogenous variation in the availability of bank credit and thereby financial constraints. I find that financially constrained (FC) firms are more likely to pursue an IPO in response to a credit shock, and these FC issuers incur higher issuance costs in the form of higher underpricing. Post-issuance, FC firms exhibit higher investment intensity than Non-Financially Constrained (NFC) firms.

Finally, in the third essay I examine the implication of bundling M&A advisory and deal financing. The payoff to M&A advisers is usually contingent on deal completion but independent of deal outcome. This contractual arrangement may result in an agency problem. I examine whether bundling of M&A advisory and financing mitigates this problem. Consistent with contract theory, I find that buy-side advisers are more likely to finance deals when the agency problem is the most severe i.e., complex deals. These advisers trade off lower advisory fees for higher interest rates. Deal financing by advisers reduces the completion time and elicits a positive response from the market.

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CHAPTER 1

INFORMATION EFFICIENCY OR HOLD-UP WITH UNIVERSAL BANKS? SOME EVIDENCE FROM POST-IPO LOANS

1.1. INTRODUCTION

The debate on the separation of commercial and investment banking activities of financial intermediaries continues unabated. Literature predominantly focuses on the benefits borrowers derive when financial intermediaries combine lending with other financial services to realize economies of scope (Gande, Puri, Saunders, and Walter (1997); (Drucker and Puri 2005); and many others). However, an equally important but less understood issue is the adverse outcome of the emergence of these one-stop shop intermediaries also known as universal banks on borrowers. The recent financial crisis of 2008 has brought the issue of combining lending with investment banking back into the spotlight. Banks can create relationship specific capital through lending and non-lending relationships and can potentially exploit this capital at the expense of their clients. We examine the implications of universal banks using private information collected during the initial public offering (IPO) underwriting process on the subsequent lending decision.

The interaction between banks and firms extends beyond lending relationships to other financial services such as securities underwriting, financial advisory, securities trading, analyst support, and investment management. Financial intermediaries use information collected through lending relationships to trade in equity markets ((Massa and Rehman 2008); (Ivashina and Sun 2011)) and derivative markets (Acharya and Johnson 2007).

These banks when acting as M&A advisors exploit inside information to make favorable bets in the options market (Lowry, Rossi, and Zhu 2018) and in the equity market (Bodnaruk, Massa, and Simonov 2009). This opportunistic behavior of the universal banks may have an adverse impact on its clients. Further, creditors can influence the management to make decisions that benefit the creditor at the expense of the shareholder. It has been found that lenders can utilize their position on the borrower's board of directors to solicit lending business and charge high interest rates on these loans (Ferreira and Matos 2012). The objective of this study is to bridge the gap in the literature on the adverse impact on borrowers when financial intermediaries cross-sell loans and equity underwriting by addressing two questions. First, do IPO firms exhibit a preference for specific lenders when borrowing after the IPO? Second, does this preference result in adverse outcomes for the borrowers?

An IPO is a watershed event in the life of a firm. Universal banks that act as underwriters to the IPO collect information on the firm's operations and management to price the equity issuance. The underwriter can reuse this inside information in the near future while making lending decisions to the issuing firm. In other words, the underwriter can create a relationship specific asset by performing due diligence on the issuer. Thus, IPO underwriting, and the subsequent lending provides an ideal context to test the implications of lenders exploiting private information.

Our hypothesis is motivated by the seminal work of Sharpe 1990 on rent extraction by informed lenders. He develops a theoretical model to show that lenders can use relationship specific assets to extract economic rents from high quality borrowers.[1] On the lines of Von Thadden 2004, we show that in a lending game between informed and uninformed lenders, the informed lenders can earn informational rents from good borrowers. Thus, we hypothesize that lenders affiliated to the IPO underwriters are more likely to charge higher spreads than commensurate with the borrower's risk on post-IPO loans. We test our hypotheses using data on syndicated loans from LPC's Dealscan and IPOs from SDC Platinum. Our primary sample includes **630** IPOs and **4,189** loans originated within 5 years from the IPO offer date. We find that loans originated by a lender affiliated to the IPO underwriter (informed) are 9% more expensive than loans originated by a lender that is unrelated to the IPO underwriter (uninformed).

A firm's decision to choose a lender may be endogenous, i.e., issuers and underwriters may self-select based on preferences and characteristics. In fact, we show that affiliated lenders in the theoretical model may prefer lending to good firms in equilibrium. Our empirical design accounts for this non-random matching between lenders and borrowers by implementing a self-selection model (Fang 2005; Li and Prabhala 2007). The first-stage lender-borrower matching regression indicates that large borrowers, borrowers with long term credit ratings, and borrowers with concentrated lending relationships are more likely to be paired with informed (affiliated) lenders. The second-stage regression indicates that loans originated by informed lenders are 5% more expensive than loans

[1] These locked-in borrowers can eventually reduce bank's ability to extract rents through implicit contracts (Sharpe (1990)) and multiple sources of financing (Rajan (1992)).

originated by uninformed (unaffiliated) lenders. Our results are robust after controlling for loan purpose, loan type, industry and time fixed effects.

The non-price features of the loan contract also support the informational rent extraction hypothesis. Lenders may be willing to forego control rights (covenants) in exchange for rights to surplus and thus, the difference in the pricing of the loan could be attributed to a tradeoff. We do not find any significant difference between the covenants for loans originated by affiliated and unaffiliated lenders.

It is possible that the firm private information is correlated with lender characteristics and firm risk. We perform additional tests to show that the information priced in the loan is distinct from lender characteristics and borrower risk. Commercial and investment banks may pursue different lending policies. We account for this difference in our analysis. Systematic and idiosyncratic risk affect the price of debt securities (Campbell and Taksler 2003). We account for differences in overall borrower risk by controlling for the volatility of equity in our analysis.

We devise a cleaner test to provide more conclusive evidence on informational rent extraction by comparing the origination price with the secondary market price for the same loan. In an efficient secondary market, when private information is disseminated, the price of the loan will converge to its fair value. We find that the price of loans originated by informed lenders on average increases by 97 basis points (bps) more than loans originated by uninformed lenders. In other words, the yield on loans from affiliated lenders decreases more in the secondary market than the yield on loans from unaffiliated lenders. We conclude that affiliated lenders originate loans at higher interest rates than commensurate with the firm's risk.

Finally, we confirm our findings through a series of robustness tests. The possibility of earning abnormal profits would reduce with the passage of time because the value of private information collected during the IPO will diminish. It turns out that the economic value of rents is the strongest for the first loan after the IPO and is absent in a sample of loans originated between the sixth and tenth year after the IPO. Overall, the evidence presented here supports the idea that IPO underwriters can create relationship specific capital through the IPO underwriting process and may extract informational rents when they lend to the IPO firm.

The initial empirical evidence on lender rent extraction in the literature focuses on the intensity of lending relationships and source of funding (Houston and James 1996; Farinha and Santos 2002). In more recent studies, one strand of literature evaluates the impact of lending relationships on the average cost of loans around a significant event such as equity IPO (Schenone 2010) or bond IPO (Hale and Santos 2009). A second strand of the literature explores the hold-up problem by comparing the cost of borrowing for firms with and without access to alternative sources of financing such as bond markets (Santos and Winton 2008) and external equity (Wu, Sercu, and Yao 2009). However, our attempt at understanding the rent extraction by lenders differs in at least two aspects from the documented findings. First, we identify a new channel for informational rent extraction by evaluating the impact of information collected through equity underwriting on the subsequent lending decision. Second, we overcome the endogeneity problem associated with the aforementioned studies by tracking the price of the same loan in the primary and secondary markets to draw conclusions on rent extraction.

The empirical issue addressed in our paper is related to (Drucker and Puri 2005) and (Schenone 2010). Drucker and Puri 2005 find evidence of an economies of scope wherein concurrent lending and SEO underwriting lowers borrowing costs. Schenone 2010 exploits the initial public offering (IPO) as an informational shock and finds evidence of rent extraction before the IPO and economies of scale after the IPO. We combine the issues in these papers by evaluating how IPO underwriters can utilize the private information produced in the underwriting process to extend loans to the IPO firm in the near future. Contrary to our findings, Chen, Ho, and Weng 2013 find that borrowers benefit by borrowing from their IPO underwriters.

The rest of the paper is organized as follows. We develop the hypotheses in Section II and describe the identification strategy in Section III. In section IV, we present the summary statistics. The main results are presented in Section V, followed by robustness checks in Section VI, and a confirmatory test using secondary market data in Section VII. Finally, we conclude in Section VIII.

1.2. A MODEL AND HYPOTHESIS DEVELOPMENT

The underwriter collects private information on the firm during the pre-IPO due diligence process and thus can create "relationship specific capital" (C. M. James 1992; Rajan 1992). An underwriter can exploit this relationship specific asset in multiple ways. First, underwriters are more likely to be involved in subsequent equity offerings of the issuer. Thus, IPO underwriting results in the creation of valuable relationship capital through loyalty (Burch, Nanda, and Warther 2005). Second, the underwriter can utilize the information for a quid pro quo arrangement with its institutional investor and retail clients. Underwriters allocate "hot" IPOs to its institutional clients in exchange for brokerage commissions (Reuter 2006; Nimalendran, Ritter, and Zhang 2007) and to retail depositors in exchange for loans (Puri and Rocholl 2008). Finally, the underwriter can reuse this information to lend to the equity issuer and possibly extract informational rents from the firm i.e., hold-up (Rajan (1992)). In general, severity of hold-up is greater when the duration of the lending relationship is long (Degryse and Van Cayseele 2000), the lender is a large bank (Kano et al. 2011), and the lending market is concentrated (Petersen and Rajan 1995).

In this section, we illustrate the theoretical mechanism underpinning our empirical analysis. The mechanism was first elucidated in a model by Sharpe 1990 and this model was later modified by Von Thadden 2004. On the lines of Von Thadden 2004, we build on Sharpe's model to provide a mathematical intuition for our empirical work. Our model is set up as a two-period game between borrowers and lenders. Lenders are of two types – informed inside lender and uninformed outside lender. The inside lender collects private information on its borrowers' quality in the first period and uses this information in making lending decisions in the subsequent period. The outside lender competes with the inside lender to finance the borrower's project in the second period.

1.2.1. The Model Setup

Consider an economy with 2 types of firms – good (H) and bad (L). There are three times and two periods. A firm starts a project at t= t_0 and needs borrow I to invest in the project at t=t_1. If the project is successful, it will generate a cash flow of X that is sufficient to repay the bank at all reasonable rates at t=t_2. If the project is unsuccessful, the payoff is zero. The project cash flow at t=t_2 is observable and verifiable to all parties.

At $t=t_0$, firms establish a relationship through their IPO process with a lender (informed). We assume that this inside (informed) lender collects information on the borrower till $t=t_1$. For a particular borrowing firm, all the other lenders that are not affiliated with its underwriter do not collect information on the firm and remain uninformed. At $t=t_1$, an intermediate signal for each firm can be observed by the inside lender and the firm. This intermediate signal Υ is given by:

$$\Upsilon \begin{cases} S & \text{if the firm exhibits good performance in period } 1 \\ F & \text{if the firm exhibits bad performance in period } 1 \end{cases}$$

The probability for $\Upsilon=S$ for an H firm is p_H, and the probability for $\Upsilon=S$ for an L firm is p_L. We assume that $p_H > p_L$. We also assume that the signal is private and cannot be observed by the uninformed (outside) banks. The outside banks know the identity of the inside bank for a borrower and the parameters for its private signal.

At $t=t_1$, firms can choose to borrow either from the inside lender (affiliated to the IPO underwriter) or from an outside lender. A borrowing firm will choose a lower rate if the inside and outside banks offer different rates and will randomly choose a lender if the same rate is offered. Banks are risk neutral, engage in Bertrand competition, and have unlimited access to funds at the net interest rate $\bar{r}$. Figure 1 provides a graphical representation of the two-period game.

We assume that the probability of success of the project at $t=t_2$ for an "H" and "L" firm is also p_H and p_L, respectively. There are a fraction of θ high firms in the economy. Thus, the unconditional (pooled) probability of success at $t=t_2$, as well as observing good performance at $t=t_1$, is

$$p_P = \theta p_H + (1\text{-}\theta)\, p_L \quad (1)$$

The Bayesian probabilities for success in period 2 after the inside lender observes the signal ϒ in period 1 are given by p(ϒ=S) and p(ϒ=F).

$$p(\Upsilon = S) = p_H\, p(H|\Upsilon = S) + p_L p(L|\Upsilon = S)$$

$$= p_H\, p(H|\Upsilon = S) + p_L(1 - p(H|\Upsilon = S)) \quad (2)$$

Note that

$$p(H|\Upsilon = S) = \frac{\theta p_H}{p_P} \quad (3)$$

So we can rewrite Eq. (2) and have

$$p(\Upsilon = S) = \frac{p_H^2\, \theta + p_L^2\, (1-\theta)}{p_P} \quad (4)$$

Similarly,

$$p(\Upsilon = F) = \frac{(1-p_H)p_H\, \theta + (1-p_L)p_L(1-\theta)}{1-p_P} \quad (5)$$

It is evident from the above expressions that p(ϒ =S) > p_P > p(ϒ =F).

At t=t_1, a lender can be uninformed and thus cannot offer different rates for different borrowers. Denote the break-even rate for an uninformed lender as r_P. Note that a failed project offers zero payoffs, so we have:

$$(1 + r_P) = \frac{1+\bar{r}}{p_P} \quad (6)$$

An informed lender can offer different rates t=t_1 based on the signal Υ. Denote the break-even rates for $\Upsilon = S$ and $\Upsilon = F$ as r_S and r_F, respectively. We have

$$(1 + r_S) = \frac{1+\bar{r}}{p_S} \quad (7)$$

$$(1 + r_F) = \frac{1 + \bar{r}}{p_F} \quad (8)$$

Clearly, $r_S < r_P < r_F$.

If $r_{S,}$ $r_{P,}$ and r_F.are the three rates that any bank can offer, an informed lender will r_P when it gets a signal of $\Upsilon = S$ and r_F when it gets a signal of $\Upsilon = F$. Note that an informed bank will not offer r_S since a signal of $\Upsilon = S$ cannot be observed by an outside bank. Also note that an outside bank cannot offer a rate of r_P: If an outside bank offers this rate to all firms, it will attract all firms with a signal of $\Upsilon = F$ and a firm with a signal of $\Upsilon = S$ will randomly choose between an informed or an uninformed bank. Consequently, the outside bank will earn a negative profit. Instead, the outside bank can be better off by offering r_F to all firms. At equilibrium, a firm with a signal of $\Upsilon = S$ always borrows from the informed bank, and a firm with a signal of $\Upsilon = F$ will randomly choose between an informed and an uninformed lender.

However, a bank should be able to lend at whatever rate it chooses. If so, the aforementioned analysis is incomplete and there is no Nash equilibrium in pure strategies. But there exists a Nash equilibrium in mixed strategies (Von Thadden 2004). Following Von Thadden (2004), we first prove that no Nash equilibrium exists in our model setup in Proposition 1 and identify the Nash equilibrium in mixed strategies in Proposition 2.

Proposition 1: *The lending game in period 2 has no Bayesian Nash equilibrium in pure strategies.*

Proof: See Appendix B

The intuition behind Proposition 1 is simple. The inside bank of a borrowing firm can potentially earn informational rents by charging a rate above the expected rate. But for any pure strategies (i.e., set a particular interest rate for an H firm), if the rate for an H firm is high enough for an outside bank to earn at least zero profit, the outside bank would offer the same rate as the inside bank. In our model, this critical interest rate is

$$r' = \frac{\frac{1}{2}p_p r_S + (1-p_p) r_F}{1 - \frac{1}{2}p_p}$$

When the inside bank offers a rate that in at or above r', an outside bank has an incentive to offer r'. Call this case the high rate case. For the high rate case, the inside bank has an incentive to lower the rate to outbid the outside lender and gain more lending business for H firms and collect more informational rents. But for any rates that are below r', an outside will only offer r_F and hence will only lend to L firms. Call this the low rate case. In this case, the inside bank has an incentive to increase the rate to earn more informational rents from H firms. Thus, neither the high nor the low rate case can be an equilibrium.

The above game is similar to a non-cooperative first-price, sealed bid auction with asymmetric information, where the set-up involves an informed bidder and an uninformed bidder. The equilibrium for such a model has been characterized by Wilson 1967 and Engelbrecht-Wiggans, Milgrom, and Weber 1983. The optimum bidding strategy for both bidders must consider both the private information of a competing bidder and the information revealed when a bid wins over competing offers. There exists a mixed strategy equilibrium such that the expected profits for uninformed bidders are zero, while informed bidders earn a positive profit. Hendricks and Porter 1988 find empirical support for the existence of such an equilibrium.

The equilibrium with mixed strategies for our model is characterized as follows:

Proposition 2: *There exists a Bayesian Nash equilibrium in mixed strategies for the lending game in period 2. The inside bank offers* r_F *for firms with an F signal, and offers r with a density function of* $g_i^S(\mathrm{r}) = \frac{p(s)(1+\mathrm{r}_P)-(1+\bar{r})}{[p(S).(1+r)-(1+\bar{r})]^2}$ *, where* $r \in [r_p, r_F)$ *for firms with an S signal. An outside bank offers* r_F *with a probability of* $p(F)$ *and offers r with a density function of* $g_O = p(s)g_i^S(\mathrm{r})$*, where* $r \in [r_p, r_F)$ *for all firms.*

Proof: See Appendix B

Proposition 2 suggests that an outside lender can still put on a limited competition for good risk even without inside information. Furthermore, such limited competition lowers the borrowing costs on average. Note that an outside bank can just offer r_F, only attract firms with an F signal, and still earn a zero profit. This strategy would allow the inside bank to charge a higher rate on average for good risk (firms with an S signal).

Outside lenders on average still earn zero profits, although with limited competition they do earn positive profits from firms with an S signal. However, the inside bank can still take advantage of its information, put a greater weight on the density function for lending to firms with an S signal, and earn a higher profit from lending to firms with an S signal. We state the result as Proposition 3.

Proposition 3: *Inside lenders on average earn a higher profit than outside lenders when lending to a firm that signals "S".*

Proof: See Appendix B

Proposition 2 also suggests that both good and bad firms can switch lenders from their IPO to their post-IPO loans. Bad firms are more likely to borrow from outside banks because they sometimes get a rate below their fair rates from an outside bank. Good firms are more likely to borrow from the inside bank because the inside bank takes advantage of its inside information and puts a greater weight on each rate that it offers to a firm with an S signal. We state this result as Proposition 4.

Proposition 4: *Firms that signal "S" are more likely to borrow from inside lender while firms that signal "F" are more likely to borrow from outside lender.*

Proof: See Appendix B

1.2.2. A Numerical Example and Empirical Implications

We provide a numerical demonstration of the model below.

Assumptions	
Probability of success for "H" firms (p_H)	95.00%
Probability of success for "L" firms (p_L)	80.00%
Fraction of "H" firms in the economy (θ)	60.00%
Average cost of raising funds for lender ($\bar{r}$)	0.50%
Computation	
Probability of an S signal, p_P, in period 1 ($\theta p_H + (1-\theta) p_L$)	89.00%
Probability of an F signal $(1 - p_P)$ in period 1	11.00%

$(\theta(1-p_H) + (1-\theta)(1-p_L))$	
Baysean Probability (p^e) of success when lending to the average firm in period 2 when signal = "S", p(S)	89.61%
Baysean Probability (p^e) of success when lending to the average firm in period 2 when signal = "F", p(F)	84.09%
Equilibrium Interest Rates ($r_S < r_P < r_F$)	
Full information rate for good firm in period 2 (r_S)	12.16%
Full information rate for bad firm in period 2 (r_F)	19.51%
Uninformed (pooled) interest rate (r_P)	12.92%

In our example, the uninformed lender randomizes the rate offered to a firm within [12.92 %, 19.51 %) and the informed lender randomizes the rate offered to a firm signaling "S" within [12.92 %, 19.51 %]. We discretize the distributions g_o(r) and g_i^S(r) to compute the average profit for the informed and uninformed lender. The interest rate and profit for the inside and outside lender are presented in Figure 2.

Figure 2(b) provides an insight into the underlying mechanism. The inside lender earns a profit by lending to firms that signal "S". An outside lender does not observe the signal and breaks even by lending to both "S" and "F" firms. The outside lender earns a profit by lending to firms that signal "S", which is offset by a loss on lending to firms that signal "F". Thus, a lender affiliated to the IPO underwriter can have some ex-post monopoly power over "S" firms.

We can draw conclusions on the bidding strategy of inside and outside lenders by evaluating the features of the post-IPO loan contract. Proposition 4 implies that everything else being equal, successful (Υ="S") firms are more likely to borrow from an affiliated lender, while unsuccessful (Υ="F") firms are more likely to borrow from an unaffiliated lender. Thus, everything else being equal, firms that borrow from affiliated lenders will have a lower default rate than those that borrow from an unaffiliated lender. Proposition 2 implies that affiliated lenders earn profits while unaffiliated lenders breakeven. The affiliated lender observes the signal Υ, i.e., private information. Proposition 3 suggests that such private information enables an affiliated lender to charge on average a higher rate for successful firms than what an unaffiliated lender charges. If we compare the spread (interest rate) on loans originated by affiliated and unaffiliated lenders, the difference in the spread should be positive after controlling for firm and loan characteristics. A key assumption in our set-up is that the informed lender has access to relevant private information. However, the unexplained difference in the spread after controlling for firm and loan characteristics could be attributed to unobservable borrower risk, private observable borrower risk or lender preferences. These sources of unexplained variation may not be mutually exclusive. Investment banks lend to riskier firms but price risk more generously than commercial banks (Harjoto, Mullineaux, and Yi 2006). Thus, the difference in the price may be correlated to lender characteristics. One possible solution to disentangling these joint hypotheses would be to observe the change in the price of the loan when private observable borrower risk is made public, arguably in the secondary loan market. We lay out our approach to relate the pricing of the loan with private observable borrower risk in the next section.

1.3. EMPIRICAL STRATEGY

In the U.S., the Glass-Steagall Act (1933) made it mandatory for financial institutions to separate their commercial and investment banking businesses into independent entities. However, after the sixties, federal regulators made less stringent interpretation of the provisions in the Glass-Steagall Act and this permitted commercial banks to operate investment banking businesses to varying degrees. The Glass-Steagall Act was formally repealed and replaced by the Gramm–Leach–Bliley Act (1999), which permitted commercial banks to operate investment banking businesses. In our main sample, we only include loans from universal banks because commercial banks may not offer any ancillary services such as underwriting, analyst coverage, and financial advisory. A lender that has common ownership with an IPO underwriter is designated as a universal bank.[2] For example, Salomon Smith Barney (underwriter) was affiliated to Citibank (lender) because they shared a common owner - Citigroup. In addition, we also account for mergers and acquisitions (M&As) between commercial banks. For example, Wells Fargo (lender) acquired Wachovia (lender). Finally, we also account for universal banks acquiring pure investment banks. For example, Deutsche Bank (universal bank) acquired Alex Brown & Sons (underwriter).

1.3.1. Lender Affiliation and the Cost of Borrowing

We evaluate the difference in the pricing of loans originated by informed lenders and uninformed lenders. This price is the All-in-drawn spread (AISD) of a syndicated loan. The lead lender negotiates the terms of the loan on behalf of the syndicate members. Hence,

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[2] Our sample includes firms like Lehman Brothers that participate in syndicated loans and underwrite IPOs.

we only consider the lead lender for the purpose of our analysis. A lead lender that is affiliated to the underwriter of the borrower's IPO is designated as an affiliated lender (Aff_Lender). The regression model is specified as an Ordinary Least Squares model with the natural logarithm of the AISD as the dependent variable.

$$Ln(AISD_{ij}) = \beta_0 + \beta_1 \ Aff\_Lender_{ij} + \beta_2' \ BorrowerChar_i + \beta_3' LoanChar_j + \theta_{Loan\_Type} + \mu_{Loan\_Purpose} + \gamma_{industry} + \delta_{Year} + \varepsilon_{ij} \quad \textbf{(1)}$$

where $BorrowerChar$ is a vector for borrower characteristics and $LoanChar$ is a vector of loan characteristics. *Aff_Lender* is a dummy variable that takes the value 1 if the IPO underwriter and the lead bank of the syndicated loan are the same. The suffix 'i' designates a borrower and 'j' designates a loan. The multiple facilities of a syndicated loan (package) are not independent. Hence, the standard errors are clustered at the package level.

Our theoretical framework in Section II suggests that the coefficient on Aff_lender_{ij}, β_1, is positive. Proposition 3 suggests that an inside lender on average earn a greater profit from lending to "good" firms because of its private information. The mixed strategy equilibrium identified in Proposition 2 implies that some "bad" firms are able to borrow at a lower rate from an unaffiliated lender. Putting these together, Propositions 2 and 3 imply that the loans for both "good" and "bad" firms, respectively, from an affiliated lender on average have a greater interest rate. We, as well as the literature, often refer to Aff_lender_{ij} as a proxy for private information. Note that the higher rates for loans from affiliated lenders are due to the fact that an affiliated lender can use its private information to earn informational rents by better targeting good firms and avoiding lending below-fair rate to bad firms. Aff_lender_{ij} as a proxy for private information does not mean better firm quality.

One could argue that Eq. (1) can control for more factors that partly capture the inside lender's private information at $t = t_1$ (when lending decisions are made). If this is true, the control variables collectively affect the predicted value of the spread of a loan and hence the intercept of the regression, as well as the estimation of the covariance matrix and the t-statistics. The coefficient on Aff_lender_{ij} captures the advantage of an affiliated lender due to its private information. Its point estimate is not affected by how well one's regression model can capture different lenders' private information.

Also, although "bad" firms are more likely to borrow from unaffiliated lenders, loans from unaffiliated lenders do not overall carry a higher rate, everything else being equal. A bad firm would randomly choose between the affiliated and unaffiliated lenders if both lenders offer it r_F, the fair rate for firms that signal F. A bad firm switches to an unaffiliated lender because it is offered a rate for "good" firms. An increased likelihood for bad firms to borrow from an unaffiliated lender due to such switching does not imply an overall higer rate, although these bad firms are risker borrowers.

Furthermore, the coefficient on Aff_lender_{ij} can simply capture additional risks beyond known firm and loan characteristics, although it is hard to find a theoretical foundation for such an argument. The regression model in Eq. (1) cannot rule out this possibility. We discuss another empirical strategy to lend more direct support for the hold-up hypothesis as we outlined in the model.

1.3.2. Cost of Borrowing and Private Information

In Proposition 4, we showed that affiliated lenders are more likely to lend to "good" firms than unaffiliated lenders. From an econometric perspective, this preference (assortative matching) results in regression estimates that are no longer consistent. This self-selection can be corrected by using a modified Heckman two-step procedure ((Li and Prabhala 2007); (Fang 2005)). This correction for the non-random matching of borrowers and lenders helps us estimate the value of private information and thereby reduce the ambiguity on the interpretation of the positive coefficient on Aff_lender_{ij}.

In the first step, we model the decision of a firm to borrow from an affiliated lender or an unaffiliated lender. This decision is modeled based on economic theory (relevance condition). The relevance condition requires that we include at least one explanatory variable that is correlated with the choice of borrower but is not directly correlated to the main outcome variable - AISD.

The issuer-underwriter pairing is positive assortative, i.e., high quality firms match with more reputable underwriters in the IPO underwriting market (Fernando, Gatchev, and Spindt 2005). Bank dependent firms prefer a reputed underwriter to improve the chances of a successful IPO and obtain lower underpricing (R. Carter and Manaster 1990; R. B. Carter, Dark, and Singh 1998, Schenone 2004). These borrowers that go public with their relationship bank are usually larger (assets) and have higher financial leverage than issuers that go public with a non-relationship bank. Further, large firms may prefer reputed (large) underwriters because these underwriters are usually affiliated to large universal banks with a greater breadth of financial services and depth of fund raising to meet the future financing requirements of the firm. Thus, the reputation of the underwriter is correlated with the quality of the firm (relevance condition) .

Underwriters protect their reputation by acting as credible information producers. The underwriter must produce accurate information to gain market share because it is involved in a repeated game with investors who subscribe to IPOs. The literature suggests that the underwriting market share is positively related to underwriter reputation (Megginson and Weiss 1991; Chemmanur and Fulghieri 1994). Thus, in the first step (Eq. (2)) we regress the choice of lender on the reputation of the underwriter. It is unlikely that the reputation of the underwriter in the IPO market is directly correlated with the spread on the loan. Thus, the exclusion condition is satisfied.

$$\text{Aff\_Lender} = \begin{cases} 0, & Z_i\alpha + \eta_i \leq 0 \\ 1, & Z_i\alpha + \eta_i > 0 \end{cases}$$

$$\Pr\left(\text{Aff}_{\text{Lender}_{\text{ij}}}\right) = \alpha_0 + \alpha_1 \text{UW\_Rank}_{ij} + \alpha_2 \text{BorrowerChar}_{ij} + \alpha_3 \text{LoanChar}_{ij} + \theta_{Loan_{Type}} + \mu_{Loan_{Purpose}} + \gamma_{\text{industry}} + \delta_{Year} + \eta_i \qquad \textbf{(2)}$$

UW_Rank in Eq. (2) is the Carter-Manaster ranking (underwriter) of the underwriter. The Carter-Manaster (CM) ranking is our main measure of underwriter reputation (R. Carter and Manaster 1990). It is constructed by using the number of IPO tombstone announcements managed by an underwrite. [3] The lowest reputation underwriters are assigned a value of 0 and the highest reputation underwriters are assigned

[3] A tombstone is a public formal announcement of an IPO.

a value of 9. Using the coefficients from equation Eq (2), we estimate the modified inverse Mills ratio - λ_{Aff_Lender} as follows:

$$\lambda_{Aff\_Lender} = Aff\_Lender \frac{\phi(Z\hat{\alpha})}{\Phi(Z\hat{\alpha})} + (1 - Aff\_Lender)\frac{\phi(Z\hat{\alpha})}{1 - \Phi(Z\hat{\alpha})}$$

where ϕ is the probability distribution function and Φ is the cumulative density function, $\hat{\alpha}$ is the first-step Probit estimate of the selection model, and Z is the vector of explanatory variables in the Probit regression. The inverse Mills ratio term (λ_{Aff_Lender}) is mathematically equal to E(η_i | Lender Type), which is an updated estimate of the private information (Li and Prabhala 2007). On one hand, affiliated lenders can earn abnormal profits by lending to "good" firms and so on average λ_{Aff_Lender} will be positive for affiliated lender loans. On the other hand, unaffiliated lenders breakeven by lending at a premium to "good" firms and at a discount to "bad" firms, and hence, on average λ_{Aff_Lender} will be zero for unaffiliated lender loans. Thus, by including the modified inverse Mills ratio (λ_{Aff_Lender}), we are testing for the relevance of private information.

In the second step (Eq (3)), we model the spread on the loan (AISD) as a function of private information, borrower characteristics and loan characteristics:

$$\begin{aligned} Ln(AISD_{ij}) = {} & \beta_0 + \beta_1 \lambda_{Aff\_Lender_{ij}} + \beta_2 BorrowerChar_{ij} \\ & + \beta_3 LoanChar_{ij} + \theta_{Loan\_Type} + \mu_{Loan\_Purpose} + \gamma_{industry} \qquad \textbf{(3)} \\ & + \delta_{Year} + \varepsilon_i \end{aligned}$$

A positive coefficient on λ_{Aff_Lender} would suggest that on average affiliated lenders earn abnormal profits, while unaffiliated lenders earn zero abnormal profits. We provide a more detailed description of the empirical design in Appendix C.

1.3.3. The Secondary Loan Market and Hold-Up

We provide more direct evidence on informational rent extraction by evaluating the change in the pricing of the loan in response to dissemination of private information. As discussed in the previous section, λ_{Aff_Lender} is an estimate of the private information conditional on the firm's choice. This private information could be attributed to unobservable borrower risk, private observable borrower risk or lender preferences. There exists some evidence that investment banks are more likely to lend to riskier firms, but they price risk more generously than commercial banks (Harjoto, Mullineaux, and Yi 2006). We disentangle these joint hypotheses by observing the change in the pricing of the loan when private observable borrower risk is made public. An increase in the price of the loan would suggest that informed lenders price private observable borrower risk at origination and earn economic rents.

Syndicated loans are traded in the secondary loan market. A lending syndicate consists of a lead lender and multiple participants. Initially, the lead lender determines the pricing of the loan and monitors the borrower on behalf of the syndicate. The lead lender disseminates private information on the borrower to syndicate members, who use this information to facilitate the process of price discovery in the secondary loan market (Bushman, Smith, and Wittenberg-Moerman 2010).

Syndicate participants can trade on private information in the secondary loan market because these loans are not considered as securities and thus, are not governed by the Securities Acts of 1933 and 1934. A Standard & Poor's report (2001) on the secondary market identified significant movement in loan prices without any corresponding news and concluded that participants trade on private information. Institutional investors also use private information acquired in the loan market to trade in public securities (Ivashina and Sun 2011).

The principle of market efficiency would imply that the secondary market would price the loan fairly, i.e., the price will be commensurate with the risk of the firm. The secondary loan market can be informationally more efficient than the secondary bond market (E. I. Altman, Gande, and Saunders 2010) and the secondary equity market (Park and Wu 2009). Hence, it is reasonable to assume that the principle of market efficiency can be applied to the secondary loan market.

If the hold-up story as we model is true, then the yield of loans for "good" firms in the secondary market will be lower than the yield at origination, and these underpriced loans are more likely to be from an affiliated lender. In other words, the price of the loan from an affiliated lender will on average increase more than a loan from an unaffiliated lender. However, if affiliated lenders originate riskier loans and these loans are fairly priced (overpriced) as suggested by Harjoto, Mullineaux, and Yi 2006, the price should remain unchanged (decrease).

We use the following regression model to disentangle the hold-up and the riskier loan hypotheses:

$$\Delta \mathrm{P}_{ij} = \psi_0 + \psi_1 \mathrm{Aff\_Lender}_{ij} + \psi_2 \mathrm{BorrowerChar}_{ij} + \psi_3 \mathrm{LoanChar}_{ij} + \Delta\vartheta_{Macro} + \theta_{Loan\_Type} + \mu_{Loan\_Purpose} + \gamma_{industry} + \delta_{Year} + \xi_i \quad \textbf{(7)}$$

Where, ΔP is the change in the price of the loan i.e., $(P_{t=1} - P_{t=0})$ and $\Delta\vartheta$ is the change in macro-economic conditions. If the coefficient ψ_1 is positive and significant, we can conclude that loans originated by affiliated lenders on average experience a greater decline in expected yield/spread than loans originated by unaffiliated lenders. That is, a positive coefficient ψ_1 is supportive of the hold-up hypothesis.

1.4. DATA AND SUMMARY STATISTICS

We obtain information on IPOs of issuers located in the U.S. from Thomson Reuters' SDC Platinum database. We restrict the sample to IPOs with offer dates between 1995 and 2016 because the syndicated loan data is more reliable after 1995. Our proxy for underwriter reputation is the Carter-Manaster (CM) underwriter ranking from Jay Ritter's website.[4] We also compute two additional measures of underwriter reputation using the IPO data from SDC Platinum.

The information on syndicated loans is from the Loan Pricing Corporation (LPC) Dealscan database. We merge the IPO data with the syndicated loan data for loans originated between 1995 and 2012 using the link file provided by (Chava and Roberts 2008). We manually match IPOs and loans by issuer name for loans originated between 2013 and 2016. A loan is designated a post-IPO loan if the loan deal activation date is after the IPO offer date. We visually inspect each loan and identify loans with lead lenders that are affiliated to the IPO underwriter. We designate a lender as an affiliated (informed) lender if the lead lender of the loan and the IPO underwriter share a common owner (holding company). Issuers may borrow from pure commercial banks or universal banks.

[4] https://site.warrington.ufl.edu/ritter/ipo-data/

We only retain loans arranged by universal banks because these banks can utilize information collected during the IPO due diligence while lending to firms after the IPO. Finally, we augment the sample by adding firm characteristics from COMPUSTAT. We exclude firms in highly regulated industries such as financial services (SIC between 6000 and 6999) and utilities (SIC between 4900 and 4999). The final sample includes 630 IPOs with 2,389 loan packages and 4,189 loan facilities with deal activation dates within 5 years after the IPO offer date. We winzorize all explanatory variables at the 99% and 1% tail of the distribution.

Our identification strategy also includes a test on loan secondary market data. We obtain loan secondary market data from Thomson Reuter and Standard & Poor Leveraged Commentary & Data (LCD). The Thomson data consist of daily market quotations for syndicated loans and includes the average bid price, average ask price, and the number of quotations. The LCD data include the primary market pricing terms when a loan is originated and the first trade price of a loan when it breaks into the secondary market. We match the primary DealScan data with the Thomson and LCD data using the Loan Identification Number (LIN), issuer name, or loan activation date. Our secondary market data start in 2000. The secondary market sample includes **630** loan facilities with deal active dates within 5 years after the IPO offer date.

The summary statistics for the sample are provided in **Table 1.** The theoretical framework indicates that the informed lenders are more likely to lend to good firms based on private information. From an empirical perspective, a good firm has a lower default risk. In Panel A, the borrower characteristics suggest that firms that are large (assets) and more tangible assets are more likely to borrow from affiliated lenders. Such firms are less likely to default on a loan. The lending pattern of affiliated and unaffiliated lenders is consistent with (Gopalan, Udell, and Yerramilli 2011) who find that large COMPUSTAT firms are less likely to switch lenders while small COMPUSTAT firms are more likely to switch lenders. Firms can mitigate the hold-up problem by borrowing from multiple lenders (Rajan 1992). Although switching lenders lowers interest rates, over time as the borrower gets informationally locked-in, the lender will increase the interest rate (Ioannidou and Ongena 2010). We follow Bharath, Dahiya, Saunders, and Srinivasan 2011 in defining the intensity of prior lending relationships. It is the fraction of the amount borrowed from a given lender in the last 5 years to the total amount borrowed in the last 5 years.[5] Affiliated lenders are also more likely to lend to firms if they have an existing lending relationship.

Loan package characteristics and loan facility characteristics are presented in Panels B and C. A loan package can comprise of multiple facilities. Each facility is a unique loan type (revolvers/term loans) with unique features. Loan packages originated by affiliated (informed) lenders are more likely to be larger (amount) and are secured. Furthermore, these loan packages are more likely to be originated by a larger syndicate. The size of the syndicate is inversely related to the amount of public information available on the firm (Ivashina 2009). The facility level characteristics suggest that affiliated lenders seek a higher spread on the loan across all loan types.

Rajan 1992 argues that the optimal maturity of a loan should be proportional to the lender's rights to the surplus. The ability to hold-up the firm will endow the lender with property rights to the firm. If the firm opts for short-term debt, the bank has direct control

[5] Our results remain unchanged if we use alternative definitions prescribed in (S. T. Bharath et al. 2011)

rights, i.e., the possibility of refusing to rollover the loan in bad states. However, if the firm opts for long-term debt, the lender gives up some right to the surplus by continuing to lend even in bad states. The manager may not have an incentive to exert effort when the bank provides a short-term loan. Hence, a firm should borrow long term from a bank when the lender has the power to hold-up the firm. In Panel C, loans from affiliated lenders have a longer maturity. This supports the theoretical result from Rajan 1992.

Finally, in Panel D we present the characteristics of the secondary market data. For both the first trade price and the 30-day average market price of the loan measured at least 1 month after origination, the price changes of loans from both affiliated and unaffiliated lenders tend to decline. However, the average price decline of loans originated by affiliated lenders is significantly less than that of the loans originated by unaffiliated lenders. The univariate tests provide suggestive evidence of rent extraction by informed lenders.

1.5. MAIN RESULTS

We now test our hypotheses in a multivariate setting. First, we compare the price of loans originated by affiliated (informed) and unaffiliated (uninformed) lenders to test the informational rent extraction (hold-up) hypothesis. Subsequently, we try to eliminate alternative explanations for the difference in the pricing of loans. Finally, we augment the evidence on rent extraction by providing additional evidence from the secondary market.

The results of the multivariate test using Eq. (1) are presented in **Table 2**. The sample includes all loans originated by a universal bank within 5 years after the IPO offer date. We include loan type, loan purpose, industry (two-digit SIC), and year fixed effects.

The multiple facilities that constitute a syndicated package are not independent and hence, we cluster standard errors at the package level.

In Column **(1)**, the coefficient on Aff_Lender suggests that loans from affiliated lenders are 12% more expensive than loans from unaffiliated lenders. Note that we do not control for loan characteristics in Column (1) to avoid potential simultaneity bias. After controlling for both firm and loan characteristics in Columns (2) and (3), affiliated lenders charge 8-9% more in interest than unaffiliated (uninformed) lenders. The average spread for loans from unaffiliated lenders is 212 bp. An additional 12% of the loan spread means that a firm can potentially pay a 25 bp higher spread due to hold-up.

The coefficients on the control variables in **Table 2** are consistent with the findings in the literature. Large firms (assets), firms that are rated, and firms that exhibit superior operating performance (profit) pay lower spreads. Firms with existing banking relationships also enjoy lower spreads. It appears that loans originated by sole lenders carry a lower spread.[6] Overall, it appears that firms pay a higher spread if they borrow from an informed lender.

However, it is possible that the choice to borrow from an affiliated lender may not be random. In fact, in the theoretical framework we show that good firms are more likely to borrow from an affiliated lender while, the bad firms are more likely to borrow from an unaffiliated lender. We address this problem by adopting a two-step Heckman procedure (Li and Prabhala 2007) using Eqs. (2) and (3). The results are presented in Table 3. In the

[6] (Ivashina 2009) finds that asymmetric information between the lead bank and participants will result in participants demanding a higher interest rate. In a multivariate test, we do not find any evidence of the lead lender's share influencing the results.

first step, we use the reputation (UW_Rank) of the underwriter as an identification variable. In Columns (1) and (3), the coefficients on UW_Rank are positive and statistically significant. Reputed underwriters are more likely to act as future lenders to IPO firms. This could be attributed to the superior ability of reputed underwriters to produce information. Further, reputed underwriters (universal banks) have larger lending businesses. Hence, these underwriters are more likely to meet the future financing needs of firms that have a greater demand for external finance.

The second step involves regressing the outcome variable (spread on the loan) on the inverse Mills ratio from the first step, and the same set of control variables from the first step. In Columns (2) and (4), the coefficients on λ_{Aff_Lender} are positive and remain statistically significant. Firms borrowing from affiliated lenders pay 5% more than firms that borrow from unaffiliated (uninformed) lenders. In economic terms, the average AISD is 220 basis points and the average loan amount is USD 250 million. Thus, an increase in 5% is equivalent to 11 basis points, or USD 275,000 per year.

The inverse Mills ratio term (λ_{Aff_Lender}) that accounts for self-selection is equal to $E(\eta_i \mid \text{Lender Type})$, which is an updated estimate of firm's private information held by the affiliated lender. Hence, by including λ_{Aff_Lender} in our regressions, we are actually testing for the relevance of private information. A positive coefficient on λ_{Aff_Lender} would suggest that affiliated lenders incorporate private information in the pricing of the loan and earn abnormal profits. In other words, it is plausible that when lenders possess private information on firms, they can extract rents in the near future.

Bank characteristics may be correlated with the spread of the loan. Investment and commercial banks may adopt a different pricing policy (Harjoto, Mullineaux, and Yi 2006).

Banks regulated by the Federal Deposit Insurance Corporation (FDIC) are required to file periodic Call Reports. We designate lenders that file a call report as a non-pure investment bank and lenders that do not file a call report as a pure investment bank. For example, Lehman Brothers is designated as a pure investment bank and Bank of America is designated as a non-pure investment bank. In unreported results, we find that firms borrowing from investment banks incur a higher cost of borrowing. However, loans originated by affiliated lenders are still more expensive than loans originated by unaffiliated lenders. Further, using a sub-sample of loans originated by non-pure investment banks, we include bank characteristics from the Call reports. It turn out that bank characteristics do not erode our results. Thus, neither bank type or bank characteristics explain the pricing of private information in loans originated by affiliated lenders.

It is possible that the private information incorporated in the pricing of the loan may be correlated with firm risk. We include the total risk of the firm in our regressions. The results presented in Table 4 indicate that riskier firms, i.e., firms with greater volatility, are more likely to borrow from affiliated lenders. However, the coefficients on λ_{Aff_Lender} are positive and statistically significant. In both economic and statistical terms our results remain unchanged.

When lenders acquire rights to surplus (informational rents) in a firm, they may forego control rights to ensure that the equity investor (manager) has an incentive to exert effort (Rajan 1992). Thus, lenders affiliated to IPO underwriters may be willing to accept fewer covenants (control rights). In other words, our results could be explained by a trade-off between spreads and covenants. We use the Covenant Intensity Index (Bradley and Roberts 2015) to proxy for covenants in the loan contract. We evaluate the difference in

Covenant Intensity Index for affiliated and unaffiliated lender loans in Table 5. There appears to be no statistical difference in the covenants incorporated in loan contracts originated by affiliated and unaffiliated lenders.

Overall, in this section we show that affiliated lenders can create a relationship specific asset through IPO underwriting and use it to extract rents when lending to the IPO firm. These results are consistent with the hold-up hypothesis as we outlined in our model.

1.6. ROBUSTNESS TESTS

In this section, we provide a series of tests that validate our empirical design and confirm the underlying assumptions.

1.6.1. Measures of Underwriter Reputation

In our main results, we use the CM rank of the lender as an identification variable. We validate our empirical design by using the market share of underwriter instead of the CM rank. The underwriting market share is estimated using two definitions. First, we compute the market share using the number of IPOs underwritten by the underwriter in the year prior to the IPO offer date. Second, we compute the market share using the dollar value of the proceeds of the IPOs underwritten in the year prior to the IPO offer date.

The results are presented in Table 6. In Column (1), the identification variable (UW_Reputation) is the first measure – number of IPOs underwritten. The coefficient on λ_{Aff_Lender} for the second-stage regression in Column (2) is positive and statistically significant. Loans originated by affiliated lenders are 5% more expensive than those originated by unaffiliated lenders. Similarly, the identification variable (UW_Reputation) in Column (3) is the second alternative measure of reputation is positive and statistically.

The results in Column (4) are similar to Column (2). Indeed, alternative measures of underwriter reputation validate our results.

1.6.2. Falsification Test

The amount of public information produced by the IPO firm and market participants (e.g., analysts) increases with time, and this will reduce the information wedge between the incumbent lender and other lenders. The decline in asymmetric information will ease the hold-up problem with the passage of time. Hence, the farther the origination date of the loan from the IPO offer date, the less likely the lender can hold-up the borrower.[7] In order to test this hypothesis, we construct a sample that includes loans originated between the sixth year and the tenth year after the IPO offer date.

Table 7 provides the summary statistics for the falsification sample. In Panel A, the borrower characteristics suggest that firms that are large (assets), have higher leverage, and greater fraction of tangible assets are more likely to borrow from affiliated lenders. It appears that affiliated lenders are more likely to lend to firms with concentrated lending relationships. These patterns suggest that falsification sample is similar to the main sample. Furthermore, for loans after more than five years since IPO, fewer firms borrow from affiliated lenders.[8] Loan package characteristics and loan facility characteristics are presented in Panel B and Panel C. Loan packages originated by affiliated (informed) lenders are more likely to be larger (amount) and are secured. The facility level characteristics suggest that affiliated lenders seek a higher spread on the loan. However,

[7] In Table E of the online appendix, we construct a sub-sample consisting of the first loan after the IPO and find the hold-up effect is economically and statistically much greater than the effect observed in the main sample.

[8] In our main sample 20% of the firms borrow from affiliated lenders while, in this sample 10% of the firms borrow from affiliated lenders.

the magnitude of this difference is lower in this sample compared to the main sample. In Panel C, loans from affiliated lenders have a longer maturity. Overall, the observable firm characteristics in this falsification sample are similar to the main sample.

We perform multivariate test on the falsification sample that is similar to the tests described in the main results. The results for the pricing of the loan are presented in Table 8. There is no statistical difference in the pricing of loans originated by affiliated and unaffiliated lenders. It appears that the ability of affiliated lenders to hold-up borrowers diminishes with the passage of time. Thus, the test on the falsification sample indicates that over time affiliated lenders lose the ability to extract informational rents from borrowers.

1.7. THE SECONDARY LOAN MARKET AND RENT EXTRACTION

The evidence presented in the previous sections supports the idea that informed lenders can earn abnormal profits when lending to firms after the IPO. Informed lenders utilize private information to charge borrowers higher interest rates than would be commensurate with the borrower’s risk when these borrowers are subjected to hold-up and do not have alternative sources of financing. Informed lenders can also use their private information to avoid lending at a rate below the fair rate for a loan. Our identification strategy accounts for the non-random pairing between firms and lenders, i.e., self-selection bias. The extent to which we can account for this self-section bias depends on the quality of our identification variable. In this section we devise a different test to augment the evidence presented in previous sections.

Syndicated loans are often traded in the secondary market. The principle of market efficiency would imply that when a loan is traded in the market the change in the price would reflect all public information. Participant lenders of a loan syndicate and other investors can potentially bring more information to the secondary market. If an informed lender is more likely to extract rents, then the yield at origination for a loan from an affiliated lender is more likely to be above the risk-adjusted rate of return. An uninformed lender is also more likely to offer a rate below the fair rate for a loan when it engages in a limited competition for good risk with informed lenders. When the yield in the secondary market converges to the appropriate rate after private information is disseminated and information asymmetry diminishes, the changes in loan prices from affiliated lenders are more likely to be greater than the price changes of loans from unaffiliated lenders.

We assume that the loan is originated at par value i.e., $P_{t=0}$ =100. Ideally, we would prefer using the origination price. But, the origination price is only available for a few loans in the secondary market sample. The univariate statistics in Table 1 suggest that there is no statistical difference in the origination price (Primary Offer Price) of loan from affiliated and unaffiliated lenders. Thus, it would not be inappropriate to assume that the loans are originated at par (100) for the purpose of our test.

The results for the multivariate test are presented in Table 9. The dependent variable is the change in price (ΔP). The price is quoted with reference to a par value of 100 ($\Delta P = P_{sec} - 100$). In Column (1), ΔP is measured using $PRC_{FirstDay}$, which is the first market price of the loan observed at least 1 month after origination while, in Column (2), ΔP is measured using $PRC_{30DayAvg}$, which is the 30-day average market price of the loan measured at least 1 month after origination. We compute the average price over 30-days to reduce the impact of noise in the trading data. In Column (1), the price of a loan originated by an affiliated lender is 87 bps higher than that for a loan originated by an unaffiliated lender, everything else being equal. The price on a given date may be noisy because the secondary loan market is not very liquid. Hence, we compute the average price over a month, and use it to calculate the price change for the dependent variable in Column (2). The price change of a loan originated by an affiliated lender again is statistically significantly more positive than that for a loan originated by an unaffiliated lender. Thus, the results indicate that the yield on the loans originated by affiliated lenders decreases to a greater degree than the yield on the loans originated by unaffiliated lenders. Indeed, this difference in price changes for loans from affiliated and unaffiliated lenders is a manifestation of rent extraction by informed lenders.

1.8. CONCLUDING REMARKS

The empirical evidence on informational rent extraction by informed lenders documented in the literature focuses on the relationship lending channel. We find that lenders can engage in informational rent extraction through the cross-selling channel. Our hypothesis is motivated by the seminal work of Sharpe 1990 on rent extraction by informed lenders. Using a theoretical model, we show that in a lending game between informed and uninformed lenders, the informed lenders can earn informational rents from good borrowers. Lenders that are affiliated to underwriters can reuse the private information collected during the IPO underwriting process to acquire property rights in the firm. Thus, we hypothesize that lenders affiliated to the IPO underwriters are more likely to charge higher spreads than commensurate with the borrower's risk on post-IPO loans.

We test our hypotheses using price and non-price features of syndicated loans from LPC's Dealscan and IPO data from SDC Platinum. Using a sample of syndicated loans originated within 5 years after the IPO offer date, we find that loans originated by affiliated lenders are more expensive than those originated by unaffiliated lenders. In particular, we estimate the impact of private information on the spread of the loan. On an average, affiliated lenders can earn an extra profit of 5% using relationship specific capital, i.e., private information.

We augment the evidence on rent extraction by evaluating the secondary market data on syndicated loans. In an efficient market, the price of the loan will converge to its true value. We find that syndicated loans originated by affiliated lenders experience an otherwise greater decrease in yield than those originated by unaffiliated lenders. This result provides direct support for the hold-up hypothesis that affiliated lenders can use their private information to originate loans at higher interest rates than commensurate with the firm's risk. Overall, the evidence presented in this paper is consistent with the theoretical models of Sharpe 1990 and Rajan 1992.

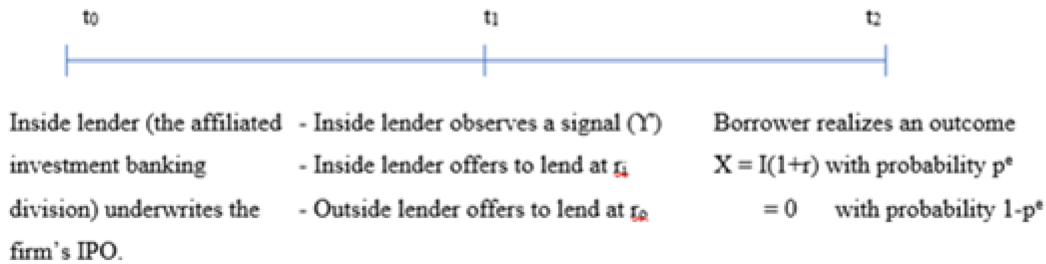

Figure 1.1: Lending Game

The figure plots the timeline of the lending game between the firm, inside lender and outside lender.

(a) Interest Rates

	ϒ="S"		ϒ="F"	
	r	$G_i^S(r)$	r	G(r)
Inside Lender	13.00%	10.41%	19.51%	100.00%
	13.25%	33.55%		
	15.25%	84.01%		
	18.50%	98.15%		
		$G_o(r)$		
Outside Lender	13.00%	9.26%		
	13.25%	29.86%		
	15.25%	74.77%		
	18.50%	87.35%		

(b) Profit

	ϒ="S"	ϒ="F"
Inside Lender	0.69%	0.00%
	0.69%	0.00%
	0.70%	0.00%
	0.72%	0.00%
Outside Lender	0.60%	-0.60%
	0.58%	-0.58%
	0.39%	-0.39%
	0.09%	-0.09%

Figure 1.2: Interest Rate and Profit to Lenders

$G_i(r)$ and $G_o(r)$ is the cumulative density function for the mixed strategy of the inside and outside lender respectively. Figure 1.2(a) presents the interest rates and figure 1.2(b) presents the profit.

Table 1.1: SUMMARY STATISTICS

This table presents the summary statistics for syndicated loans originated up to 5 years after the IPO. The IPO sample includes all offerings between 1995 and 2016. Panel A provides the borrower characteristics at the loan origination date, Panel B provides the package characteristics, Panel C provides the facility characteristics, and Panel D provides the facility level secondary market characteristics of the loan. COV_INTENSITY is the number of financial covenants attached to a loan. Sole Lender, Secured, Revolver, and Performance Pricing are dummy variables to indicate single lender loans, secured loans, credit lines, and loans with performance pricing features, respectively. $\Delta P_{FirstDay}$ and $\Delta P_{30DayAvg}$ are the differences between the secondary market prices and the issuance price (100). Variable definitions are provided in Appendix A.

	(1) Unaffiliated Lender				(2) Affiliated Lender				(2) - (1) Differences	
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.	Diff.	p-value
PANEL A: BORROWER CHARACTERISTICS										
Assets	2011	2,090	346	7,862	401	5,878	1,208	14,367	3,788	0.00
Leverage	2011	0.32	0.29	0.30	401	0.44	0.43	0.33	0.12	0.00
Tangibility	2011	0.26	0.16	0.25	401	0.31	0.23	0.29	0.05	0.00
Profit	2011	-0.14	0.09	4.67	401	-3.66	0.11	46.21	-3.52	0.13
Rated	2011	0.06	0.00	0.23	401	0.04	0.00	0.21	-0.02	0.25
Cash	2011	0.14	0.06	0.24	401	0.13	0.06	0.18	-0.01	0.34
Market-to-Book	1902	2.34	1.66	2.51	346	2.31	1.52	6.46	-0.03	0.93
Relationship	2011	0.29	0.00	0.41	401	0.35	0.00	0.45	0.06	0.01
Volitility_12M	1321	0.16	0.14	0.09	203	0.14	0.11	0.09	-0.01	0.05
PANEL B: PACKAGE CHARACTERISTICS										
Deal Amount(million)	2011	321	125	764	401	827	380	1375	506	0.00
Secured	2011	0.66	1.00	0.47	401	0.72	1.00	0.45	0.06	0.02
Performance Pricing	2011	0.51	1.00	0.50	401	0.44	0.00	0.50	-0.07	0.01
Sole Lender	2011	0.27	0.00	0.45	401	0.09	0.00	0.29	-0.18	0.00

	(1) Unaffiliated Lender				(2) Affiliated Lender				(2) - (1) Differences	
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.	Diff.	p-value
PANEL C: FACILITY CHARACTERISTICS										
Maturity (months)	3463	49.45	57.00	25.64	726	58	60	21.94	8.47	0.00
Facility Amount (million)	3463	206	99	537	726	497	200	852	291	0.00
All-in-drawn Spread (AISD)	3463	212	200	118	726	267	250	147	56	0.00
Revolver (AISD)	2220	186	175	104	360	217	200	112	31	0.00
Term Loan A (AISD)	645	239	225	117	116	303	263	175	65	0.00
Term Loan (B to I) (AISD)	503	278	275	120	226	311	275	137	33	0.00
Other Loan[9] (AISD)	95	285	250	190	24	444	413	230	159	0.00
Credit Line	3463	0.64	1.00	0.48	726	0.50	0.00	0.50	-0.14	0.00
PANEL D: LOAN ORIGINATION AND SECONDARY MARKET PRICES										
Primary Offer Price (% of Par)	68	0.99	1.00	0.03	42	1.00	1.00	0.00	0.01	0.06
$\Delta P_{FirstDay}$	405	-1.52	-0.50	2.94	183	-0.65	0.06	2.94	0.87	0.00
$\Delta P_{30DayAvg}$	405	-1.52	-0.50	2.38	183	-0.59	0.125	2.34	0.92	0.00

[9] The following loans are classified as "Other Loan" - Acquisition Facility, Bridge Loan, Demand Loan, FRN (Bond-Style, FRN (Loan-Style), Guarantee, Guidance Line (Uncommitted), Leagues/Other, Lease, Multi-Option Facility, NIF - Note Issuance Facility, Note, Other Loan, Standby Letter of Credit, Synthetic Lease, Unadvised Guidance Line (Uncommitted).

Table 1.2: PRICING OF POST-IPO LOANS

This table presents the regression results specified in Eq. (1). The sample includes all syndicated loans originated up to 5 years after the IPO. The dependent variable is the natural log of the All-in-drawn spread (AISD). Aff_Lender is a dummy variable that takes the value 1 if the IPO underwriter and the lead bank of the syndicated loan are the same. The regression is run at the loan facility level. Relationship is the lending relationship intensity of the lender with the IPO firm. Variable definitions are provided in Appendix A. Standard errors are clustered at the package level. Robust t-statistics are in parentheses. ***, **, and * stand for significance level at the 1%, 5%, and 10%, respectively.

	(1) Ln(AISD)	(2) Ln(AISD)	(3) Ln(AISD)
Aff_Lender	0.12***	0.08***	0.09***
	(4.20)	(3.26)	(3.58)
Leverage	0.37***	0.28***	0.28***
	(7.72)	(7.18)	(7.29)
Tangibility	0.08	0.08*	0.08*
	(1.50)	(1.74)	(1.76)
Ln(Assets)	-0.13***	-0.04***	-0.05***
	(-13.78)	(-4.55)	(-4.91)
Profit	-0.16***	-0.16***	-0.15***
	(-3.88)	(-5.17)	(-5.30)
Rated	-0.84***	-0.54***	-0.53***
	(-12.22)	(-8.45)	(-8.30)
Log(Amt)		-0.08***	-0.08***
		(-8.58)	(-9.13)
Log(Maturity)		-0.02	-0.03
		(-1.04)	(-1.57)
Secured		0.35***	0.36***
		(14.52)	(14.68)
Perf_Pricing		-0.11***	-0.12***
		(-5.91)	(-6.19)
Relationship			-0.06**
			(-2.57)
Sole Lender			-0.09***
			(-3.28)
Constant	5.64***	6.64***	6.84***
	(59.21)	(44.56)	(42.23)
Loan Purpose FE	No	Yes	Yes
Loan Type FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	4,189	4,189	4,189
R-squared	0.41	0.54	0.55

Table 1.3: PRIVATE INFORMATION & PRICING OF POST-IPO LOANS

This table presents the two-stage regression results specified in Eqs. (2) and (3). The dependent variable in the first stage Probit (specification 1) is Aff_Lender, which is a dummy variable that takes the value 1 if the IPO underwriter and the lead bank of the syndicated loan are the same. The dependent variable in the second stage OLS (specification 2) is the natural log of the All-in-drawn spread (AISD). The regressions are at the loan facility level. UW_Rank is a Carter-Manaster ranking (underwriting) of the underwriter. Variable definitions are provided in Appendix A. Standard errors are clustered at the package level. Robust t-statistics are in parentheses. ***, **, and * stand for significance levels at the 1%, 5%, and 10%, respectively.

	(1) Aff_Lender	(2) Ln(AISD)	(3) Aff_Lender	(4) Ln(AISD)
λ_{Aff_Lender}		0.05***		0.05***
		(3.08)		(3.04)
UW_Rank	0.17***		0.17***	
	(11.10)		(11.12)	
Leverage	0.43***	0.25***	0.42***	0.29***
	(3.12)	(6.57)	(3.08)	(7.37)
Tangibility	-0.16	0.08	-0.15	0.08
	(-0.70)	(1.54)	(-0.67)	(1.58)
Ln(Assets)	0.12***	-0.09***	0.12***	-0.04***
	(3.10)	(-10.59)	(2.99)	(-4.47)
Profit	-0.23**	-0.15***	-0.24**	-0.16***
	(-2.12)	(-5.49)	(-2.17)	(-5.70)
Rated	-0.61***	-0.55***	-0.60***	-0.54***
	(-3.17)	(-7.97)	(-3.12)	(-8.24)
Relationship	0.34***	-0.07***	0.34***	-0.06**
	(3.24)	(-2.93)	(3.25)	(-2.46)
Secured	0.09	0.38***	0.07	0.36***
	(0.90)	(14.80)	(0.75)	(14.33)
Perf_Pricing	-0.11	-0.14***	-0.11	-0.11***
	(-1.35)	(-7.14)	(-1.37)	(-5.73)
Sole Lender	0.03	-0.02	0.05	-0.09***
	(0.26)	(-0.73)	(0.34)	(-3.29)
Log(Amt)			-0.02	-0.09***
			(-0.51)	(-9.17)
Log(Maturity)			0.07	-0.02
			(1.03)	(-1.08)
Constant	-2.60***	5.24***	-2.60***	6.65***
	(-5.16)	(67.15)	(-3.37)	(39.75)
Loan Purpose FE	Yes	Yes	Yes	Yes
Loan Type FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	3,969	3,969	3,969	3,969
R-squared	0.41	0.53	0.41	0.54

Table 1.4: PRICING OF POST-IPO LOANS & FIRM RISK

This table presents the two-stage regression results specified in Eqs. (2) and (3). The dependent variable in the first stage Probit (1 & 3) is Aff_Lender, which is a dummy variable that takes the value 1 if the IPO underwriter and the lead bank of the syndicated loan are the same. The dependent variable in the second stage OLS (2 & 4) is the natural log of the All-in-drawn spread (AISD). The regressions are at the loan facility level. UW_Rank is a Carter-Manaster ranking (underwriting) of the underwriter. The regressions include loan purpose, loan type, year, and industry fixed effects. Variable definitions are provided in Appendix A. Standard errors are clustered at the package level. Robust t-statistics in parentheses. ***, **, and * stand for significance at the 1%, 5%, and 10% levels, respectively.

	(1) Aff_Lender	(2) Ln(AISD)	(3) Aff_Lender	(4) Ln(AISD)
$\lambda_{\text{Aff\_Lender}}$		0.05***		0.07***
		(3.03)		(3.41)
UW_Rank	0.16***		0.14***	
	(8.27)		(6.17)	
Volitility_12M	3.21***	0.76***		
	(4.79)	(4.40)		
Volitility_24M			2.83***	0.74***
			(2.85)	(3.35)
Leverage	0.14	0.37***	0.27	0.41***
	(0.60)	(6.11)	(0.85)	(5.40)
Tangibility	-0.37	0.10	0.50	0.11
	(-1.12)	(1.53)	(1.20)	(1.44)
Ln(Assets)	0.22***	-0.04***	0.29***	-0.04**
	(4.06)	(-2.94)	(4.40)	(-2.41)
Profit	-0.18	-0.18***	0.05	-0.06
	(-1.25)	(-7.13)	(0.16)	(-0.87)
Rated	-0.62**	-0.52***	-0.60*	-0.55***
	(-2.43)	(-6.10)	(-1.87)	(-6.48)
Relationship	0.68***	-0.04	1.04***	-0.07**
	(4.51)	(-1.36)	(5.87)	(-1.96)
Secured	-0.02	0.33***	0.21	0.31***
	(-0.18)	(10.15)	(1.24)	(8.03)
Perf_Pricing	-0.11	-0.07***	-0.03	-0.07**
	(-1.02)	(-2.81)	(-0.21)	(-2.43)
Sole Lender	0.04	-0.08**	-0.15	-0.08*
	(0.20)	(-2.28)	(-0.62)	(-1.82)
Log(Amt)	-0.03	-0.08***	-0.07	-0.08***
	(-0.70)	(-6.54)	(-1.37)	(-5.02)
Log(Maturity)	-0.01	-0.05**	-0.07	-0.07***
	(-0.07)	(-2.34)	(-0.57)	(-2.63)
Constant	-3.43***	6.45***	-3.60***	6.35***
	(-3.16)	(30.77)	(-2.64)	(24.91)
Observations	2,367	2,367	1,653	1,653
R-squared	0.44	0.56	0.51	0.59

Table 1.5: LOAN COVENANTS

This table presents the TWO-STAGE regression for Covenant Intensity Index (CIX). The dependent variable in the first stage Probit is Aff_Lender, which takes the value 1 if the IPO underwriter, and the lead lender are the same. The dependent variable in the second stage OLS is the CIX. The regressions are at the loan package level. UW_Rank is a Carter-Manaster ranking (underwriting) of the underwriter. Variable definitions are provided in Appendix A. Standard errors clustered at the package level. Robust t-statistics in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Aff_Lender	(2) CIX
λ_{Aff_Lender}		0.06
		(1.56)
UW_Rank	0.17***	
	(6.23)	
Leverage	0.73***	0.14
	(3.27)	(1.37)
Tangibility	0.23	-0.34**
	(0.66)	(-2.22)
Ln(Assets)	0.12*	-0.10***
	(1.78)	(-3.00)
Profit	-3.24**	1.57***
	(-2.24)	(3.11)
Rated	-0.48*	-0.05
	(-1.70)	(-0.34)
Relationship	0.38***	0.06
	(2.93)	(0.98)
Secured	-0.03	1.36***
	(-0.19)	(17.34)
Sole Lender	-0.23	0.05
	(-1.16)	(0.55)
Log(Deal_Amt)	-0.17**	0.09**
	(-2.41)	(2.46)
Constant	-1.61**	2.87***
	(-1.99)	(9.88)
Loan Purpose FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	1,414	1,414
R-squared	0.40	0.43

Table 1.6: PRICING OF POST-IPO LOANS (ROBUSTNESS)

This table presents the TWO-STAGE regression results specified in equation 2 & 3. UW_Reputation is IPO_number and IPO_amount in specification (1) and (3) respectively. The dependent variable in the first stage Probit (specification 1 and 3) is Aff_Lender, which is a dummy variable that takes the value 1 if the IPO underwriter, and the lead bank of the syndicated loan are the same. The dependent variable in the second stage OLS (specification 2 and 4) is the natural log of the All-in-drawn spread (AISD). The regressions are at the loan facility level. Variable definitions are provided in Appendix A. Standard errors clustered at the package level. Robust t-statistics in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Aff_Lender	(2) Ln(AISD)	(3) Aff_Lender	(4) Ln(AISD)
$\lambda_{\text{Aff\_Lender}}$		0.05***		0.06***
		(3.57)		(3.75)
UW_Reputation	0.06***		0.05***	
	(6.37)		(7.83)	
Leverage	0.51***	0.29***	0.49***	0.29***
	(3.27)	(7.43)	(3.11)	(7.43)
Tangibility	-0.07	0.08	-0.08	0.08
	(-0.30)	(1.58)	(-0.36)	(1.58)
Ln(assets)	0.14***	-0.04***	0.13***	-0.04***
	(3.56)	(-4.48)	(3.26)	(-4.48)
Profit	-0.25*	-0.16***	-0.24*	-0.16***
	(-1.92)	(-5.72)	(-1.83)	(-5.74)
Rated	-0.50***	-0.54***	-0.58***	-0.54***
	(-2.65)	(-8.25)	(-2.94)	(-8.26)
Relationship	0.30***	-0.06**	0.32***	-0.06**
	(3.03)	(-2.46)	(3.18)	(-2.46)
Secured	0.07	0.36***	0.06	0.36***
	(0.77)	(14.35)	(0.63)	(14.35)
Perf_Pricing	-0.08	-0.11***	-0.07	-0.11***
	(-1.00)	(-5.73)	(-0.86)	(-5.73)
Sole Lender	0.05	-0.09***	0.01	-0.09***
	(0.38)	(-3.29)	(0.11)	(-3.29)
Log(Amt)	0.01	-0.09***	0.01	-0.09***
	(0.19)	(-9.18)	(0.20)	(-9.19)
Log(Maturity)	0.09	-0.02	0.09	-0.02
	(1.42)	(-1.08)	(1.40)	(-1.08)
Constant	-2.18***	6.65***	-2.08***	6.65***
	(-3.03)	(39.78)	(-2.91)	(39.80)
Loan Purpose FE	Yes	Yes	Yes	Yes
Loan Type FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	3,969	3,969	3,969	3,969
R-squared	0.34	0.54	0.34	0.54

Table 1.7: SUMMARY STATISTICS (FALSIFICATION SAMPLE)

This table presents the summary statistics for syndicated loans originated between the sixth year, and tenth year after the IPO offer date. The IPO sample includes all offerings between 1995 and 2016. Panel A provides the borrower characteristics; Panel B provides the package characteristics; Panel C provides the facility characteristics. Secured and Performance Pricing are dummy variables to indicate secured loans and loans with performance pricing features respectively. Variable definitions are provided in Appendix A.

	(1) Unaffiliated Lender				(2) Affiliated Lender				(2) - (1) Differences	
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.	Diff.	p-value
PANEL A: BORROWER CHARACTERISTICS										
Assets	1255	3399	913	9217	123	9204	2330	18143	5805	0.00
Leverage	1255	0.32	0.28	0.29	123	0.42	0.38	0.30	0.10	0.00
Tangibility	1255	0.26	0.17	0.24	123	0.32	0.21	0.29	0.06	0.02
Profit	1255	0.11	0.09	0.19	123	0.12	0.08	0.17	0.01	0.48
Rated	1255	0.06	0.00	0.24	123	0.13	0.00	0.34	0.07	0.03
Cash	1255	0.11	0.06	0.14	123	0.12	0.07	0.12	0.01	0.70
Market-to-Book	1230	1.72	1.37	1.07	120	1.71	1.49	0.91	-0.01	0.96
Relationship	1255	0.48	0.47	0.46	123	0.70	1.00	0.42	0.22	0.00
PANEL B: PACKAGE CHARACTERISTICS										
Deal Amount (million)	1255	477	225	1003	123	1104	500	1977	626	0.00
Secured	1255	0.64	1.00	0.48	123	0.61	1.00	0.49	-0.03	0.57
Performance Pricing	1255	0.48	0.00	0.50	123	0.37	0.00	0.48	-0.11	0.01
Sole Lender	1255	0.14	0.00	0.34	123	0.03	0.00	0.18	-0.11	0.00

	(1) Unaffiliated Lender				(2) Affiliated Lender				(2) - (1) Differences	
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.	Diff.	p-value
PANEL C: FACILITY CHARACTERISTICS										
Maturity (months)	2075	51	60	22	230	56	60	21	5	0.00
Facility Amount (million)	2075	315	150	653	230	731	320	1224	416	0.00
All-in-drawn Spread (AISD)	2075	247	225	155	230	284	250	170	37	0.00
Credit Line	2075	0.62	1.00	0.49	230	0.56	1.00	0.50	-0.06	0.11

Table 1.8: PRICING OF POST-IPO LOANS (FALSIFICATION TEST)

The sample includes all syndicated loans originated between the sixth year, and tenth year after the IPO offer date. This table presents the TWO-STAGE regression results specified in equation 2 & 3. The dependent variable in the first stage Probit (specification 1 & 3) is Aff_Lender, which is a dummy variable that takes the value 1 if the IPO underwriter, and the lead bank of the syndicated loan are the same. The dependent variable in the second stage OLS (specification 2 & 4) is the natural log of the All-in-drawn spread (AISD). The regressions are at the loan facility level. UW_Rank is a Carter-Manaster ranking (underwriting) of the underwriter. Variable definitions are provided in Appendix A. Standard errors clustered at the package level. Robust t-statistics in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Aff_Lender	(2) Ln(AISD)	(3) Aff_Lender	(4) Ln(AISD)
λ_{Aff_Lender}		-0.000		-0.008
		(-0.019)		(-0.382)
UW_Rank	0.151***		0.154***	
	(5.791)		(5.953)	
Leverage	0.463*	0.370***	0.447*	0.358***
	(1.817)	(7.077)	(1.753)	(7.003)
Tangibility	-0.112	0.167**	-0.075	0.183**
	(-0.301)	(2.103)	(-0.201)	(2.384)
Ln(assets)	0.082	-0.087***	0.140**	-0.042***
	(1.450)	(-6.698)	(2.189)	(-2.969)
Profit	-86.774***	-14.928	-80.149**	-11.497
	(-2.775)	(-0.581)	(-2.409)	(-0.476)
Rated	0.901***	-0.511***	0.948***	-0.498***
	(3.364)	(-7.470)	(3.411)	(-7.447)
Relationship	0.196	-0.084**	0.220	-0.065**
	(1.182)	(-2.560)	(1.305)	(-2.030)
Secured	0.037	0.334***	0.012	0.321***
	(0.247)	(10.213)	(0.082)	(10.039)
Perf_Pricing	-0.009	-0.189***	-0.010	-0.182***
	(-0.073)	(-6.700)	(-0.079)	(-6.622)
Sole Lender	-0.567**	-0.017	-0.582**	-0.067
	(-2.374)	(-0.304)	(-2.385)	(-1.148)
Log(Amt)			-0.115**	-0.083***
			(-2.296)	(-5.556)
Log(Maturity)			0.032	0.000
			(0.252)	(0.014)
Constant	-1.533**	5.718***	0.110	6.923***
	(-2.539)	(52.502)	(0.107)	(26.685)
Loan Purpose FE	Yes	Yes	Yes	Yes
Loan Type FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	2,305	2,305	2,305	2,305
R-squared	0.38	0.55	0.38	0.56

Table 1.9: SECONDARY MARKET PRICING OF POST-IPO LOANS

This table presents the regression results specified in equation 4. The sample includes loans with a market price greater than $85. The dependent variable is the change in price (ΔP). The price is quoted with reference to a par value of 100 ($\Delta P = P_{sec} - 100$). P_{sec} is the secondary market price. P_{sec} is $PRC_{FirstDay}$ in column (1) and (2), and $PRC_{30DayAvg}$ in column (3) and (4) . Aff_Lender is a dummy variable that takes the value 1 if the IPO underwriter, and the lead bank of the syndicated loan are the same. The regression is run at the loan facility level. Δ Term Spread is the change in the Term Spread between the origination date of the loan and the quotation date of the loan. The Term Spread is the difference between the yield of a 10-year Treasury constant maturity bond and a 3-month Treasury constant maturity bill. Δ Default Spread is the change in the Default Spread between the origination date of the loan and the quotation date of the loan. The Default Spread is the difference between the yield of a seasoned Moody's Aaa Corporate Bond and a seasoned Moody's Baa Corporate Bond. Real GDP growth is the real GDP growth in the current quarter in 2009 dollars. Variable definitions are provided in Appendix A. Standard errors clustered at the package level. Robust t-statistics in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) ΔP	(2) ΔP	(3) ΔP	(4) ΔP
Aff_Lender	0.87***	0.97***	0.90***	0.97***
	(2.71)	(2.80)	(2.94)	(2.88)
Leverage	-0.46	-0.61	-0.43	-0.62
	(-1.27)	(-1.44)	(-1.19)	(-1.45)
Tangibility	0.59	0.56	0.44	0.43
	(0.84)	(0.72)	(0.64)	(0.57)
Ln(Assets)	0.10	0.18	0.16	0.25*
	(0.80)	(1.39)	(1.35)	(1.97)
Return on Assets	3.80***	3.76**	3.69***	3.52**
	(2.91)	(2.17)	(2.83)	(2.07)
Rated	-0.28	-0.42	-0.53	-0.70
	(-0.34)	(-0.48)	(-0.61)	(-0.77)
Market-to-Book		0.09		0.11
		(1.06)		(1.21)
Δ Term Spread	-0.17	-0.16	-0.17	-0.16
	(-0.66)	(-0.60)	(-0.67)	(-0.63)
Δ Default Spread	-2.57***	-2.41***	-2.67***	-2.34***
	(-3.45)	(-3.15)	(-3.37)	(-2.92)
Real GDP growth	-0.06	-0.04	-0.06	-0.05
	(-0.87)	(-0.63)	(-0.94)	(-0.68)
Constant	-3.15***	-3.70***	-4.21***	-4.90***
	(-2.72)	(-3.23)	(-3.10)	(-3.62)
Loan Purpose FE	Yes	Yes	Yes	Yes
Loan Type FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	587	533	587	533
R-squared	0.48	0.47	0.48	0.47

CHAPTER 2

IPO DECISION, UNDERPRICING AND FINANCIAL CONSTRAINTS

2.1 INTRODUCTION

Although the literature on Initial Public Offerings (IPOs) is quite rich, evidence of a causal relationship between a motive to go public and the issuance decision, and the associated pricing of equity for U.S. firms remains elusive. The main reason for this gap in the literature is the unavailability of information on private firms. Survey based studies (Brau and Fawcett 2006) of U.S. executives sheds some light on the factors that influence the IPO decision. The study by (Chemmanur, He, and Nandy 2010) examining the role of product market characteristics in the IPO decision for U.S. manufacturing firms is the closest we have got to understanding the decision to go public.

Most studies find that firms pursue IPOs to alleviate capital constraints and finance growth opportunities. This perspective is either explicitly stated in theoretical models (Chemmanur, He, and Nandy 2010) or implicitly inferred from empirical results (Pagano, Panetta, and Zingales 1998; Aslan and Kumar 2011). During the pre-IPO book-building process, firms provide external investors with information on the quality of its projects to estimate the demand and price of equity. This cost of evaluating the firm's projects will have an impact on the underpricing (Chemmanur and Fulghieri 1999).

Evidence suggests that financial frictions such as agency costs (Schenone 2004; Ljungqvist and Wilhelm 2003) and asymmetric information (Benveniste and Spindt 1989; Rock 1986 and many others) have a first order effect on underpricing. I build on the theory of financial constraints (Fazzari, Hubbard, and Petersen 1988) and exploit the passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (IBBEA) as an exogenous shock to the supply of capital to understand the link between access to financing, the IPO decision, and the pricing of equity. Using a sample of U.S. IPOs between 1990 and 2002, I find that financially constrained (FC) firms are 25% more likely to go public than non-financially constrained (NFC) firms to alleviate financial constraints. Further, FC firms offer 6% more in underpricing than NFC firms to successfully raise equity. Finally, after going public FC firms invest more aggressively than NFC firms.

The objective of this study is to examine the role of financial constraints in the decision to go public and the related equity underpricing by addressing three related questions. First, do financial constraints influence the decision to go public? Second, is there an incremental cost of issuing equity for financially constrained firms? Third, how does going public to alleviate financial constraints affect a firm's investment decision? I answer the first question by examining the relationship between ex ante nature of the firm (before going public) with regards to ease of accessing capital markets and the likelihood of going public in response to an exogenous change in the access to capital. Subsequently, I address the second question by evaluating the impact of this change in the access to capital on the underpricing for FC and NFC firms. Finally, I perform a comparative analysis on the investment decision of FC and NFC firms after the issuance of equity.

Bank debt is a vital source of capital for private firms, especially young firms (Robb and Robinson 2014). Further, a firm's capital structure exhibits a persistence that predates its IPO (Lemmon, Roberts, and Zender 2008). As a consequence, the financing decisions of private firms that are more reliant on external finance, are more sensitive to changes in bank lending conditions. An exogenous change in the supply of credit will result in an increase in the intensity of financial constraints for FC firms. The passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (IBBEA) resulted in a change in the supply of bank debt for FC firms. FC firms experienced a decline in the supply of bank credit after the IBBEA was implemented and thereby, an increase in the intensity of financial constraints (Zarutskie 2006). A change in the supply of credit to FC firms may induce such firms to substitute credit with equity to a limited degree (Fluck 1998). I hypothesize that the propensity to go public (PTGP) increases with an increase in the magnitude of financial constraints. I test this hypothesis in a difference-in-difference (DD) framework by aggregating the number of firms going public at the state level. The results suggest that FC firms are more likely to use external equity as a substitute for bank credit. In economic terms, the FC firms are 25% more likely to go public than NFC firms. In additional tests, I aggregate the IPO proceeds raised at the state level and find that FC firms raise 28 cents more to the dollar than NFC firms.

Next, I examine the role of financial constraints in the pricing of equity. The shift in the demand for equity by FC firms will affect the pricing of equity. This effect can operate through two channels. First, when the magnitude of financial constraints increases, issuers experience a decline in bargaining power with prospective investors. Although, underwriters are compensated based on the final offer price, they may prefer a higher discount (underpricing). A lower offer price (higher underpricing) will lower the marketing and placement effort on the part of the underwriter (Loughran and Ritter 2002). In addition, underwriters are usually affiliated to larger investment banking entities. These underwriters may engage in a quid pro quo arrangement with investors who are willing to make side-payments in the form of inflated brokerage commissions in exchange for discounted shares (Loughran and Ritter 2004). The underwriter may also make preferential allotments to the personal brokerage accounts of issuing firm executives (spinning). For example, Credit Suisse First Boston Corporation (CSFB) collected inflated commissions from its clients in exchange for allocations of "hot" IPOs[10]. Thus, the misalignment of underwriter incentives may result in a higher under- pricing. FC firms have accesses to fewer sources of capital and hence, have lower bargaining power with their underwriters.

Second, banking relationships reduce asymmetric information (between the bank and the firm), and this reduction in asymmetric information results in a lower IPO underpricing for bank dependent firms. Empirical evidence suggests that firms with banking relationships can issue equity at higher prices i.e., IPOs are less underpriced (C. James and Wier 1990; Slovin and Young 1990). The IBBEA was a shock to lending relationships of FC firms and thereby increased the cost of information production for external investors. This incremental cost will be borne by the firm in the form of higher underpricing (Chemmanur and Fulghieri 1999). Along similar lines, Beatty and Ritter 1986 argue that the pre-IPO information production cost is analogous to investing in a call option on the IPO. The value of the option increases with uncertainty (volatility), which is greater

[10] Credit Suisse First Boston was fined $100 million in 2002.

for FC firms. The empirical tests reveal that IPO underpricing of FC firms is greater than NFC firms by 6% .

Finally, I examine the outcome of the IPO decision on the investment policy of the firm. FC firms by definition possess valuable investment opportunities, but financial frictions limit the extent to which they can invest in these opportunities. The IPO provides firms with equity capital and improves access to other sources of capital. Hence, post-issuance FC firms can increase their investment intensity. I find that FC firms increase capital expenditures by 30% more than NFC firms.

The validity of my empirical design depends on the correct identification of financially constrained firms. Firms that primarily utilize the IPO proceeds to repay debt (payment of borrowings, refinancing, etc.) are more likely to issue equity to re-balance their capital structure by exploiting market misvaluations or provide existing shareholders with lucrative sellout opportunities and are less likely to be financially constrained (Pagano, Panetta, and Zingales 1998). Further, firms that primarily utilize the proceeds of equity issuance (seasoned equity offering) for payment of debt, invest less (Walker and Yost 2008) and possess fewer growth options (Hertzel and Li 2010) than firms that utilize the proceeds for any other purpose. These debt-paying firms replace and increase borrowing after issuing equity. Hence, I designate these debt-paying firms as non-financially constrained, and the non-debt-paying issuers as financially constrained. I also use firm characteristics such as payout policy and firm age to identify ex-ante financially constrained firms. An examination of firm characteristics reveals that the aforementioned definitions are correlated with firm characteristics associated with financing frictions.

I validate my results through robustness checks and also confirm the suitability of assumptions that underlie the empirical design. First, I evaluate the sensitivity of the results to the size of the treatment window. My results remain unaffected by the size of the treatment window. Next, I perform a placebo test to examine if the results are driven by spurious correlations. Finally, I provide suggestive evidence that the fundamental assumption of parallel trends in a DD framework is satisfied, and hence this design is appropriate to study the research question.

The findings contribute to multiple strands of the literature. I provide causal evidence that financial constraints have a direct impact on the pricing of public equity. Previous studies document that underpricing is driven by asymmetric information between different types of investors and issuers, litigation risk and ex-post uncertainty. I present evidence that the forces of demand and supply of capital too have an influence on underpricing. In addition, the existing literature on financial constraints is focused more on listed firms and private firms in the Survey of Small Business Finances (SSBF). I provide a bridge to the existing literature by providing evidence on the impact of access to capital on the decision to go public. Finally, I contribute to research on banking deregulation. Banking deregulation has resulted in positive and negative outcomes for firms. I find that credit rationing against FC firms results in these firms seeking public equity as a substitute.

The rest of the paper is organized as follows. I develop the hypotheses in Section 1.2 and describe the identification strategy and data in Section 1.3. The main results are presented in Section 1.4, followed by robustness checks in Section 1.5. Finally, I conclude in Section 1.6.

2.2 LITERATURE AND HYPOTHESIS DEVELOPMENT

2.2.1. The IPO decision and Financial Constraints

Evidence suggests that the demand for capital is a critical determinant of the probability of going public, both statistically and economically (Lowry 2003). Besides providing firms with capital, IPOs lower the intensity of financial constraints through improved access to credit (Schenone 2010), increase in the bargaining power with banks (Rajan 1992), lower cost of credit (Saunders and Steffen 2011), and creation of publicly traded shares that can be used as a currency in acquisitions (Schultz and Zaman 2001; Hsieh, Lyandres, and Zhdanov 2011).

In an ideal world, if a firm has insufficient internal funds to make investments, it can access external finance at no incremental cost (Modigliani and Miller 1958). However, financial frictions such as incomplete contracting, agency costs, and asymmetric information give rise to financial constraints, which restrict the amount, and impose incremental costs on raising external finance. Tirole 2006 elucidates the concept of financial constraints as follows, "Borrowers with little cash on hand, with large private benefits from misbehaving, and whose performance conveys little information about managerial choices are more likely to see their positive NPV projects turned down by the capital market". In other words, financially constrained firms are unable to fund good investments because of an inability to raise capital, greater dependence on bank loans, and illiquidity of assets (Lamont, Polk and Saa-Requejo (2001)).

Financially constrained (FC) firms often suffer from issues related to financing frictions, and creditors engage in capital rationing to a greater degree against such firms to solve contracting problems (Jaffee and Russell 1976; Stiglitz and Weiss 1981 and many others). In general, FC firms are more dependent on external finance (Erel et al. 2012) and are more likely to raise equity to meet capital deficits (Lemmon and Zender 2010) than NFC firms. Thus, managers at FC firms adversely affected by credit rationing are more likely to issue equity (Lowry 2003; Lin and Paravisini 2013). Further, market distortions such as market segmentation also affect a FC firm's choice of external capital. FC firms that lack access to one form of debt (for example bank loans), may find it difficult to reduce capital deficits using other forms of debt (for example bonds), especially when capital markets experience shocks (Chernenko and Sunderam 2012)[11]. Hence, FC firms are more likely to go public to lower the intensity of financial constraints, while NFC firms may go public for other reasons such as re-balancing their capital structure after implementing substantial investment plans (Pagano, Panetta, and Zingales 1998; Poulsen and Stegemoller 2008).

In the US, on the supply side, two factors eased the process, and lowered the costs of going public in the nineties. First, firms may have found it easier to substitute debt with equity because equity markets were overpriced (or less underpriced), and this lowered their cost of external equity finance (Lettau, Ludvigson, and Wachter 2008). Second, most provisions of the Glass-Stegall Act were repealed with the passing of the Gramm-Leach-Bliley Act (GLBA) in 1999. This increased the participation of commercial banks and institutional investors in the IPO market[12.] These developments may have contributed to the ease of FC firms substituting monitored debt with external equity.

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[11] FC firms can also ease financial constraints by selling out to another firm i.e., an acquisition (Erel, Jang and Weisbach (2015)). However, the acquired firm will compete for funds with other divisions of the acquirer (Stein (1997)).

[12] The Federal Reserve authorized Bankers Trust, Citibank and J.P. Morgan to engage in limited under-writing and dealing in certain securities in 1987 under Section 20 subsidiaries. The growth in investment banking activity resulted in a more competitive underwriting market.

Hypothesis A: *FC firms are more likely than NFC firms to go public in response to an exogenous decrease in the supply of capital.*

2.2.2. Underpricing and Financial Constraints

Given the far-reaching role of financial constraints in the IPO decision, I also examine the associated impact on IPO underpricing. When a firm decides to go public, it has to convince external investors on the quality of its projects. The cost of evaluating the firm's projects in equilibrium is borne by the firm in the form of higher underpricing (Chemmanur and Fulghieri 1999). Evidence suggests that financial frictions such as agency costs (Schenone 2004; Ljungqvist and Wilhelm 2003), and asymmetric information (Benveniste and Spindt 1989; Rock 1986 and many others) have a first order effect on underpricing. Since, agency costs and asymmetric information are more severe for FC firms than NFC firms, FC firms may have to offer greater underpricing.

Underwriters are involved in the price discovery process for an IPO and often have a say in the offer price. Although, underwriters are compensated based on the final offer price, they may prefer a higher discount (underpricing) for two reasons. First, a lower offer price (higher underpricing) will lower the marketing and placement effort on the part of the underwriter (Loughran and Ritter 2002). Second, usually underwriters are part of larger investment banking entities. These underwriters may engage in a quid pro quo arrangement with investors who are willing to make side-payments in the form of inflated brokerage commissions in exchange for discounted shares (Loughran and Ritter 2004). For example, Credit Suisse First Boston Corporation (CSFB) collected inflated commissions from its clients in exchange for allocations of "hot" IPOs. The underwriter may also make preferential allotments to the personal brokerage accounts of issuing firm executives (spinning).

Additional anecdotal evidence on the motivation of the underwriter to offer shares at a discount can be found in Re eToys, Inc. Initial Public Offering Securities Litigation. eToys creditors sued Goldman Sachs (underwriter) when eToys went bankrupt after the internet bubble burst. The creditors claimed that Goldman Sachs intentionally set an artificially low offer price for the IPO which generated lower proceeds and as a consequence eToys had insufficient cash to stay afloat. The plaintiffs provided two key pieces of evidence. The first was a document called the "Trade-Up" report prepared by Goldman Sachs. This report demonstrated to institutional clients the money they made from Goldman's IPO allocation over the years. The second was evidence that showed that Goldman's clients made unnecessary trades to generate brokerage commissions. In fact, Goldman's sales team were encouraged to use IPO allocations as currency to generate business. Thus, the misalignment of underwriter incentives may result in a higher underpricing.

FC firms have accesses to fewer sources of capital and hence, have lower bargaining power with their underwriters. A reduction in the supply of credit would further erode the ability of the issuer to ensure the shares are issued at a fair price. Hence, FC firms are more likely to offer higher underpricing than NFC firms.

Hypothesis B: *FC firms are more likely than NFC firms to offer higher underpricing in response to an exogenous decrease in the supply of capital.*

2.2.3. Post-IPO Investment Decision

IPOs relax financial constraints and hence, issuers can increase investment in growth options ((Aslan and Kumar 2011)). This view is also supported by survey-based papers (Bancel and Mittoo 2009; Brau and Fawcett 2006). In the U.S., IPOs are generally followed by a large growth in assets (Mikkelson, Partch, and Shah 1997) and capital expenditures (Kim and Weisbach 2008). If investing in growth options is the primary motive of FC firms going public then ex-post, FC firms should exhibit higher investment intensity than NFC firms.

Hypothesis C : *Post-issuance, FC firms are more likely to increase their investments than NFC firms.*

2.3 IDENTIFICATION STRATEGY AND DATA

I obtain IPO data for U.S. issuers from Thomson Reuters' SDC Platinum database with offer dates between 1990 and 2002. IPOs with an offer price below $5.00 per share, unit offers, REITs, closed-end funds, banks and S&Ls, ADRs, and IPOs not listed on CRSP within six months of issuing have been excluded. Data on firm age is from Jay Ritter's website. I augment the sample by adding firm characteristics from COMPUSTAT and stock price from CRSP. The final sample consists of 3621 IPOs with offer dates in a five-year window centered on the year of the exogenous shock (IBBEA). The underpricing (initial return or first-day return) is defined as the percentage change from the offer price to the closing price on the first day of trade.

The summary statistics are presented in Table 1. It appears that FC firms are similar in size to NFC firms. However, FC firms are young high-tech firms with lower cash flows and higher R&D intensity. This is consistent with the premise that FC firms possess more growth options but are unable to fund all available opportunities. FC firms hold a higher proportion of cash which is indicative of the precautionary savings motive (Almeida, Campello, and Weisbach 2004; Denis and Sibilkov 2010). The column "Difference" provides an indication of the treatment effect on FC and NFC firms. The treatment effect on FC firms is evident with younger firms, with lower cash levels and higher R&D intensity pursuing an IPO. A similar effect is observed for NFC firms but the magnitudes are much smaller. The relatively muted impact of the treatment on NFC firms is also evident in the change in underpricing. Although, NFC firms offer a higher underpricing after treatment, it is 1/3 of the increase in underpricing for FC firms. The evidence in this table suggests that the IBBEA had a greater impact on FC firms than on NFC firms.

The literature provides different approaches to identify financially constrained firms. I designate firms that primarily utilize the IPO proceeds for payment of debt (payment of borrowings, refinancing, etc.) as financially constrained (FCP). FC firms incur a higher cost of external capital and hence, raise equity only when external finance is required to make investments. Such debt repaying firms are more likely to exploit market misvaluations by issuing equity to re-balance their capital structure or provide existing shareholders with lucrative sellout opportunities and are less likely to be financially constrained (Pagano, Panetta, and Zingales 1998). Further, firms that primarily utilize the proceeds of equity issuance (seasoned equity offering) for payment of debt, invest less (Walker and Yost 2008) and possess fewer growth options (Hertzel and Li 2010) than firms that utilize the proceeds for any other purpose. After the equity issuance, these debt-paying firms replace and increase borrowing. I validate this measure of financial constraints by using alternative definitions. The first alternate definition is the payment of dividends (FCD). FC firms are less likely to pay dividends to shareholders (Fazzari, Hubbard, and Petersen 1988). I designate firms that do not pay dividends as FC firms. The second alternate definition is the age of the firm (FCYN). Young firms are more sensitive to financial frictions i.e., they suffer from information asymmetry problems (Hadlock and Pierce 2010). I designate firms below the median age in the sample as FC firms.

In order to establish that the above measures correctly identify FC firms, I evaluate the correlation between these measures and firm characteristics. In Table 2 , the correlation between the three measures of financially constrained firms are positive and statistically significant. Further, the correlation between the measures of financially constrained firms and firm characteristics are in the expected directions and significant. It appears that financially constrained firms have lower leverage, higher cash (Almeida, Campello, and Weisbach 2004; Denis and Sibilkov 2010), lower cash flows, higher R&D intensity, are younger and smaller (Hadlock and Pierce 2010).

My empirical design exploits the differential sensitivity of NFC and FC firms to an exogenous change in credit supply to determine the impact of financial constraints on the demand for equity and the associated underpricing. The sensitivity of the firm's investment decision to the supply of capital is not directly observable. Studies on financial constraints use observable firm characteristics such as the presence of credit rating (Bernanke and Gertler 1989 and many others) or dividend payout ratios to identify FC firms. The approach has been extended by creating indices for financial constraints (Lamont, Polk, and Saá-Requejo 2001; Whited and Wu 2006; Hadlock and Pierce 2010) for listed firms based on firm characteristics and information from management reports (such as MD&A). However, using the level (magnitude) of such measures to arrive at conclusions is inappropriate given the endogenous nature of these measures. This problem can be addressed if we compare the impact of the change in these endogenous measures in response to an exogenous shock (Roberts and Whited 2013). An exogenous change in regulation (and thereby the availability of credit) affecting the intensity of financial constraints is one such suitable shock. I use the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (IBBEA) as an exogenous shock to financial constraints. The IBBEA was implemented at different points of time in states across the U.S. The staggered nature of changes in state banking regulation provides a set of counterfactuals on how the equity issuance decision would have evolved in the absence of any exogenous variation in access to capital. Furthermore, this method accounts for aggregate trends in capital markets and the real economy. This permits me to disentangle the effect of financial constraints from other motivations influencing the IPO decision.

The passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (IBBEA) created a national framework for banks to operate across state lines[13]. The IBBEA left the door open on certain regulatory issues to the discretion of the states. States could restrict new banks from entering the market by setting requirements on (1) a minimum age of in-state banks targeted for an acquisition, (2) restrictions on the ability of out-of-state banks to open a new branch, (3) restrictions on the ability of out-of-state banks to acquire a single in-state bank branch, and (4) a statewide cap on deposits below 30% of the total deposits in the state. This resulted in variation in the implementation and impact

[13] A key assumption in a DD framework is that the shock is exogenous. In this instance, firms must have no role in determining the timing of the deregulation. Evidence suggests that the decision to deregulate banking in a state was influenced by political factors, and was not determined by firms seeking external finance (Kroszner and Strahan (1999)).

of the IBBEA across states over time. The timing and degree of deregulation are provided in Table 3.

The states had three years after Congress passed the IBBEA to respond to the discretionary restrictions i.e., until 07/01/1997. For example, Oklahoma chose to retain all 4 restrictions on 5/31/1997 and thus, had an index value of 4. I follow the literature (Greene 2017) in designating a state as a deregulating state by considering only the initial response to IBBEA. If the state changed interstate banking laws on multiple occasions, then IPOs after the first response are excluded from the sample. States that initially adopt all four restrictive provisions are designated as non-deregulating states while, those that initially remove at least one barrier to interstate banking are designated as deregulating states. The effective date for states that do not ease banking restrictions is 07/01/1997.

Easing of branching restrictions in the U.S. resulted in out-of-state banks entering new markets, and as a consequence reduced the local market power of the current in-state banks (Jayaratne and Strahan 1998). An increase in the number of lenders in a market can result in informationally opaque firms facing credit supply shocks. This phenomenon can operate through two channels. First, in concentrated markets, lenders can internalize the benefits of private information and so, creditors may be more willing to finance FC firms. However, when credit markets experience increasing competition, lenders are unable to exploit this information monopoly, and may be less inclined to lend to these opaque borrowers (Rice and Strahan 2010).[14]

[14] FC firms suffer from greater information asymmetry related issues than NFC firms. Lenders engage in capital rationing to solve contracting problems (Jaffee and Russell (1976); Stiglitz and Weiss (1981)) and specifically, tend to ration in favor of NFC firms (Bernanke, Gertler and Gilchrist (1994); Erel et al. (2012).

Second, the lenders organizational structure has an impact on lending policy. Large lenders depend more on hard information while small lenders depend more on soft information. Soft information acquired through lending relationships across time and products are important in alleviating financial constraints (Berger and Udell 1995; Petersen and Rajan 1995; Canales and Nanda 2012 and many others). Small banks have a more decentralized structure which gives branch managers more autonomy over lending decisions. In this setting, lenders have a greater incentive to collect and use soft information (Stein 2002). When banks lend to FC firms, they depend on soft information, which gives small banks an advantage over large banks in lending to FC firms. Small banks that have banking relationships with small firms provide liquidity insurance to these firms, especially during a financial crisis (Berger, Bouwman and Kim 2017) and tend to invest a greater proportion of their assets in small business loans than large institutions (Berger, Kashyap and Scalise 1995 and many others)[15]. Thus, a proliferation of large lenders through new entrants or acquisitions in markets that have a significant presence of small lenders may adversely affect the availability of credit to FC firms (Berger, Saunders, Scalise and Udell 1998; Carow, Kane and Narayanan 2006; Di Patti and Gobbi 2007 and many others).

Empirical studies find that the passage of the IBBEA resulted in a reduction in the amount borrowed by younger firms (Zarutskie 2006), higher failure rates for new firms (Zarutskie 2006; Kerr and Nanda 2009) and reduction in the proportion of loans made to small firms by large banks (Berger et al. 1998). Further, young firms (financially constrained) substituted debt with external equity and increased retained earnings

[15] When bank consolidation results in an increase in local market share, the efficiency effects are offset by an increase in market power. These large lenders increase interest rates and cut lending to small borrowers (Sapienza (2002)).

(Zarutskie 2006). Studies (Zarutskie 2006) that evaluate the impact of IBBEA using firm level data for private firms that are more suitable IPO candidates (average assets $6.5 million) find that FC firms faced tighter borrowing conditions[16]. Finally, bank mergers may result in opposite outcomes over the short and long term. In the short term, FC firms (small borrowers) benefit from lower spreads from greater competition but these benefits were reversed within 3 years (Erel 2011). Thus, it appears that the IBBEA had an adverse impact on FC firms over the longer term (>3 years).

I test hypothesis "A" by aggregating IPOs based on their ease of accessing external capital (FC/NFC), size category (number of employees) and state. The sample construction procedure is laid out in Appendix B. In a difference-in-difference (DD) framework (Tsoutsoura 2015; Morse 2011), I compare the propensity to go public (PTGP) for firms (aggregated at the state level) that are financially constrained (the treated group) to those that are non- financially constrained (the control group) before and after the shock. The propensity to go public is the ratio of the number of financially constrained (or non-financially constrained) firms (of a given size category) going public to the total number of firms in the corresponding size category in a given state for each year. The data on total number of firms in a state is from the Longitudinal Business Database provided by the U.S. Census Bureau. The size category is based on number of employees and consists of three categories of firms - less than 100, 100 to 499 and greater than 500 employees. The propensity to go public is computed separately for FC and NFC firms in each state for each year. For example, in the state of California, 27 NFC and 67 FC firms with more than 500

[16] Rice and Strahan (2010) use the small business survey data (average assets $0.5 million) that consist of firms that are unsuitable for an IPO. Further, although an increase in competition may lower spreads for small firms, banks continue to limit credit to solve contracting problems, and credit rationing increases in states that ease interstate branching (Rice and Strahan (2010)).

employees went public in 1996. There were 5008 firms with more than 500 employees in California in 1996. Hence, the PTGP for NFC and FC firms in California with more than 500 employees is 0.54% and 1.34% respectively. The regression is specified as follows:

$$PTGP_{i,t} = \alpha_1 + \beta_1 \text{ TREATMENT}_{i,t} \times \text{CFC}_{i,t} + \mu_1 \text{ TREATMENT}_{i,t} + \eta_1 \text{ CFC}_{i,t} + \delta_1 \text{ Controls}_{i,t} + \theta_1 \text{ State} + \lambda_1 \text{ Year} + \epsilon_{i,t} \quad (1)$$

$$\text{PROPENSITY TO GO PUBLIC} = \frac{\text{Number of FC (NFC) firms of a given category going public}}{\text{Total Number of firms in a given category}}$$

where, TREATMENT is a dummy variable that equals 1 if the issuer's state deregulates its bank branching laws in its initial response to IBBEA and if the offer issue date was after the issuer's state initially responded to IBBEA.[17] I use the FCP, FCD and FCYN definitions to identify financially constrained (FC) firms. CFC is a dummy equal to one for the aggregate FC firms and zero for the aggregate NFC firms.[18] Controls is a vector that includes state level macroeconomic variables such as unemployment, GDP growth, and the CEA Index. An Ordinary Least Squares (OLS) approach is inappropriate for this test because the dependent variable is bounded between 0 and 1. The regression is specified as a Generalized Linear Model (GLM) for fractional dependent variables (Papke and Wooldridge 1996). This quasi- likelihood method is robust and relatively efficient under the GLM assumptions. The sample includes Initial Public Offerings (IPO) with offer dates in a five-year window centered on the year a state initially responded to banking deregulation (IBBEA).

[17] Zarutskie (2006) uses a similar model specification

[18] I obtain similar results when I use the Interstate Branching Restrictions Index instead of the TREATMENT dummy.

The second test for hypothesis ”A” is based on IPO proceeds. I use the aggregate proceeds by firm type (FC/NFC), size category (number of employees) and state. The regression is specified as follows:

$$
\begin{aligned}
AggProceeds_{i,t} = \alpha_2 + \beta_2 \, \mathrm{TREATMENT}_{i,t} \times \mathrm{CFC}_{i,t} + \mu_2 \, \mathrm{TREATMENT}_{i,t} + \eta_2 \, \mathrm{CFC}_{i,t} \\
+ \delta_2 \, \mathrm{Controls}_{i,t} + \theta_2 \, \mathrm{State} + \lambda_2 \, \mathrm{Year} + \epsilon_{i,t}
\end{aligned} \tag{2}
$$

where, TREATMENT is a dummy variable that equals 1 if the issuer’s state deregulates its bank branching laws in its initial response to IBBEA and if the offer issue date was after the issuer’s state initially responded to IBBEA. The regression is specified as an Ordinary Least Squares (OLS) model.

In the second part of the analysis, I try to establish a relationship between the intensity of financial constraints and the offer pricing i.e., the underpricing. The credit supply shock will affect only those firms that have their headquarters located in states that respond to the IBBEA. This will have an impact on the difference in the underpricing between NFC and FC firms.

This differential effect can operate through two channels. First, FC firms in non-deregulated states have a greater access to bank loans than those in deregulated states. This implies that FC firms in deregulated states will experience a decline in bargaining power with underwriters. Thus, the treated FC firms may have to accept a higher underpricing to successfully place their issues. Underwriters can earn higher trading commissions and improve stock liquidity by offering higher underpricing (Nimalendran, Ritter, and Zhang 2007; Goldstein, Irvine, and Puckett 2011; Ellul and Pagano 2006). Second, FC firms have a higher demand for capital than NFC firms and may have to raise funds in the future through public equity and bond issuance. These FC firms may be willing to offer a higher underpricing in anticipation of future interactions with investment banks. Anecdotal evidence can be found in the eToys case where the CEO (Toby Lenk) testified that, “The investment banks have punitive power over us. We need them to raise capital. You don’t go complaining to investment banks because they will crush you”. The regression is specified as follows:

$$\begin{aligned} UP_{j,t} = {} & \alpha_3 + \beta_3 \, \text{TREATMENT}_{j,t} \times \text{FC}_{j,t} + \mu_3 \, \text{TREATMENT}_{i,t} + \eta_3 \, \text{FC}_{i,t} \\ & + \delta_3 \, \text{Controls}_{j,t} + \theta_3 \, \text{State} + \lambda_3 \, \text{Year} + \gamma_3 \, \text{Industry} + \psi_{j,t} \end{aligned} \tag{3}$$

where, UP is the underpricing (initial return). FC is a dummy equal to one for financially constrained firms and zero otherwise. TREATMENT is a dummy variable that equals one if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer issue date was after the issuers state initially responded to IBBEA, and zero otherwise. The sample construction procedure for the hypothesis ”B” is presented in Appendix C.

In the final part of the analysis, I evaluate the post-IPO investment decision. The IPO improves access to capital for FC firms and this should increase investment in growth opportunities. These firms should invest more than NFC firms. The regression is specified as follows:

$$\begin{aligned} g_{j,t+1} = {} & \alpha_4 + \beta_4 \, \text{TREATMENT}_{j,t} \times \text{FC}_{j,t} + \mu_4 \, \text{TREATMENT}_{i,t} + \eta_4 \, \text{FC}_{i,t} \\ & + \delta_4 \, \text{Controls}_{j,t} + \theta_4 \, \text{State} + \lambda_4 \, \text{Year} + \gamma_4 \, \text{Industry} + \psi_{j,t} \end{aligned} \tag{4}$$

where $g_{j,t+1}$ is the asset growth rate.

2.4 MAIN RESULTS

2.4.1. The IPO decision and Financial Constraints

The literature (Zarutskie 2006) finds that young private firms used significantly less external debt after a state responded positively to the IBBEA, which is indicative of an increase in the intensity of financial constraints. My analysis is based on the premise that FC firms are more dependent on bank loans than NFC firms. Bank debt is a vital source of capital for private firms, especially for young firms (Robb and Robinson 2014). In addition, a firm's capital structure exhibits a persistence that predates the IPO (Lemmon, Roberts, and Zender 2008). Thus, the financing decisions of private firms that are more reliant on external finance will be more sensitive to changes in bank lending conditions. I provide suggestive evidence on this premise using the annual financial statements prior to the IPO. In Table 4, I evaluate the impact of the credit supply shock on pre-IPO long term leverage and secured debt. FC firms have lower long-term leverage prior to going public and this difference in leverage is statistically significant for three out of the four definitions of financially constrained firms. The pre-IPO long term leverage of FC firms declines by approximately 16%. In other words, when a state responds to IBBEA, FC firms are unable to borrow over longer maturities. NFC firms do not experience a significant change in their leverage for most definitions of financial constraints.

Further, banks usually seek collateral when they extend credit to firms (Berger and Udell 1990). I use secured loans as a proxy for bank loans to examine the bank dependence of firms prior to the IPO. The average fraction of secured debt for FC firms declines after the shock, and this decline is statistically significant for all definitions of financial constraints. On average, secured debt for FC firms going public declines by 25%. This finding is consistent with the literature that after deregulation, banks reduced lending to financially constrained firms.

An alternative approach to evaluate the impact of the capital supply shock is to compare the probability distribution of firms with and without the treatment. I plot the probability density function (pdf) of firm age, with and without the treatment effect (Figure 2(a)). Treatment is equal to one for firms that go public after a state deregulates interstate banking, and zero otherwise. A non-parametric Kruskal-Wallis test is performed (unreported) to test if the two distributions are from the same population. It fails to reject the null hypothesis (p-value=0.00) that the two distributions are from the same population. This implies that the credit supply shock had an impact on the type of firms going public. In order to address concerns on the technology boom in the nineties driving the results, I also plot the distribution for only manufacturing firms (SIC code 2000 to 3999). A plot of the pdf (Figure 2(b)) for manufacturing firms indicates a similar shift in the distribution and assuages concerns on the coincidental effect of the technology boom of the nineties. Here too, the Kruskal-Wallis fails to reject the null. The graphical evidence shows that the credit supply shock had an impact on the distribution. Indeed, it appears that when firms experience a change in lender policy, the distribution shifts to the left i.e., the probability of a young firm going public increases significantly.

Next, I test hypothesis ”A” on the propensity to go public in a multivariate setting. The results using equation 1 are provided in Table 5 Panel A. The dependent variable is the propensity to go public (PTGP). The coefficient of interest is the interaction term - Treatment X CFC. It is positive and statistically significant for all specifications. This implies that when FC firms experience capital supply shocks, they are more likely to issue external equity than NFC firms. On an average, the propensity of FC firms going public is greater than that of NFC firms. GDP growth is the only control variable that is statistically significant. An increase in aggregate growth opportunities (GDP growth), increases the number of firms seeking external equity (Korajczyk and Levy 2003). The treatment dummy is constant for firms in a state for a year. Thus, the error term may be correlated among firms in a state in a year, and so I cluster standard errors at the state-year level (Rice and Strahan 2010).

Specification (1), (2) and (3) are non-linear models. The OLS regression presented in column (4) provides an estimate of the marginal effect for the interaction term. The dependent variable is scaled up by 100000. The co-efficient of the interaction term suggests that likelihood that FC firms go public increases by 25%.[19]

The impact of the shock on the demand for equity can also be evaluated by comparing the change in aggregate IPO proceeds before and after the shock. Table 5, Panel B presents the results of the aggregate state level data using equation 2. The dependent variable is the aggregate proceeds from the IPO. The coefficient of the interaction term is positive and statistically significant for FCP and FCYN. This suggests that FC firms demand more equity than NFC firms in the response to a capital supply shock. In economic terms, FC firms raise at least 28 cents more to the dollar than NFC firms.

Figure 3 presents the time series of the change in PTGP in response to the credit supply shock. The interaction term TREATMENT X CFC is estimated for each year prior and subsequent to the shock. The difference in the PTGP for FC and NFC firms at the

[19] The mean PTGPscaled = 34.36.Thus, a coefficient of 9.192 is a 25% increase in PTGP.

aggregate level steadily increases from time zero i.e., when firms experience the exogenous shock to 5 years after the shock. The gradual change in bank lending policies that results in greater credit rationing towards FC firms, increases the likelihood that FC firms may seek alternative sources of capital- public equity being one of them.

Additional evidence of the gradual impact of the change in the intensity of financial constraints is presented in Figure 4. A Poisson regression with the number of IPOs (categorized by FC and size) as a dependent variable yields similar results. The interaction term TREATMENT X CFC is positive and significant after the shock and insignificant before the shock.

2.4.2. Underpricing and Financial Constraints

Now, I extend the analysis to understand the role of financial constraints in the pricing of equity. Table 6 presents the underpricing for all IPOs with offer dates centered around between 5 years before and after a state first responds to the IBBEA. The number of IPOs peaks in 1996, while the highest mean underpricing is in 1999. The mean underpricing over the sample period is 25%. These patterns are consistent with the overall IPO trend in the literature (Loughran and Ritter 2004). Thus, my sample is similar to IPO samples in the literature and is not biased towards the inclusion of FC firms.

Table 7 presents the results of the regression for hypothesis ”B” using equation 3. The coefficient of interest is the interaction term (β3), which is positive and statistically different from zero for all definitions of a FC firm. The increase in the demand for equity from FC firms may have induced these firms to increase the underpricing to successfully place their issues. The difference in the underpricing of FC and NFC firms increases by

5.79%, 5.57%, and 8.94% for the FCP, FCD, and FCYN definitions respectively. The treatment effect explains a substantial variation in underpricing offered by FC firms, second only to the impact of the bubble period. The average underpricing in Table 6 is 25%. Thus, for FC firms when underpricing increases by 5.79%, the change corresponds to an increase of 23%.

I control for the partial adjustment phenomenon (Hanley 1993), VC backing (Megginson and Weiss 1991), primary issues (Ljungqvist and Wilhelm 2003) and underwriter reputation (R. B. Carter, Dark, and Singh 1998). The sign of the coefficients are in the expected direction. Reputable underwriters (toptier) in the nineties offered higher underpricing. Firm size (Ln(Assets)), and firm age (Ln(age)) are negatively associated with the underpricing, while returns on the NASDAQ (Nasdaq15) and the partial adjustment (Revision) are positively associated with the underpricing. I include a dummy Bubble to control for the dot-com bubble in 1999-2000. In addition, the regression includes controls for time, state and industry fixed effects. The standard errors are clustered at the state-year level.

The average proceeds (real) of the IPOs in the sample is $100 million. An incremental underpricing of 6% implies that FC issuers were willing to leave an additional $6 million on the table to successfully raise equity. It appears that changes in bank lending policies distorted the firms financing decisions and the resulting effect manifested itself through FC firms offering higher underpricing to successfully raise the required capital. This finding complements the evidence in asset pricing literature that investors demand a premium on financially constrained firms (Livdan, Sapriza, and Zhang 2009).

2.4.3. Post-IPO Investment Decision

Table 8 presents the results of post-IPO investment decision of FC and NFC firms. The dependent variable in columns (1), (2) and (3) is the scaled increase in PP&E (Capex). The co-efficient of the interaction term (Treatment X FC) is positive, and statistically significant. FC firms increase their capital expenditures after going public. FC firms invests 30% more than NFC firms. Further, the co-efficient of FC is positive, which implies that on an average FC firms have a higher investment intensity than NFC firms.

The dependent variable in column (4), (5) and (6) is the total asset growth rate (gasset). The co-efficient of the interaction term (Treatment X FC) is positive, and statistically significant. The asset growth rate of FC firms is 10% greater than NFC firms. Overall, I find that FC firms invest more than NFC firms after the IPO.

2.5 ROBUSTNESS CHECKS

In this section, I validate my results through robustness checks, and also confirm the suitability of assumptions that underlie the empirical design.

2.5.1 Size of Treatment Window

In the main analysis, I use the DD methodology with a treatment window of ±5 years, centered on the year a state first responds to the IBBEA. If the effect measured by the interaction term is noise, then the coefficient may be sensitive to the size of the treatment window. In Table 9 and 10, I provide suggestive evidence that the measured effect is not noise by varying the size of the treatment window. The treatment effect is estimated over two different windows ±4 years and ±6 years in Panel A and Panel B respectively. The regression includes all control variables, and fixed effects from the original specification. In Table 9, Panel A, PTGP increases by at least 0.344, while in Panel B PTGP increases by at least 0.367. The increase in the magnitude of the coefficient is consistent with Figure 3.

Similarly, in Table 10 I vary the size of the treatment window. In Panel A, IPO firms offer at least an additional 5.24% underpricing, while in Panel B IPO firms offer an additional 5.37% underpricing. The interaction effect is increasing in magnitude with time i.e., as banks consolidate the issuers experience a change in lending policies and may be more inclined to pursue an IPO.

2.5.2 Falsification Test

I perform a placebo test to provide additional evidence that the timing of the IBBEA is related to the change in the demand for equity and thereby the change in the difference in the underpricing for FC firms and NFC firms. A placebo shock is assumed at 5 years after and 5 years before the actual treatment dates for each state. Table 11 presents the placebo test for the hypothesis ”A”. The interaction term is not significant in Panel A. In Panel B, the interaction term is positive and significant at 1% only for the FCYN definition.

The placebo tests for hypothesis ”B” are presented in Table 12 . The results in Panel A and Panel B indicate that the placebo shock has no significant impact on the underpricing for FC and NFC firms. The coefficient on the interaction term is not statistically different from zero except for FCYN in Panel A. Surprisingly, the sign on the co-efficient is negative. The results of the placebo tests suggest that the timing of the credit supply shock affected the demand for equity and the associated IPO underpricing for FC firms.

2.5.3 Parallel Path Assumption

An assumption of the difference-in-difference (DD) methodology is that the change in the variable of interest (dependent variable) should remain unchanged in the absence of any treatment effect. In other words, the difference in underpricing for treatment and control group should exhibit a parallel trend. The assumption can be graphically verified in Figure 5. The plots suggest that the treatment and control groups exhibit a similar underpricing trend prior to the exogenous shock to credit supply. Subsequently, after the shock, the underpricing increases for FC firms much more than that for NFC firms. Thus, it appears that the assumption of parallel trends holds true, and our empirical design is appropriate.

2.6 CONCLUDING REMARKS

The objective of this paper is to relate two themes that are widely discussed in the IPO literature - the decision to go public and the underpricing of equity with access to capital i.e., financial constraints. I examine this relationship by addressing three related questions. First, do financial constraints influence the decision to go public? Second, is there an incremental cost of issuing equity for financially constrained firms? Third, how does going public to alleviate financial constraints affect a firm's investment decision?

Using the passage of IBBEA as an exogenous shock to the supply of capital, I evaluate the change in the propensity to go public for FC and NFC firms. A decline in the supply of capital to FC firms will push these firms towards pursuing an IPO. As expected, I find that FC firms are more likely to go public than NFC firms to alleviate financial constraints. The literature on financial constraints is focused more on listed firms and private firms in the Survey of Small Business Finances (SSBF). I provide a bridge to the existing literature by providing evidence on the impact of access to capital on the decision to go public.

Underwriters have perverse incentives to issue shares at a discount (underpricing). FC firms that experience a decline in bank credit have lower bargaining power with the underwriter and offer a more underpricing than NFC firms. Previous studies document that underpricing is driven by asymmetric information between different types of investors and issuers, litigation risk and ex-post uncertainty. I present evidence that the forces of demand and supply of capital too have an influence on underpricing.

Finally, FC firms by their very nature possess valuable growth opportunities but are unable to invest on account of limited access to capital. The IPO improves access to capital and FC firms can invest more aggressively than NFC firms.

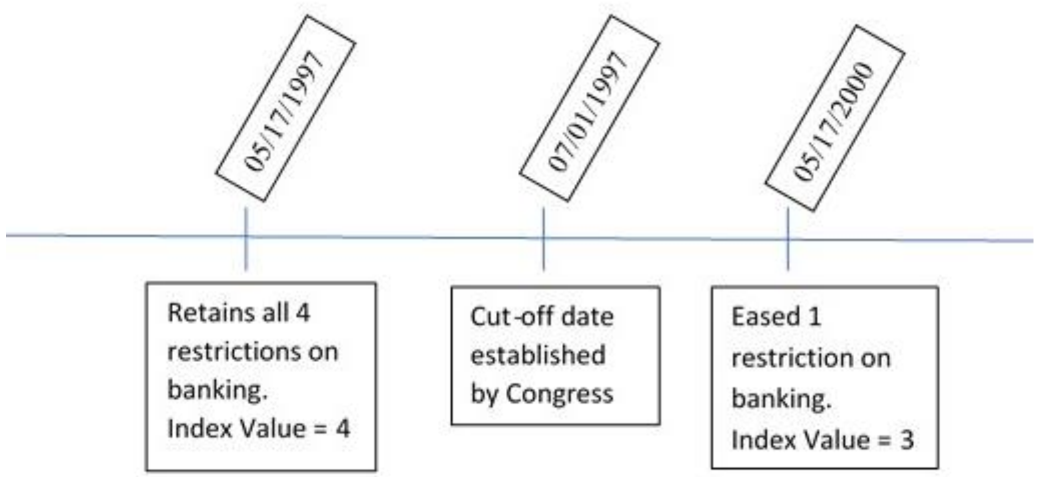
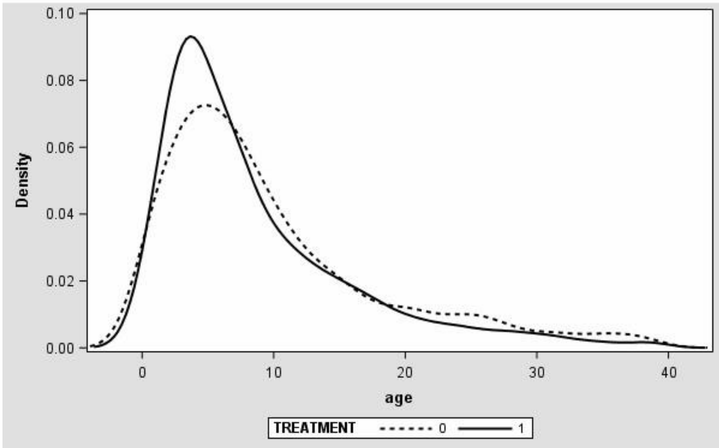


Figure 2.1: Time-line of a State's Response to IBBEA

The figure provides the time line of Oklahoma's response to IBBEA. The state of Oklahoma first responds to the IBBEA on 05/17/1997. IPOs five years before and after this date are include in the sample. Since, the banking restriction index remains unchanged at 4, Oklahoma is designated as a non-deregulated state. However, Oklahoma lowers restrictions in 2000. IPOs in Oklahoma are excluded from the sample if the offer date is after 05/17/2000.

(a) Age of Firm and Treatment Effect
(full sample)



(b) Age of Firm and Treatment Effect
(manufacturing firms)

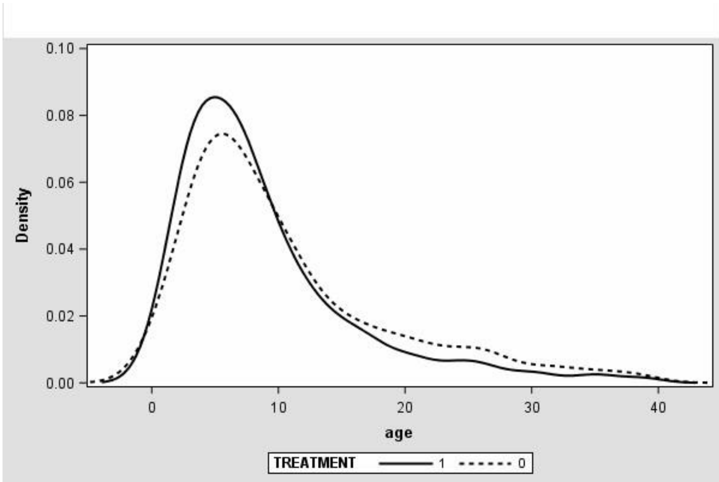


Figure 2.2: Probability Density Function (Epanechnikov) of Firm Age

The figure plots the probability density function (PDF) of firm age. Treatment takes the value 1 after a state deregulates interstate banking, and 0 otherwise. Data are described in Section III.

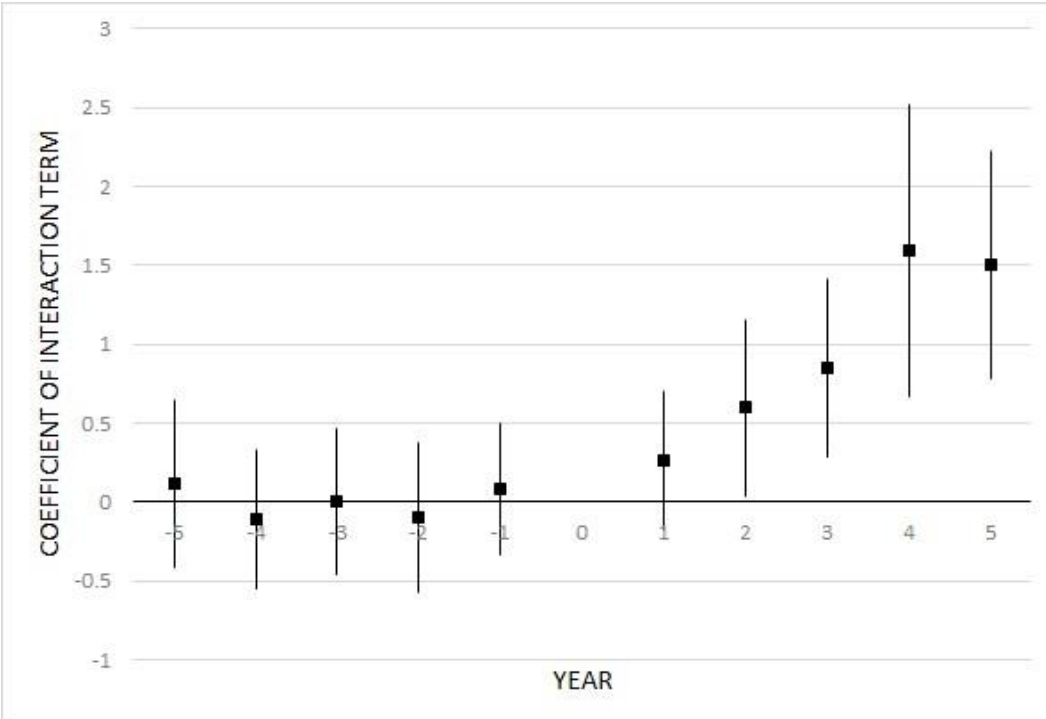


Figure 2.3: Point Estimates of Propensity to go Public

This figure presents the GLM regression for the propensity to go public (PTGP) for FC firms and NFC firms. The figure plots point estimates for the slope of the interaction terms (β) of the following specification:

$$PTGP_{i,t} = \alpha_1 + \beta_{-5} TREATMENT_{i,-5} \times CFC_{i,-5} + \beta_{-4} TREATMENT_{i,-4} \times CFC_{i,-4} + \beta_{-3} TREATMENT_{i,-3} \times CFC_{i,-3} + \beta_{-2} TREATMENT_{i,-2} \times CFC_{i,-2} + \beta_{-1} TREATMENT_{i,-1} \times CFC_{i,-1} + \beta_0 TREATMENT_{i,0} \times CFC_{i,0} + \beta_1 TREATMENT_{i,1} \times CFC_{i,1} + \beta_2 TREATMENT_{i,2} \times CFC_{i,2} + \beta_3 TREATMENT_{i,3} \times CFC_{i,3} + \beta_4 TREATMENT_{i,4} \times CFC_{i,4} + \beta_5 TREATMENT_{i,5} \times CFC_{i,5} + \mu_1 TREATMENT_{i,t} + \eta_1 CFC_{i,t} + \delta_1 Controls_{i,t} + \theta_1 State + \lambda_1 Year + \varepsilon_{i,t}$$

Where λ_1 and θ_1 are year and state fixed effects respectively. Treatment is a dummy variable that equals 1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer date is after the issuers state initially responded to IBBEA. CFC is a dummy equal to one for the aggregated FC firms, and zero for the aggregated NFC firms. The vertical bars correspond to 95% confidence intervals with standard errors clustered at the state-year level.

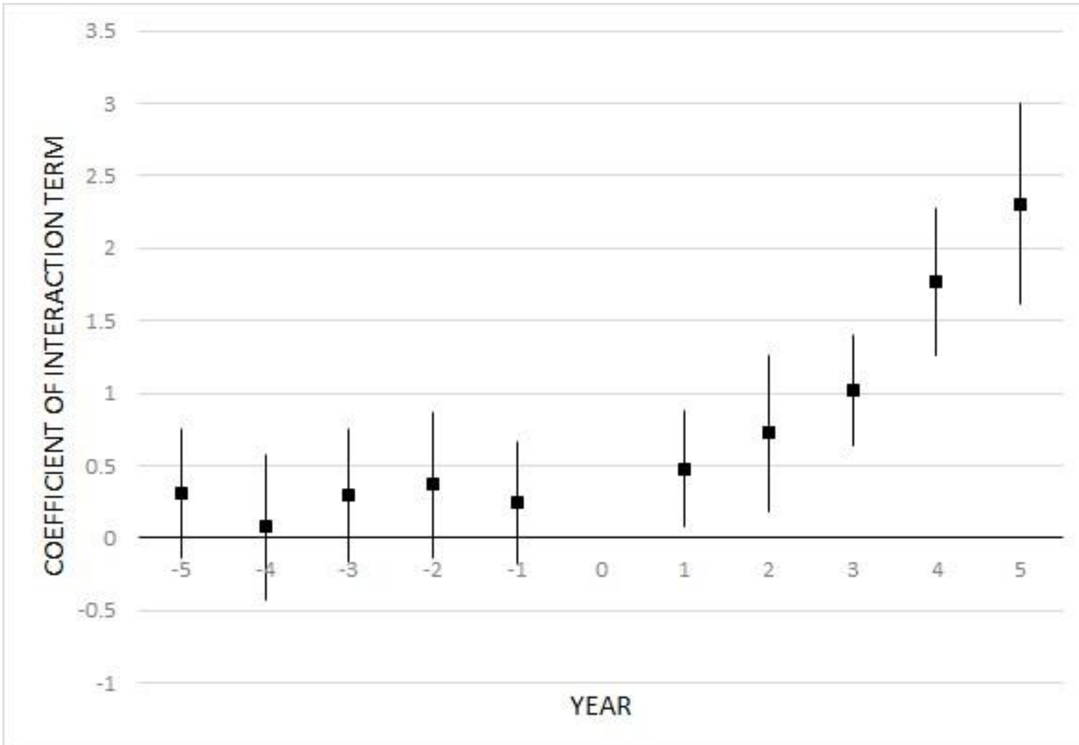


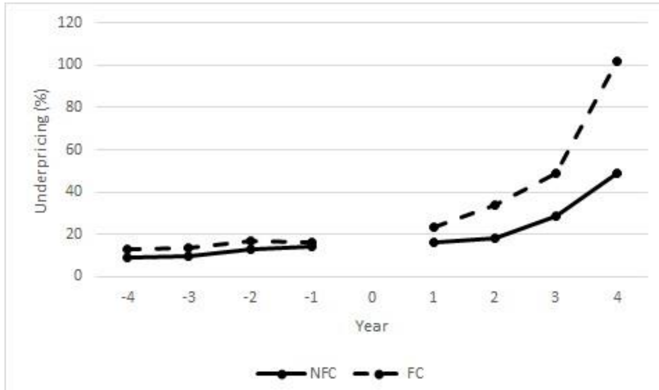
Figure 2.4: Point Estimates of Number of IPOs

This figure presents the Poisson regression of the number of IPOs (IPO Count) for FC firms and NFC firms. The figure plots point estimates for the slope of the interaction terms (β) of the following specification:

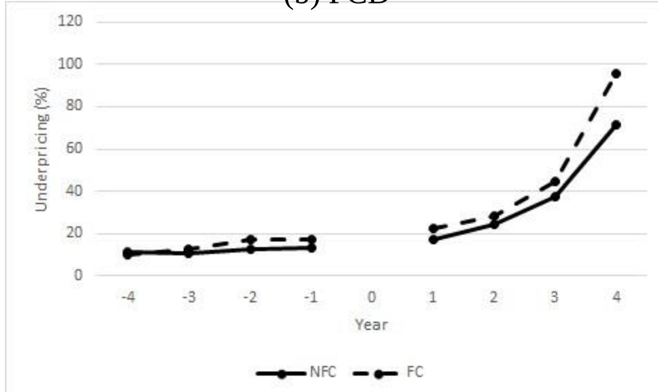
$$IPO\_Count_{i,t} = \alpha_1 + \beta_{-5} TREATMENT_{i,-5} \times CFC_{i,-5} + \beta_{-4} TREATMENT_{i,-4} \times CFC_{i,-4} + \beta_{-3} TREATMENT_{i,-3} \times CFC_{i,-3} + \beta_{-2} TREATMENT_{i,-2} \times CFC_{i,-2} + \beta_{-1} TREATMENT_{i,-1} \times CFC_{i,-1} + \beta_0 TREATMENT_{i,0} \times CFC_{i,0} + \beta_1 TREATMENT_{i,1} \times CFC_{i,1} + \beta_2 TREATMENT_{i,2} \times CFC_{i,2} + \beta_3 TREATMENT_{i,3} \times CFC_{i,3} + \beta_4 TREATMENT_{i,4} \times CFC_{i,4} + \beta_5 TREATMENT_{i,5} \times CFC_{i,5} + \mu_1 TREATMENT_{i,t} + \eta_1 CFC_{i,t} + \delta_1 Controls_{i,t} + \theta_1 State + \lambda_1 Year + \varepsilon_{i,t}$$

Where λ_1 and θ_1 are year and state fixed effects respectively. Treatment is a dummy variable that equals1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer date is after the issuers state initially responded to IBBEA. CFC is a dummy equal to one for the aggregated FC firms, and zero for the aggregated NFC firms. The vertical bars correspond to 95% confidence intervals with standard errors clustered at the state-year level

(a) FCP



(b) FCD



(c) FCYN

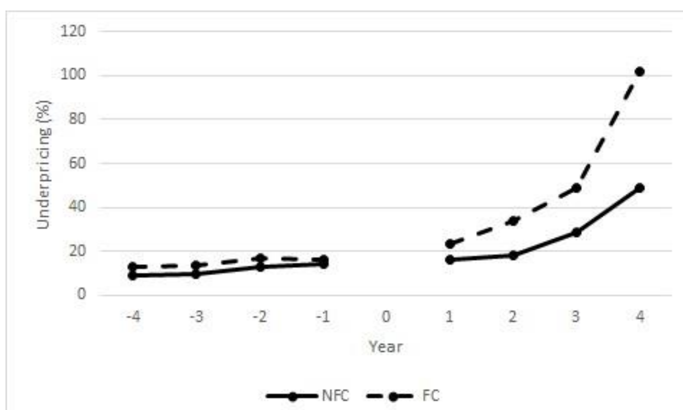


Figure 2.5: Parallel Path Assumption

The figure plots the average underpricing for financially constrained(FC) and non-financially constrained(NFC) firms on window centered on the year a state initially responds to the banking deregulation (IBBEA).

Table 2.1: Summary Statistics

The table presents the characteristics of the sample of 3621 Initial Public Offerings(IPO) with offer dates in a five-year window centered on the year a state initially responds to banking deregulation (IBBEA). IPO with an offer price below ☆5.00 per share, unit offers, REITs, closed-end funds, banks and S&Ls, ADRs, and IPOs not listed on CRSP within six months of issuing have been excluded. Firms that utilize their proceeds to service/pay off their debt obligations are considered as Non-Financially Constrained (NFC) firms, while the rest are considered as Financially Constrained (FC) firms. Treatment is a dummy variable that equals 1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer date is after the issuers state initially responded to IBBEA. Difference is the difference in the mean between the two treatment regimes. The corresponding p-value is provided in the last column. Variable definitions are provided in Appendix A

	(0) Treatment=0		(1) Treatment=1		(1) - (0)	
	N	mean	N	mean	Difference	p-value
FC (FCP)						
Underpricing	1386	17.07	1159	46.17	29.10***	0.00
Assets	1386	2.12	1159	2.39	0.27***	0.00
Sales	1386	172.31	1159	168.85	-3.46	0.95
Age	1386	13.73	1159	11.07	-2.66***	0.01
ROA	957	-0.10	892	-0.40	-0.30***	0.00
Cash	957	0.22	892	0.35	0.13***	0.00
Cash Flow	957	-0.12	892	-0.41	-0.30***	0.00
Investment	957	0.10	892	0.10	0.00	0.73
R&D Intensity	957	0.18	892	0.26	0.08***	0.00
N						
NFC (FCP)						
Underpricing	761	11.00	315	10.74	10.74***	0.00
Assets	761	2.73	315	2.84	0.11	0.42
Sales	761	196.15	315	183.41	-12.74	0.75
Age	761	19.80	315	16.91	-2.89**	0.05
ROA	533	0.10	242	-0.10	-0.20***	0.00
Cash	533	0.06	242	0.10	0.04***	0.00
Cash Flow	533	0.08	242	-0.11	-0.18***	0.00
Investment	533	0.08	242	0.08	0.00	0.59
R&D Intensity	533	0.04	242	0.11	0.07***	0.01

Table 2.2: Measures of Financial Constraints

The Spearman Rank Correlations between the six measures of financial constraints are presented in Panel A. The Spearman Rank Correlations between the six measures of financial constraints and firm characteristics are presented in Panel B. The significance levels are designated as *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Variable definitions are provided in Appendix A

	FCP	FCD	FCYN	DVD	LEV	CASH	CFLOW	SIZE	AGE	R&D Int.
FCP	1									
FCD	0.132***	1								
FCYN	0.110***	0.108***	1							
DVD	-0.132***	-1	-0.108***	1						
LEV	-0.120***	-0.0135	-0.0226	0.0135	1					
CASH	0.310***	0.144***	0.269***	-0.144***	-0.177***	1				
CFLOW	-0.105***	-0.0811***	-0.169***	0.0811***	-0.349***	-0.243***	1			
SIZE	-0.123***	-0.115***	-0.506***	0.115***	0.0507***	-0.273***	0.129***	1		
AGE	-0.138***	-0.138***	-0.257***	0.138***	-0.0396**	-0.266***	0.232***	0.431***	1	
R&D Int.	0.117***	0.0973***	0.105***	-0.0973***	0.239***	0.262***	-0.773***	-0.123***	-0.236***	1

Table 2.3: Distribution of IPOs

The table provides the deregulation dates from Rice and Strahan (2010). The Bank Restriction Index can vary between 0 and 4. The deregulation dummy is 1 if the Bank Restriction Index is 4 and 0 for all other values of Bank Restriction Index. Abbr. is the abbreviation for the corresponding state. The effective date for states that do not ease interstate banking restrictions is set at 3 years after Congress passed the IBBEA (07/01/1997). If a state changes banking regulation more than once, then the IPO after the first response date are excluded.

State	Abbr.	Effective Date	Bank Restriction Index	Deregulation	Number of IPOs
Alabama	AL	5/31/1997	3	1	20
Alaska	AK	1/1/1994	2	1	2
Arkansas	AR	6/1/1997	4	0	7
Arizona	AZ	9/1/1996	3	1	48
California	CA	9/28/1995	3	1	980
Colorado	CO	6/1/1997	4	0	93
Connecticut	CT	6/27/1995	1	1	83
DC	DC	6/13/1996	0	1	12
Delaware	DE	9/29/1995	3	1	4
Florida	FL	6/1/1997	3	1	181
Georgia	GA	6/1/1997	3	1	107
Hawaii	HI	6/1/1997	3	1	3
Iowa	IA	4/4/1996	4	0	11
Idaho	ID	9/29/1995	3	1	7
Illinois	IL	6/1/1997	3	1	120
Indiana	IN	6/1/1997	0	1	28
Kansas	KS	9/29/1995	4	0	17
Kentucky	KY	6/1/1997	4	0	11
Louisiana	LA	6/1/1997	3	1	16
Massachusetts	MA	8/2/1996	1	1	266
Maryland	MD	9/29/1995	0	1	68
Maine	ME	1/1/1997	0	1	4
Michigan	MI	11/29/1995	0	1	43
Minnesota	MN	6/1/1997	3	1	81
Missouri	MO	9/29/1995	4	0	40
Mississippi	MS	6/1/1997	4	0	14

State	Abbr.	Bank Restriction Index	Effective Date	Deregulation	Number of IPOs
Montana	MT	9/29/1995	4	0	4
North Carolina	NC	7/1/1995	0	1	52
North Dakota	ND	5/31/1997	3	1	2
Nebraska	NE	5/31/1997	4	0	13
New Hampshire	NH	6/1/1997	4	0	15
New Jersey	NJ	4/17/1996	1	1	134
New Mexico	NM	6/1/1996	3	1	5
Nevada	NV	9/29/1995	3	1	23
New York	NY	6/1/1997	2	1	248
Ohio	OH	5/21/1997	0	1	69
Oklahoma	OK	5/31/1997	4	0	20
Oregon	OR	7/1/1997	3	1	45
Pennsylvania	PA	7/6/1995	0	1	132
Rhode Island	RI	6/20/1995	0	1	10
South Carolina	SC	7/1/1996	3	1	17
South Dakota	SD	3/9/1996	3	1	5
Tennessee	TN	6/1/1997	3	1	41
Texas	TX	8/28/1995	4	0	293
Utah	UT	6/1/1995	2	1	26
Virginia	VA	9/29/1995	0	1	80
Vermont	VT	5/30/1996	2	1	5
Washington	WA	6/6/1996	3	1	85
Wisconsin	WI	5/1/1996	3	1	28
West Virginia	WV	5/31/1997	1	1	2
Wyoming	WY	5/31/1997	3	1	1
TOTAL					3621

Table 2.4: Bank Dependence

The table presents the impact of the IBBEA on the debt characteristics of the sample of 3621 Initial Public Offerings (IPO) with offer dates in a five-year window centered on the year a state initially responds to banking deregulation (IBBEA). Treatment is a dummy variable that equals 1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer date is after the issuers state initially responded to IBBEA. Difference is the difference in the mean between the two treatment regimes. Financially constrained firms are identified using the FCP, FCD and FCYN definitions. Leverage is the ratio of long-term debt to total assets. Secured debt is the ratio of secured debt to total assets. Leverage and secured debt are measured prior to the IPO offer date. The corresponding p-value is provided in the last column. Variable definitions are provided in Appendix A

	(0) Treatment=0		(1) Treatment=1		(1) - (0)	
	Obs.	Mean	Obs.	Mean	Difference	p-value
Panel A: Leverage						
FC (FCP)	957	0.21	892	0.19	-0.03	0.13
NFC (FCP)	533	0.38	242	0.33	-0.06**	0.05
FC (FCD)	1226	0.28	993	0.22	-0.06***	0.00
NFC (FCD)	264	0.23	141	0.19	-0.04	0.12
FC (FCYN)	648	0.26	619	0.19	-0.08***	0.00
NFC (FCYN)	648	0.28	619	0.25	-0.03*	0.07
Panel B: Secured Debt						
FC (FCP)	957	0.13	892	0.09	-0.04***	0.01
NFC (FCP)	533	0.21	242	0.19	-0.02	0.46
FC (FCD)	1226	0.16	993	0.11	-0.05***	0.00
NFC (FCD)	264	0.14	141	0.13	-0.01	0.55
FC (FCYN)	648	0.16	619	0.09	-0.07***	0.00
NFC (FCYN)	842	0.16	515	0.14	-0.02	0.18

Table 2.5: IPO Decision and Financial Constraints

The table presents the results for a sample of IPOs, aggregated at the state level, with offer dates in a five-year window centered on the year a state initially responds to banking deregulation (IBBEA). In Panel A, the dependent variable is the propensity to go public (PTGP). PTGP is the ratio of the number of firms in a size category in a state completing an IPO to the total number of firms in the same size category in a state. The FCP, FCD, and FCYN definitions are used to identify financially constrained (FC) firms in specification (1), (2), and (3) respectively. These regressions are specified as a Generalized Linear Model (Papke and Wooldridge (1996)). In column (4), the model is specified as an OLS, and the dependent variable is scaled by 100000. In Panel B,the dependent variable is the aggregate IPO proceeds at the state level.These regressions are specified as a OLS model. Treatment is a dummy variable that equals 1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer issue date was after the issuers state initially responded to IBBEA. All control variables are lagged by one period. z-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year.Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

Panel A: Propensity to go Public

	(1) FCP	(2) FCD	(3) FCYN	(4) FCP (OLS)
Treatment X CFC	0.708***	0.578***	0.380***	9.192**
	(4.754)	(3.622)	(3.136)	(2.123)
Treatment	-0.406***	-0.372**	-0.122	-5.677
	(-2.645)	(-1.960)	(-0.916)	(-1.478)
CFC	0.434***	1.108***	-0.050	14.652***
	(6.387)	(13.134)	(-0.867)	(5.845)
Unemployment	-0.072	-0.054	-0.062	-0.248
	(-0.947)	(-0.653)	(-0.822)	(-0.137)
GDP growth	2.631**	2.835**	2.457*	41.319
	(2.074)	(1.990)	(1.903)	-1.327
CEA Index	-0.029	-0.014	-0.034	-2.128***
	(-1.061)	(-0.442)	(-1.230)	(-3.206)
Constant	-16.256***	-16.344***	-14.429***	146.254***
	(-6.480)	(-5.966)	(-5.771)	(2.861)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Observations	3,090	3,090	3,090	3,090

Panel B: Capital Raised

	(1) FCP	(2) FCD	(3) FCYN
Treatment X CFC	0.570***	0.216	0.286***
	(4.417)	(1.613)	(2.616)
Treatment	-0.262**	-0.035	-0.100
	(-2.294)	(-0.311)	(-0.864)
CFC	0.414***	0.852***	-0.178***
	(6.276)	(12.222)	(-3.039)
Unemployment	-0.051	-0.043	-0.081
	(-0.957)	(-0.829)	(-1.530)
GDP growth	0.286	-0.100	-0.232
	(0.330)	(-0.118)	(-0.245)
CEA Index	-0.039*	-0.040**	-0.038*
	(-1.899)	(-2.082)	(-1.769)
Constant	2.650	2.445	2.949*
	(1.624)	(1.605)	-1.756
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Observations	3,090	3,090	3,090
R-squared	0.477	0.432	0.485

Table 2.6: IPO Underpricing

The table presents the mean and median underpricing (initial return) for all IPOs with offer dates in a five-year window centered on the year a state initially responds to banking deregulation (IBBEA). IPOs with an offer price below $5.00 per share, unit offers, REITs, Ls, ADRs, and IPOs not listed on CRSP within six months of issuing have been excluded. The underpricing (initial return/first-day return) is defined as the percentage change from the offer price to the closing price on the first day of trade.

Year	N	Mean	Std. Dev.	Median
1990	54	8.19	12.86	2.93
1991	157	12.30	15.35	7.95
1992	331	10.56	17.47	4.17
1993	428	13.32	19.50	6.49
1994	346	10.02	15.33	4.78
1995	390	22.13	26.50	14.29
1996	588	17.88	24.18	10.71
1997	386	13.81	18.01	8.23
1998	227	24.08	54.73	10.53
1999	381	76.98	95.09	46.92
2000	296	59.52	81.34	28.71
2001	20	10.58	13.86	9.17
2002	17	14.42	19.47	9.82
Total	3621	25.93	50.35	10.13

Table 2.7: Demand for Equity and Underpricing of IPO

The sample includes 3621 Initial Public Offerings (IPOs) with offer dates in a five-year win- dow centered on the year a state initially responds to banking deregulation (IBBEA). The dependent variable in all regressions is the underpricing/first-day return. In specifications 1, 2 and 3 financially constrained firms are identified using the FCP, FCD, and FCYN definitions respectively. Year fixed effects, state fixed effects, and industry fixed effects are included, where the coefficients are not reported for brevity. t-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year. Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

	(1) FCP	(2) FCD	(3) FCYN
Treatment X FC	5.79**	5.57**	8.94***
	(2.14)	(2.02)	(3.12)
Treatment	-3.70*	-2.26	-4.17*
	(-1.68)	(-1.05)	(-1.70)
FC	-1.36	0.83	-1.85
	(-1.16)	(0.66)	(-1.00)
Tech	4.80**	4.75**	4.84**
	(2.10)	(2.12)	(2.12)
Primary	0.11***	0.11***	0.11***
	(4.27)	(4.17)	(4.25)
Nasdaq15	0.88***	0.90***	0.90***
	(5.42)	(5.45)	(5.41)
Toptier	2.40	2.67*	2.31
	(1.51)	(1.68)	(1.48)
Nasdaq	1.48	1.35	1.48
	(1.10)	(1.00)	(1.11)
VC	2.44	2.50	2.18
	(1.57)	(1.59)	(1.44)
Lnassets	-0.16	-0.51	-0.14
	(-0.56)	(-1.62)	(-0.52)
Lage	-2.34***	-2.10***	-1.73*
	(-3.10)	(-2.82)	(-1.72)
Bubble	36.67***	37.96***	37.26***
	(8.22)	(8.93)	(8.79)
Revision	0.95***	0.95***	0.95***
	(8.88)	(8.90)	(8.89)
Constant	-5.54	-4.76	-6.91
	(-0.60)	(-0.57)	(-0.81)
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	3620	3620	3620
R-squared	0.46	0.46	0.46

Table 2.8: Post-IPO Investment Decision

The sample includes all IPOs from Table 7. The dependent variable in specification (1), (2) and (3) is the capital expenditure before depreciation as a fraction of the PP&E variable is the asset growth rate (gasset) in specification (4), (5) and (6). Asset growth rate is defined as the change in total assets as a fraction of total assets in the previous year. I use the FCP definition in (1) and (4), FCD definition in (2) and (5) and FCYN definition in (3) and (6). Year fixed effects, state fixed effects and industry fixed effects are included, where the coefficients are not reported for brevity. t-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year. Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

		Capex			g_{asset}	
	(1)	(2)	(3)	(4)	(5)	(6)
	FCP	FCD	FCYN	FCP	FCD	FCYN
Treatment X FC	0.35**	0.34**	0.27	0.11**	0.10*	0.07
	(2.24)	(2.22)	(0.99)	(2.02)	(1.82)	(1.11)
Treatment	-0.22	-0.21	-0.04	0.02	0.03	0.08**
	(-1.47)	(-1.27)	(-0.36)	(0.54)	(0.63)	(2.31)
FC	0.06	0.06	0.36**	-0.02	-0.01	0.12***
	(0.73)	(0.79)	(2.17)	(-0.68)	(-0.25)	(3.52)
Leverage	-1.35***	-1.42***	-1.44***	-0.50***	-0.51***	-0.52***
	(-6.81)	(-7.07)	(-7.08)	(-5.45)	(-5.58)	(-5.63)
Ln(Sale)	-0.11***	-0.12***	-0.09***	0.03***	0.03***	0.04***
	(-3.14)	(-3.28)	(-2.67)	(2.74)	(2.75)	(3.40)
RoA	-0.03	-0.03	-0.02	0.01*	0.01*	0.01**
	(-0.90)	(-0.90)	(-0.73)	(1.71)	(1.72)	(2.20)
Tobins Q	0.06	0.06	0.06	0.20***	0.20***	0.20**
	(0.88)	(0.91)	(0.79)	(2.58)	(2.61)	(2.57)
Constant	1.43***	1.47***	1.37***	0.07	0.07	0.02
	(5.31)	(5.48)	(4.88)	(0.49)	(0.47)	(0.14)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7166	7166	7166	7166	7166	7166
R-squared	0.05	0.05	0.06	0.06	0.06	0.06

Table 2.9: Size of Treatment Window (Propensity to go Public)

The table presents the results for a sample of IPOs, aggregated at the state level, offer dates in a window centered on the year a state initially responds to banking deregulation (IBBEA). The dependent variable is the propensity to go public (PTGP). The FCP, FCD, and FCYN definitions are used to identify financially constrained (FC) firms in specification (1), (2), and (3) respectively. These regressions are specified as a Generalized Linear Model (Papke and Wooldridge (1996)). Treatment is a dummy variable that equals 1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA, and if the offer issue date was after the issuers state initially responded to IBBEA. All control variables are lagged by one period. z-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year. Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

	(1) FCP	(2) FCD	(3) FCYN
Panel A: ± 4 years			
Treatment X FC	0.662***	0.600***	0.344***
	(4.250)	(3.598)	(2.670)
Treatment	-0.414***	-0.432**	-0.142
	(-2.613)	(-2.183)	(-1.028)
FC	0.430***	1.070***	-0.026
	(6.007)	(12.221)	(-0.437)
Panel B: ± 6 years			
Treatment X FC	0.701***	0.578***	0.367***
	(4.833)	(3.680)	(3.092)
Treatment	-0.397***	-0.369**	-0.111
	(-2.645)	(-1.972)	(-0.850)
FC	0.437***	1.124***	-0.062
	(6.749)	(13.846)	(-1.097)
Control Variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes

Table 2.10: Size of Treatment Window (IPO Underpricing)

The sample includes 3621 Initial Public Offerings (IPO) with offer dates in a window centered on the year a state initially responds to banking deregulation (IBBEA). The dependent variable in all regressions is the underpricing/first-day return. In specifications 1, 2 and 3 financially constrained firms are identified using the FCP, FCD, and FCYN definitions respectively. Year fixed effects, state fixed effects, and industry fixed effects are included, where the coefficients are not reported for brevity. t-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year. Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

	(1) FCP	(2) FCD	(3) FCYN
Panel A: ± 4 years			
Treatment X FC	6.70**	5.24*	10.41***
	(2.37)	(1.71)	(3.43)
Treatment	-4.69**	-2.42	-5.27**
	(-2.04)	(-1.07)	(-2.06)
FC	-1.14	1.37	-2.05
	(-0.88)	(1.01)	(-1.04)
Panel B: ± 6 years			
Treatment X FC	5.74**	5.37**	8.94***
	(2.16)	(2.01)	(3.19)
Treatment	-3.75*	-2.25	-4.24*
	(-1.73)	(-1.07)	(-1.78)
FC	-1.26	0.88	-2.17
	(-1.12)	(0.73)	(-1.22)
Control Variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Table 2.11: Placebo Test (Propensity to go Public)

The table presents the results for a sample of IPOs, aggregated at the state level, with offer dates in a five-year window centered on a placebo date. In Panel A, the placebo date is 5 years before the date a state initially responded to banking deregulation (IBBEA). In Panel B, the placebo date is 5 years after the date a state initially responded to banking deregulation (IBBEA). In specifications 1, 2 and 3 financially constrained firms are identified using the FCP, FCD and FCYN definitions respectively. TREATMENT is a dummy variable that equals 1 if the issuers state deregulates its bank branching laws in its initial response to IBBEA and if the offer issue date was after the issuers state initially responded to IBBEA. Year fixed effects based on the IPO year, state fixed effects and industry fixed effects based on the two-digit SIC code are included, where the coefficients are not reported for brevity. z-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year. Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

	(1) FCP	(2) FCD	(3) FCYN
Panel A			
Treatment X FC	-0.045	-0.130	-0.045
	(-0.349)	(-0.759)	(-0.349)
Treatment	0.244	0.329*	0.244
	(1.489)	(1.650)	(1.489)
FC	0.466***	1.188***	0.466***
	(4.81)	(8.806)	(4.810)
Panel B			
Treatment X FC	-0.709***	0.475*	1.761***
	(-4.091)	(1.931)	(4.693)
Treatment	0.111	-0.577*	-1.568***
	(0.292)	(-1.713)	(-3.651)
FC	0.183**	1.360***	0.910***
	(2.408)	(12.137)	(8.743)
Control Variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes

Table 2.12: Placebo Test (IPO Underpricing)

The sample includes 3621 Initial Public Offerings (IPO) with offer dates in a five-year window centered on a placebo date. In Panel A, the placebo date is 5 years before the date a state initially responded to banking deregulation (IBBEA). In Panel B, the placebo date is 5 years after the date a state initially responded to banking deregulation (IBBEA). The dependent variable in all regressions is the underpricing/first-day return. In specifications 1, 2 and 3 financially constrained firms are identified using the FCP, FCD, and FCYN definitions respectively. Year fixed effects, state fixed effects, and industry fixed effects are included, where the coefficients are not reported for brevity. t-statistics (in parentheses) are computed using heteroskedasticity consistent standard errors that are corrected for clustering within states and year. Variable definitions are provided in Appendix A. Significance levels of 10%, 5%, and 1% are marked with *, **, and *** respectively.

	(1) FCP	(2) FCD	(3) FCYN
Panel A			
Treatment X FC	1.87	-2.05	-8.92***
	(1.04)	(-0.35)	(-2.88)
Treatment	-1.92	-8.77	-7.34
	(-0.88)	(-1.16)	(-1.55)
FC	1.02	3.03	2.67
	(0.84)	(1.58)	(1.01)
Panel B			
Treatment X FC	0.43	1.75	-1.47
	(0.31)	(1.29)	(-0.38)
Treatment	0.14	-0.31	-10.93**
	(0.10)	(-0.22)	(-2.01)
FC	1.32*	-0.42	-0.51
	(1.70)	(-0.37)	(-0.22)
Control Variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

CHAPTER 3

M&A ADVISER CONTRACTING

3.1 INTRODUCTION

Empirical studies find that on an average mergers and acquisitions (M&As) do not increase acquirer shareholders' wealth (Moeller, Schlingemann, and Stulz 2004). Financial advisers can lower transaction costs, ameliorate information asymmetry problems, and decrease contracting costs for firms (Servaes and Zenner 1996). In addition, financial advisers provide managers with insurance against lawsuits if the deal fails to meet stakeholder expectations. Hence, acquirers may seek the assistance of financial advisers to improve outcomes especially for complex deals (Servaes and Zenner 1996). Although, the literature on M&As is well developed, our understanding of the nature of contracting between acquirers and their financial advisers is quite limited.

Usually, the payoff to the adviser is contingent on the completion of the deal but is independent of its impact on shareholder wealth. This payoff structure may result in an agency problem because the adviser may not exert enough effort in evaluating the suitability and cost of the acquisition (McLaughlin 1990, 1992). In this paper, I examine the role of acquisition financing in reducing the agency problem between the acquirer and its adviser.

Acquirers are more dependent on financial advisers for complex transactions, which require more effort in screening and monitoring the target. Creditors fulfill this role and thus, advisers can demonstrate greater effort by financing complex deals. In a sample of bank-financed acquisitions, I find that the buy-side adviser is more likely to finance complex acquisitions. A bundled contract with lower advisory fees (immediate payoff) in lieu of higher loan interest (future payoff) will ensure the adviser has an incentive to ensure the success of the acquisition. On the expected lines, I find that advisers that finance acquisitions charge higher spreads (interest) on acquisition loans but accept lower advisory fees. The bundling of advisory service and lending yields superior outcomes as measured by changes to shareholder wealth and completion time.

In the recent past, there has been a growing trend of firms pursuing deals without the involvement of an adviser. The Wall Street journal reported that in 2015, approximately 26% of large deals did not include an adviser on the buy-side. This decline in the role of advisers could be attributed to ineffective contracting between the acquirer and adviser. Financial advisers earn an advisory fee on the completion of the deal. However, the advisory fee is not contingent on the impact of the acquisition on shareholder wealth. This payoff structure creates perverse incentives for the adviser.

Anecdotal evidence on the agency problem between an adviser and acquirer can be found in Daisy Systems v. Bear Stearns. Daisy Systems appointed Bear Stearns as its adviser for the acquisition of Cadnetix, a high-technology firm whose primary asset was intellectual property. Although Daisy successfully acquired the target, problems with Cednetix eventually drove Daisy to bankruptcy. In the lawsuit that followed, the Ninth Circuit court ruled that the financial advisor acted in a "negligent, ill-informed and nonexpert" manner. Thus, legal provisions may not be effective in lowering agency costs for the acquirer.

Acquisition gains for the acquirer are negatively correlated with the reputation of the adviser (Hunter and Jagtiani 2003; Ismail 2010). As a consequence, reputation capital may not serve as an appropriate mechanism to manage the agency problem. However, a contract that ensures the adviser has skin in the game can lower agency costs. The bundling of advisory service and financing will increase the involvement of the adviser and may result in better outcomes for firms. Target advisers can increase bidding competition and thereby the price of the target by providing financing to the acquirer i.e., stapled finance (Povel and Singh 2010). Stapled finance provides acquirers with access to cheap debt over longer maturities. The target (sell side) adviser does not break-even on these acquisition loans but earns a higher compensatory advisory fee (Aslan and Kumar 2017). Thus, acquisition financing can play a role in mitigating agency problems associated with financial advisers.

Agency theory (Harris and Raviv 1979; Shavell 2006) posits that a risk averse agent (adviser) should be compensated by a risk neutral principal based on the level of effort and not on the outcome of the activity. Creditors exert effort to monitor (Diamond 1984) and screen (Boyd and Prescott 1986; Diamond 1991) the firm's investments. An adviser that acts as creditor will exert more effort in evaluating and executing an M&A deal than an adviser that does not finance the deal. The severity of the agency problem is increasing in the complexity of the acquisition. Hence, on the demand side, it is more likely that acquirers will prefer financial advisers that are willing to finance complex deals. On the supply side, good financial advisers can signal their quality by financing complex deals. Further, if the buy-side adviser is willing to forgo immediate payoffs (advisory fees) for differed payments in the future (interest), the incentives of the adviser are better aligned with those of the acquirer. This contractual arrangement should result in better outcomes for acquirers as measured by wealth effects and completion times.

I use a sample of 724 M&A M&A transactions announced between 1995 and 2014 to evaluate the role of acquisition financing in M&A advisory. An examination of the price and non-price features of the acquisition loan provides an insight on the contractual arrangement between the adviser and acquirer. Since, the agency problem is more acute for complex deals, advisers are more likely to finance complex deals. Complexity is measured in terms of the relative size of the deal and involvement of competing acquirers.

Next, I compare the spread on acquisition loans originated by lenders affiliated to the adviser and independent lenders. Affiliated lenders seek an additional 80 basis points (bps) on acquisition loans than unaffiliated lenders. Further, anticipating managerial moral hazard problems affiliated lenders impose tighter covenants and demand collateral. This is consistent with the premise that banks use price and non-price terms as complementary tools to deal with borrower risk. Finally, I also find evidence of a substitution effect wherein affiliated lenders charge lower advisory fees (20 bps), possibly in lieu of higher interest payments.

In order to evaluate the effectiveness of the bundled contract, I compare the outcome of acquisitions financed by advisers with those financed by unrelated lenders. First, I examine the impact on completion time, which is measured from the announcement date to the effective date. After the deal is announced, the advisers will direct effort towards minimizing completion time to avoid competing offers. On an average, completion time for affiliated advisers is 10 days shorter than independent advisers. Second, I investigate the impact of the acquisition on investor wealth. Investor wealth will be eroded if affiliated lenders collude with acquirer managers by facilitating empire building, and in exchange extract rents in the form of higher interest payments. However, the results indicate that acquisitions financed by advisers elicit a positive response from the market. Thus, acquisition financing may be effective in certifying deal quality.

I address two potential sources of endogeneity. First, the dummy variable Aff_Lend, which identifies deals financed by the adviser may proxy for unobservable acquirer characteristics. I consider a sample of non-acquisition loans from the affiliated lender originated in the same time window as the main sample. Non- acquisition loans priced of similar terms by affiliated and unaffiliated lenders. Second, the pairing between the acquirer and the lender in not random because complex deals are financed by affiliated lenders. I use a two-stage Heckman procedure to address the self-selection bias. The results of the two-stage regression are consistent with my main results.

This paper contributes to several areas of the literature. First, I add to the literature on conflict of interests between shareholders, and financial intermediaries (Michaely and Womack 1999; Bradshaw, Richardson, and Sloan 2003; Mehran and Stulz 2007). I find that the agency problem between the adviser and acquirer can be mitigated by bundling advisory service and financing. Second, the findings augment the literature on the cross-selling channel employed by universal banks. Investment banks cross-subsidize advisory fees by the related equity financing fees (Golubov, Petmezas, and Travlos 2012) and interest on staple finance loans (Aslan and Kumar 2017). I find a similar substitution effect between advisory fees and the interest on acquisition loans.

The paper is organized as follows. I develop the hypotheses in the next section. The identification strategy and the data are described in section 3.3. I present the main results in section 3.4 and validate the results through robustness tests in section 3.5. Finally, I conclude in section 3.6.

3.2 HYPOTHESIS DEVELOPMENT

3.2.1 Bundling of Financial Advice and Lending

Financial advisers can lower transaction costs, ameliorate information asymmetry problems and decrease contracting costs for firms (Servaes and Zenner 1996). Advisers lower transaction costs by specializing in transaction execution and possessing economies of scale and scope in information production. Further, advisers interact with buy side and sell side firms in the market for corporate control, and thus can ameliorate information asymmetry problems. Finally, investment banks monitor the firm and thereby lower agency costs for the shareholder. These advisers also provide managers with insurance against lawsuits if the deal does not meet stakeholder expectations.

The majority of takeovers in the U.S. are financed by loans (Bharadwaj and Shivdasani 2003). Banks affiliated to financial advisers may be willing to provide external finance to facilitate the transaction. The firm’s decision to borrow from an affiliated lender can be attributed to two hypotheses - Information Friction Hypothesis and Bonding Hypothesis. These two hypotheses may not be mutually exclusive.

Banks can lower the cost of information production by engaging in repeated interactions with firms (Petersen and Rajan 1995) , and expanding the scope of banking activities (Puri 1996). Borrowers may benefit from the resultant economies of scale and scope in the form of lower cost of borrowing(S. Bharath et al. 2007), and improved access to credit (Petersen and Rajan 1995). Further, these intermediaries enjoy diversification benefits (White 1986), increase in revenues, and improvement in their competitiveness (Drucker and Puri 2005; Calomiris and Pornrojnangkool 2009) by combining commercial and investment banking activities. Financial advisers with an affiliated lending business can extend the benefit of providing concurrent lending services to the client in the form of lower advisory fees and/or cheaper loans. Thus, information- ally opaque firms can reduce adverse selection costs by borrowing from a better-informed lender i.e., an affiliated lender. In other words, borrowers that suffer from severe information asymmetry problems are more likely to prefer an affiliated lender ("Information Friction Hypothesis").

H1A: *Affiliated lenders are more likely to finance M&A deals involving informationally opaque acquirers*

The fee paid to the adviser includes a variable component and/or a fixed component. This fee may be unconditional, contingent on completion, or both. However, the payoff to the acquirer's adviser is independent of the impact of the transaction on shareholder wealth. This payoff structure may result in an agency problem because the adviser may not exert enough effort in evaluating the suitability and cost of the transaction (McLaughlin 1990, 1992). For example, advisory fees are higher for successful takeovers which may induce advisers to push for higher premiums to ensure the deal is successful (McLaughlin 1990). An examination of the legal and economic facets of the contract between the adviser and acquirer will shed more light on this problem.

The ruling of the Delaware Supreme Court provides a template for defining the legal nature of the adviser-client relationship. In re Rural/Metro Corp. stockholders[20], the Delaware Supreme court ruled that financial advisers are responsible for the quality of their advice and they must keep the firm informed about potential conflict of interests. However, the court observed that the relationship between an adviser and the firm is contractual and not fiduciary in nature. This implies that legal provisions may not be effective in lowering agency costs of the acquirer.

From an economic perspective, the relationship between the adviser and the acquirer can be studied using two frameworks based on Contract Theory - agency theory (Harris and Raviv 1979; Shavell 2006) and information asymmetry theory/signaling mechanisms (Spence 1973).

Agency theory stipulates that a Pareto optimal contract must account for the risk preferences of the contracting parties. When the principal is risk averse and the agent is risk neutral, a Pareto optimal contract will allocate the risk to the agent. In such circumstances, the payoff to the agent is equal to total gain of the investment minus the principal's share of the gain. A risk neutral adviser will bear the acquisition's risk and will attempt to maximize the value of the acquisition. Thus, the payoff to the agent will be contingent on the outcome of the acquisition. In other words, the acquirer should compensate the adviser only if the acquisition is successful i.e., the expected synergies are realized. The acquirer can offer the adviser out-of-the-money call options with a strike price based on the synergies from the acquisition.

[20] RBC Capital Markets, LLC v. Jervis, No. 140, 2015, C.A. No. 6350-VCL (Del. Nov. 30, 2015) (Rural Metro)

When the principal is risk neutral and the agent is risk averse, the payoff to the agent cannot be based on the overall gain. In this situation, the principal will bear the risk and will compensate the agent based on the agent's effort. A risk averse adviser must demonstrate effort towards ensuring the acquisition is successful and the acquirer will compensate the adviser based on the level of effort. Evidence suggests that investment bankers are risk-averse (Hunter and Walker 2006). They represent buy and sell side clients across different industries to diversify their risk. In addition, they are usually affiliated to large financial institutions who actively manage their risk.

The position of a creditor is tantamount to writing a put option on the firm. Creditors have a vested interest in ensuring that the option is never in the money i.e., the firm does not go bankrupt. Hence, creditors try to influence managerial decisions. The literature documents multiple channels through which creditors protect their interests. First, creditors monitor the firm, and may renegotiate the loan contract when the firm defaults (Diamond 1984). This deters the firm from making poor investment choices. Second, creditors screen the firm's investments and finance only positive NPV projects (Boyd and Prescott 1986; Diamond 1991). In fact, the market recognizes the ability of creditors in screening and monitoring acquisitions. Bank financed acquisition elicit a more positive response than non-bank financed acquisitions (Bharadwaj and Shivdasani 2003). Hence, an adviser that finances the acquisition will exert more effort than an adviser that only provides advisory service.

Target firms benefit from the bundling of advisory service and financing. Target advisers can increase bidding competition and thereby the price of the target by providing financing to the acquirer i.e., stapled finance (Povel and Singh 2010). Stapled finance provides acquirers with access to cheap debt over longer maturities. The target (sell side) adviser does not break-even on these acquisition loans but earns a higher compensatory advisory fee (Aslan and Kumar 2017). Thus, acquisition financing can play a role in mitigating agency problems associated with financial advisers.

Signaling theory proposes that transacting parties can lower transaction costs by signaling their quality (Spence 1973). The outcome of an acquisition depends on the quality of the financial adviser (Bao and Edmans 2011). Good advisers have an incentive to corner a greater share of the more lucrative M&A advisory business (as compared to lending). M&A advisory fees are as important as, if not more, than equity underwriting fees (Kolasinski and Kothari 2008). The advisory market can move from a pooling equilibrium to a separating equilibrium if good advisers can differentiate themselves from bad advisers. Good advisers can achieve this by providing a credible signal of their quality. If the adviser is willing to have skin in the game by investing in the debt of the firm, he can differentiate himself from other competing advisers.

In summary, the financial adviser (intermediary) can mitigate the agency problem by financing the acquisition (Leland and Pyle 1977; Campbel and Kracaw 1980). The agency problem is more severe when the acquirer is more dependent on the adviser i.e., when deals are more complex. This implies that the adviser is more likely to provide financing for complex acquisitions ("Bonding Hypothesis").

H1B: *Affiliated lenders are more likely to finance complex M&A deals*

3.2.2 Affiliated Lenders and Loan Features

Financial advisers with a lending business can extend the benefit of concurrent lending and advisory service to firms in the form of lower fees and/or lower interest payments (Drucker and Puri 2005; S. Bharath et al. 2007). The information friction hypothesis would imply that loans from affiliated lenders are cheaper and have fewer covenants.

H2A: *Acquisition loans from affiliated lenders are more likely to have lower interest rates and fewer covenants.*

Under the bonding hypothesis, a contract is Pareto optimal if the payoff to the adviser (agent) is contingent on his effort. When a risk averse adviser lends to a firm, the adviser will increase effort towards screening the target and monitoring the acquirer. However, the incentive to exert effort may diminish if the affiliated lender earns a higher up- front advisory fee in lieu of a cheap loan. In M&A deals that involve equity issuance, advisers cross-subsidize advisory fees by the related equity financing fees (Golubov, Petmezas, and Travlos 2012). Thus, a bundled contract with a lower upfront advisory fee, and a compensatory higher interest rate on the loan will generate the highest level of effort.

Creditors can use financial covenants to impose restrictions on the actions of the manager (Smith and Warner 1979). The strictness of covenants is increasing in the degree of the risk of the firm (Demiroglu and James 2010). Thus, financial covenants act as a screening mechanism that limit moral hazard problems by the borrower (Dichev and Skinner 2002). The bonding hypothesis suggests that the affiliated lenders finance more complex acquisitions, which are riskier. Thus, affiliated lenders would impose restrictions to mitigate moral hazard problems associated with managerial decisions.

H2B: *Acquisition loans from affiliated lenders are more likely to have higher interest rates and tighter covenants*

When investment banks bundle advisory service and equity underwriting, they cross- subsidize advisory fees with equity underwriting fees (Golubov, Petmezas, and Travlos 2012)A similar arrangement exists between targets and their advisers. Sell side advisers trade-off advisory fees with interest on acquisition loans for deals with stapled finance (Aslan and Kumar 2017). The bonding hypothesis implies that a contract that compensates the adviser on the level of effort is Pareto optimal. Acquirer advisers may be willing to differ some of the upfront payoff to the future and thereby demonstrate a higher intensity of effort in executing the deal.

H3: *Advisers affiliated to lenders are more likely to charge a lower advisory fee than unaffiliated advisers.*

3.3 EMPIRICAL STRATEGY

3.3.1 Bundling of Advisory Service and Lending

The objective of the analysis is to understand the role of bundling advisory service and financing in mitigating adviser agency costs. A lender that offers advisory service and acquisition financing is an affiliated lender. I designate a lender as an affiliated lender if the lead lender and M&A adviser share a common owner (holding company). For example, Salomon Smith Barney (M&A adviser) was affiliated to Citibank (lender) because they shared a common owner - Citigroup. In addition, I also account for mergers and acquisitions (M&As) between banks. For example, Wells Fargo (lender) acquired Wachovia (lender). Finally, I account for universal banks acquiring pure investment banks. For example, Swiss Bank Corporation Bank (universal bank) acquired Dillon, Read & Co (M&A adviser).

The decision to borrow from an affiliated or unaffiliated lender is modeled using a Logit regression. The dependent variable is equal to 1 if the adviser and lender are related and zero otherwise. The regression model is specified as

$$\begin{aligned} Prob.(Aff\_Lend)_{i,t} &= \alpha_1 + \beta_1 \text{ Deal\_Char}_{i,t} + \mu_1 \text{ Acq\_Char}_{i,t} \\ &+ \theta_1 \text{ Industry} + \kappa_1 \text{ Year} + \epsilon_{i,t} \end{aligned} \tag{1}$$

where Deal_Char and Acq_Char are deal characteristics and acquirer characteristics respectively. I also include industry (θ1) and time (κ1) fixed effects. Aff_Lend is a dummy variable equal to 1 when the adviser and lender are related. Informational friction costs are higher for smaller firms with growth options and limited access to credit markets. If the information friction hypothesis holds true, then these firm characteristics should be positively correlated with the decision to borrow from an affiliated lender.

The acquirer may need assistance with the estimation of synergies for complex acquisitions. For example, top-tier financial advisers can identify more synergistic combinations and expropriate a greater fraction of synergies to accrue to acquirers (Golubov, Petmezas, and Travlos 2012). In addition, structuring a complex transaction requires expertise on economic, legal and taxation issues. For example, some deals may require regulatory approval and advisers can utilize their comparative advantage to decrease completion time. Hence, the acquirer is more dependent on the prudent advice of the adviser for complex transactions and is more likely to seek financing from an affiliated lender (bonding hypothesis). If the bonding hypothesis holds true, deal characteristics should be correlated with lender choice.

3.3.2 Affiliated Lenders and Loan Features

I test the second hypothesis on the pricing of the acquisition loan using an Ordinary Least Squares (OLS) model. The dependent variable is the log of all-in-drawn spread (AISD). The AISD is defined as the spread in excess of a benchmark (usually LIBOR). It corresponds to the total cost (interest rate and fees) paid over LIBOR for each dollar drawn down under the loan commitment. I use the logarithm of loan spreads to address the problem of skew- ness in the distribution of the AISD. This modification of the functional form is prescribed in the literature (Qian and Strahan 2007; Graham, Li, and Qiu 2008; Valta 2012). I follow the literature (Ivashina and Kovner 2011) on loan pricing to identify deal, loan and firm characteristics that influence the pricing of the loan. The regression is specified as follows

$$\begin{aligned} Log(AISD)_{i,t} = \alpha_2 + \delta_2\ \text{Aff\_Lend}_{i,t} + \beta_2\ \text{Deal\_Char}_{i,t} + \mu_2\ \text{Acq\_Char}_{i,t} \\ + \psi_2\ \text{Loan\_Char}_{i,t} + \theta_2\ \text{Industry} + \kappa_2\ \text{Year} + \epsilon_{i,t} \end{aligned} \quad (2)$$

where Loan_Char is the loan characteristic vector. An acquisition may have more than one related acquisition loans (package), which in turn may have multiple loan facilities. I retain all related acquisition loans. An advantage of this specification is that for deals with multiple loans, loans from unaffiliated lenders act as a control for loans from an affiliated lender for the same M&A transaction. This approach addresses endogeneity concerns on account of omitted variables. I run the above regression at the facility level.

A firm's decision to choose a lender may be endogenous, i.e., acquirers and lenders may match based on preferences and characteristics. The empirical design accounts for this non-random matching between lenders and acquirers by implementing a self-selection model (Li and Prabhala 2007). I implement a Heckman (Heckman 1979) two-step correction procedure to alleviate concerns on self-selection bias.

The first-stage equation models the choice between an affiliated and unaffiliated lender, and the second-stage regression includes a control variable for the selection bias. A strong identification strategy necessitates that I include an identification variable in the first stage but not in the second stage (Li and Prabhala 2007). This identification variable must be correlated with lender selection but not be directly correlated with the outcome - spread of the loan. Firms may hire multiple advisers for complex acquisitions. I use the number of advisers on the buy side as an identification variable. The number of buy side advisers will not be directly correlated with the cost of the loan. The first stage of the regression is specified as follows

$$\begin{aligned} Prob.(Aff\_Lend)_{i,t} = \alpha_3 + \rho_3 \text{ Nos\_Adv}_{i,t} + \beta_3 \text{ Deal\_Char}_{i,t} + \mu_3 \text{ Acq\_Char}_{i,t} + \\ \theta_3 \text{ Industry} + \kappa_3 \text{ Year} + \epsilon_{i,t} \end{aligned} \tag{3}$$

The second stage is specified as follows

$$\begin{aligned} Log(AISD)_{i,t} = \alpha_4 + \delta_4 \text{ Aff\_Lend}_{i,t} + \rho_4 \lambda_{i,t} + \beta_4 \text{ Deal\_Char}_{i,t} + \mu_4 \text{ Acq\_Char}_{i,t} \\ + \psi_4 \text{ Loan\_Char}_{i,t} + \theta_4 \text{ Industry} + \kappa_4 \text{ Year} + \epsilon_{i,t} \end{aligned} \tag{4}$$

where, λ is the inverse Mills ratio using the estimation from the first stage regression.

In order to test the third hypothesis on advisory fees, I compare the advisory fees for deals financed by affiliated lenders with those financed by unaffiliated/independent lenders. The dependent variable is the advisory fee scaled by the deal value. The regression specification accounts for the non-random pairing of acquirers and lenders. I use the M&A experience of the acquirer as an identification variable. Acquirers with prior M&A experience will be less dependent on the adviser. Thus, the prior experience of the acquirer is correlated with the dependence on the adviser (thereby the choice of lender) but not directly correlated with the advisory fee. The first stage is specified as follows

$$\begin{aligned} Prob.(Aff\_Lend)_{i,t} = \alpha_5 + \rho_5 \text{ M\&A Experience}_{i,t} + \beta_5 \text{ Deal\_Char}_{i,t} + \mu_5 \text{ Acq\_Char}_{i,t} + \\ \eta_5 \text{ Tgt\_Char}_{i,t} \theta_5 \text{ Industry} + \kappa_5 \text{ Year} + \epsilon_{i,t} \end{aligned} \tag{5}$$

I run the above regression at the acquisition level i.e., only one observation per M&A deal. In the second stage of the regression, the inverse Mills ratio is included as a control variable.

$$\begin{aligned} Advisory\_Fee_{i,t} = \alpha_6 + \delta_6 \text{ Aff\_Lend}_{i,t} + \rho_6 \hat{\lambda}_{i,t} + \beta_6 \text{ Deal\_Char}_{i,t} + \mu_6 \text{ Acq\_Char}_{i,t} + \eta_6 \text{ Tgt\_Char}_{i,t} \\ \theta_6 \text{ Industry} + \kappa_6 \text{ Year} + \epsilon_{i,t} \end{aligned} \tag{6}$$

where, $\hat{\lambda}$ is the inverse Mills ratio using the estimation from the first stage regression.

3.3.3 Wealth Effects

The source of financing has an impact on the bidding strategy of the acquirer and thereby on the acquisition premium (Vladimirov 2015). Acquisitions that are financed by bank loans elicit a positive response from the market (Bharadwaj and Shivdasani 2003). This suggests that banks can certify the quality of the acquisition. Creditors monitor the acquirer and possess control rights to mitigate shareholder-creditor conflicts (Diamond 1984). These creditors also screen the firm's investments (Boyd and Prescott 1986; Diamond 1991) and ensure only good deals are consummated.

A bundled contract (advisory service and loan) provides the adviser with a greater incentive to screen and monitor the firm's investment. Hence, deals financed by affiliated lenders may be assessed in a more positive light than deals financed by unaffiliated lenders.

I estimate the cumulative abnormal return (CAR) using the market model to evaluate the impact of lender choice on shareholder wealth. The parameters are estimated over a window of 100 days with a gap of 10 days between the estimation window and event window. The regression is specified as follows:

$$CAR_{i,t} = \alpha_7 + \delta_7 \text{ Aff\_Lend}_{i,t} + \beta_7 \text{ Deal\_Char}_{i,t} + \mu_7 \text{ Acq\_Char}_{i,t} + \eta_7 \text{ Tgt\_Char}_{i,t} \\ \theta_7 \text{ Industry} + \kappa_7 \text{ Year} + \epsilon_{i,t} \quad (7)$$

3.4 DATA AND SUMMARY STATISTICS

The M&A sample includes deals announced between 01 January 1994 and 31 December 2014 from the Thomson Reuters' Securities Data Company Platinum - Mergers and Acquisitions database (SDC Platinum) involving acquirers and targets located in the United States. Deals that exceed $1 million and constitute at least 5% of the market value of the acquirer are retained. Deals (acquirer and/or target) in the highly regulated financial services (SIC code 6000 to 6999) or utilities (SIC code 4900 to 4999) sector are dropped. The M&A sample includes only deals where control is transferred from the existing target shareholders to the acquirer shareholders. In other words, the acquirer controls less than 50% of the target on the announcement date and holds more than 50% of the target after completion. Acquirer financial information is from COMPUSTAT and stock price data is from CRSP. I do not include leveraged buyout deals in the sample because the motivations and outcomes of strategic M&As and LBOs are quite different. In addition, LBOs usually involve a financial sponsor. These sponsors have existing relationships with the adviser and lender, which can influence the pricing of the acquisition loan. Finally, I only retain those deals that involve at least one financial adviser that is related to a prospective lender. Thus, all my tests are conditional on the participation of an adviser who has the ability to finance an acquisition.

The data on acquisition loans is from Thomson Reuters' Loan Pricing Corporation (LPC) DealScan database that provides origination data on syndicated loans. The LPC loan data is more reliable and representative of the syndicated loan market after the mid-nineties. Hence, I retain loans originated between 01 January 1994 and 31 December 2014. I designate loans with primary purpose as "Acquisition line", "Takeover", "Capital expend.", "Corp. purposes", "Project finance", and "Working capital" as acquisition related loans[21]. The M&A sample is merged with the syndicated loan sample using the link file provided by (Chava and Roberts 2008) for deals announced between 1994 and 2012. I

[21] 4Loans with primary purpose as "Debt Repayment", "Dividend Recap", "Spinoff", "Stock buyback", "LBO" etc. are non-acquisition loans. I obtain similar results when I exclude loans with primary purpose as "Project finance", and "Working capital".

employ a fuzzy matching technique to map M&A deals with the related syndicated loans between 2013 and 2014.

The mapping of deals with loans results in multiple deal loan matches. I exclude acquisition loans (package) originated more than 1 year from the M&A deal effective date because acquirers are more likely to arrange for loans closer to the closure of the deal[22]. The cost of borrowing includes an undrawn spread and a facility fee that are payable on the unused amount, and the total amount respectively. Banks charge borrowers these spreads/fees to recoup opportunity costs on loan commitments. Hence, the firm can minimize its borrowing cost by arranging for funds only when necessary. I validate the matching procedure of the acquisition loans with the M&A transactions using additional information from SDC Platinum and DealScan. SDC Platinum provides the name of the lender for few M&A deals and DealScan provides the name of the target for some acquisition loans.

An acquisition loan can have multiple loan facilities. For example, TTM Technologies acquired Tyco Printed Circuit Group on 27 October 2006. The acquirer arranged for a loan from UBS with deal active date 27 October 2006. The package included two facilities - a revolver and a term loan. The final sample consists of 1486 loan facilities and 724 M&A deals.

Usually, multiple lenders participate in a syndicated loan. However, the terms of the loan are negotiated by the lead lender. I follow the literature (S. T. Bharath et al. 2011; Berg, Saunders, and Steffen 2016), and designate a lender as a lead lender if at least one of

[22] (Huang, Lu, and Srinivasan 2012)use the same time window to identify acquisition loans

the following conditions are met: (a) Lead Arranger Credit = “Yes” in Dealscan, (b) LenderRole = “Agent,” “Admin agent”, “Arranger”, or “Lead bank” in Dealscan, or (c) the lender is the sole lender.

If the lead lender and M&A adviser share a common owner (holding company), then the lender is designated as an affiliated lender. I identify deals financed by affiliated lenders by employing a fuzzy matching technique. The regulatory and competitive environment of the banking sector in the U.S. has undergone significant changes since the nineties. I account for the consolidation in the US banking sector while constructing the sample. For example, Wells Fargo acquired Wachovia Corporation in 2008. If the announcement date of an M&A transaction is after 2008 with Wachovia as the adviser, and Wells Fargo as the lender, then such a deal is considered to be funded by an affiliated lender. A summary of the major affiliated and unaffiliated lenders is provided in Table I.

Table II presents the summary statistics for the sample. I winsorize all the continuous variables are at the 1% and 99% levels. Acquirers may be more dependent on advisers for deals that require regulatory approval (Regulated), have a high cash payout (CASH), extend across state lines (Inter-State), and are relatively large (Relative Value).

An acquirer offering more cash instead of stock bears the risk of failure in realizing synergies. Acquirers use their overvalued shares as currency for acquisitions (Rhodes-Kropf, Robinson, and Viswanathan 2005; Savor and Lu 2009). Thus, in cash deals the estimation of synergies is critical for the acquirer. Advisers possess comparative advantage over acquirers in estimating synergies for transactions. Further, M&A deals may be subject to antitrust approvals from the Federal Trade Commission and the Justice Department.

Executing deals that require regulatory approval may require the expertise of financial advisers.

Relative size is defined as the transaction value divided by the sum of market value of the acquirer and the transaction value (Offenberg and Pirinsky 2015). The relative size is a proxy for the magnitude of the synergy from merger (Loughran and Vijh 1997). Financial advisers interact with multiple firms in the market for corporate control and can utilize this expertise to decrease information asymmetry between acquirers and targets, thereby providing a fairer estimate of synergies. These advisers can also leverage economies of scope and scale to estimate synergies. Thus, the acquirer will be more dependent on the adviser in relatively large deals. The difference in relative size for deals financed by affiliated lenders and unaffiliated lenders is statistically significant at 1% . Surprisingly, affiliated lenders are less likely to finance diversifying deals and tender offers. Thus, deal characteristics suggest that affiliated lenders are more likely to finance complex transactions.

Affiliated lenders are more likely to participate in deals involving large (log(Assets Acq)) acquirers with a higher fewer growth options (TobinQ Acq), higher leverage, and access to diverse sources of capital (Rating_Acq). It is quite unlikely that such firms face a higher informational friction cost. Further affiliated lenders are more likely to participate in deals involving targets that operate in the hi-tech sector and have multiple business segments. Though, information on such targets may be easily available, valuation of the target may require some expertise. Thus, firm characteristics provide little evidence to support the informational friction hypothesis.

The loan characteristics in Panel D provide some additional interesting insights on lender choice. Affiliated lenders are more likely to originate more expensive (higher spreads) loans, demand collateral and seek tighter covenants. These features are suggestive of the higher risk involved in M&A deals financed by affiliated lenders. Further, these loans are less likely to include a revolving credit facility (i.e., no embedded option). In Panel A, the advisory fees are lower for deals financed by affiliated lenders. Overall, the evidence presented in table II supports the bonding hypothesis.

3.5 MAIN RESULTS

3.5.1 Bundling of Advisory Service and Lending

I test the informational friction and bonding hypothesis in a multivariate setting. The decision to seek financing from an affiliated lender is modeled as a binary choice model as shown in equation 1. Table III presents the marginal effects of the Logit regression. The dependent variable Aff_Lend is equal to 1 if the acquisition loan is originated by an affiliated lender, and zero otherwise. The control variables in column (1) include deal characteristics, while additional controls for acquirer characteristics are introduced in column (2) and (3). I also include industry and year fixed effects.

Advisers are more likely to finance deals when the payout structure has a greater fraction of cash (Cash Pct). An acquirer offering more cash instead of stock bears the risk of failure in realizing synergies. Thus, the greater the fraction of cash paid, the more critical is the estimation of synergies for the acquirer. The estimation of synergies is also very critical for relatively large acquisitions (Relative Value). An increase in target size decreases acquirer returns (Alexandridis et al. 2013). This could be attributed to manager's tendency to engage in empire building because larger targets provide high private benefits (Harford and Li 2007; Grinstein and Hribar 2004). Further, larger targets may incur higher post-acquisition integration costs. The greater complexity and costs of integrating large targets decreases the likelihood of realizing potential synergies (Ahern 2010). Thus, acquirers are more dependent on advisers for relatively large acquisitions. On an average, acquisitions decrease acquirer shareholder wealth. An inaccurate valuation of the target could increase the bankruptcy risk for the acquirer. Surprisingly, affiliated lenders are less likely to finance diversifying deal i.e., acquirer and target operate in different industries.

The market for corporate control involves multiple players on the buy side and sell side. Acquirers may face competition from other potential suitors for acquiring a target. In such circumstances, the acquirer is dependent on the negotiation and execution skills of the adviser. Hence, deals with multiple bidders are more likely to be financed by acquirers (Multiple Bidders).

Acquirers with high leverage (Leverage Acq), fewer growth options (TobinQ Acq), and access to capital markets (Rating Acq) are more likely to borrow from an affiliated lender. These acquirers usually do not face higher information friction costs. On the contrary, the higher leverage and fewer growth options are indicative of a more mature borrower. Hence, the evidence in table III supports the bonding hypothesis.

3.5.2 Pricing of Acquisition Loans

The decision to borrow from an affiliated lender will have an impact on the pricing of the loan. Syndicated loans are priced in terms of the all-in-drawn spread (AISD). The AISD is defined as the spread in excess of a benchmark (usually LIBOR). Table IV presents the results on loan pricing using equation 2. The dependent variable is the natural logarithm of AISD. The main independent variable Aff Lend is equal to 1 if the loan is originated by an affiliated lender, and zero otherwise. In column (1), the independent variable vector includes deal and acquirer characteristics, while in column (2) additional controls for loan characteristics are included. The loan spread, and loan characteristics are determined simultaneously, and hence are likely to be endogenous. By performing separate estimations, I try to establish that the results are not biased by the endogenous nature of the loan contract.

A syndicated loan (package) consists of multiple facilities. An observation is a unique facility. Hence, to account for the correlation in the error term, I cluster the standard errors at the package level. I also include industry, loan type and year fixed effects. The loan type refers to the nature of the loan - credit line, term loan A, term loan B to G and other loan types (LC,bridge loan, etc.). In all the specifications, the coefficient on Aff_Lend is positive and statistically significant. It appears that affiliated lenders charge a higher spread than unaffiliated lenders for acquisition loans.

A firm's decision to choose a lender may be endogenous, i.e., acquirers and lenders may match based on preferences and characteristics. The empirical design accounts for this non-random matching between lenders and acquirers by implementing a self-selection model. The first stage regression is presented in Column (3) and (5). Firms are more likely to hire multiple advisers for complex acquisitions. The number of advisers will not be directly correlated with the cost of the loan. I use the number of advisers (Number of Advisers) on the buy side as an identification variable. In second-stage of the regression, I include the inverse Mills ratio as an independent variable. The results in column (4) and (6) suggest that loans originated by affiliated lenders bear a higher interest rate. The average AISD is 200 bps and the co-efficient of Aff_Lend is 0.4. Hence, the cost of borrowing increases by about 80 basis points (bps) when acquirers borrow from affiliated lenders. The median loan amount is approximately $200 million. In economic terms, the incremental cost of borrowing from an affiliated lender is $1.6 million per year.

The coefficients for most control variables are along the expected lines. The cost of borrowing is negatively associated with diversifying deals (Diversify) and public targets (Public Tgt), and positively associated with the relative size of the deal (Relative Value) and fraction of cash paid (Cash Pct). When acquirers pursue diversifying acquisitions, the diversification effect lowers the overall risk of the firm (Aivazian, Qiu, and Rahaman 2015), which explains the negative coefficient on Diversify. Public targets are easier to screen and hence, have lower information production costs. Relative Size (Relative Value) is also positive and statistically significant. This is consistent with the expectation that relatively large deals are riskier, and lenders price this incremental risk.

Loan spreads are negatively correlated with acquirer firm size (log(Assets)_Acq), and positively associated with acquirer leverage (Leverage_Acq). The coefficients on loan characteristics are also consistent with the literature. The spread of the loans is positively correlated with collateral (Gottesman and Roberts 2007) and maturity (Gottesman and Roberts 2004), and negatively correlated with amount.

Overall, I find that acquisition loans originated by affiliated lenders are more expensive than those originated by unaffiliated lenders. This phenomenon can be the outcome of three possibilities. First, the acquirer is financially constrained, and the affiliated lender is extracting rents. I include measures of financial constraints (Size-Age Index (Hadlock and Pierce 2010) and the KZ Index (Lamont, Polk, and Saá-Requejo 2001) in the estimation of equation 1. I find that the Size-Age Index and the KZ Index have no explanatory power in the choice of lender and the consequent cost of borrowing (unreported results). Further, financially constrained acquirers prefer issuing equity over debt for cash payments to the target (Vladimirov 2015).

The second possibility is that the M&A adviser possesses private information on the deal and can leverage this information to earn rents (Sharpe 1990). Bank dependent acquirers with an intense/concentrated relationship would be more prone to a hold-up problem (Rajan 1992; J. F. Houston and James 2001). Firms without a public debt rating are considered to be bank dependent (Chava and Purnanandam 2011). The coefficient on acquirer rating is positive and significant. This suggests that non-bank dependent borrowers are more likely to borrow from an affiliated lender i.e., adviser informational rent extraction is not a plausible explanation. I provide additional evidence to refute the possibility of rent extraction in robustness test section.

The third possible explanation for higher spreads is that the acquisition loan is an integral part of the contract between the adviser and acquirer. Pareto optimality would dictate that the adviser's compensation should be based on the level of effort in evaluating and executing the deal. Thus, an optimal contract will increase the adviser's effort towards evaluating and executing the deal and differ part of the immediate payoff (advisory fee) to the future (interest payments).

3.5.3 Advisory Fee

I provide evidence supporting the above argument by comparing the advisory fee charged by independent advisers and affiliated advisers (adviser related to the lead lender). SDC Platinum provides data on advisory fee for a small fraction of M&A deals. The advisory fee data is available for 120 transactions in the sample. Table V presents the OLS regression of the advisory fee on deal and firm characteristics. The dependent variable is the advisory fee as a percentage of deal value. The coefficient on Aff_Lend is negative and statistically significant in all specifications. Affiliated advisers offer discount of 20 basis points on advisory fees.

The acquirer-lender pairing may not be random, and hence I use the two-stage regression to correct for self-selection. Acquirers with prior M&A experience will be less dependent on the adviser. The identification variable in column (3) is the M&A experience of the acquirer. The coefficient of M&A Experience is negative and significant. After correcting for the self-selection, the coefficient of Aff_Lend in column (4) suggests that affiliated advisers accept lower advisory fees. The median deal size is $365 million. Thus, affiliated advisors accept $0.73 million less in advisory fees than independent advisors.

Some M&A deals may be subject to antitrust approvals from the Federal Trade Com- mission and the Justice Department. Hence, executing such deals may require the expertise of financial advisers, which explains the positive coefficient on Regulated. Similarly, inter-state deals and relatively large deals may involve greater effort, and thereby necessitate a higher advisory fee. The advisory fee is also correlated with the size (Log(assets)_Acq), acquirer complexity (Segment_Acq) and acquirer growth opportunities (TobinQ Acq). Overall, I find that acquirers that borrow from affiliated lenders pay lower advisory fees but incur a higher spread on the acquisition loan, which supports the bonding hypothesis.

3.5.4 Non-Price Features of Acquisition Loans

Lenders use interest rate, collateral, maturity and amount as complementary tools to manage borrower risk. Ex post, collateral protects against moral hazard problems (Gonas, Highfield, and Mullineaux 2004; Berger, Scott Frame, and Ioannidou 2011). The lender can appropriate secured assets when the borrower defaults. Therefore, collateral is an important element of the contract between borrowers and lenders. Affiliated lenders are more likely to finance riskier deals and thus, acquisition loans originated by affiliated lenders are more likely to be secured.

Shareholder-credit conflicts arise on account of adverse payout policies, asset substitution, under-investment problem and over-investment problem. The lender can use control rights i.e., covenants to manage shareholder-credit conflicts (Chava and Roberts 2008; Demiroglu and James 2010). Covenant intensity is higher for firms with growth opportunities, and higher leverage (Billett, King, and Mauer 2007). Further, along the lines of (Myers 1977), lenders use covenants and debt maturity as substitutes to ameliorate the under-investment problem (Bradley and Roberts 2015). Since, affiliated lenders are more likely to finance riskier deals, acquisition loans originated by affiliated lenders are more likely to be include more covenants. The results of the regression with non-price terms as dependent variables are presented in Table VI.

The intensity of covenants is measured using the Covenant Intensity Index (Bradley and Roberts 2015). The CIX focuses on six covenants. These include financial covenants, dividend restrictions, secured, equity sweep , debt sweep and asset sweep. Thus, CIX takes values between 0 to 6.

The result in column (1) suggests that acquisition loans originated by affiliated lenders include more restrictive covenants than loans from unaffiliated lenders. I run the two- stage regression to correct for self-selection bias in columns (2) and (3). The coefficient on Aff_Lend is positive and statistically significant in column (3). The result is consistent with the premise that affiliated lenders finance complex deals, which tend to have a higher risk of failure. These lenders manage shareholder-creditor conflict by seeking greater control rights.

The dependent variable in column (4) is Secured, which is equal to 1 if the loan is secured, and zero otherwise. The coefficient on Aff_Lend is positive and significant at 10%. This implies that affiliated lenders are more likely to seek collateral to manage the greater risk associated with complex deals.

3.5.5 Optionality Feature of the Loan

Credit lines are a combination of a term loan and an option. When firms borrow using credit lines, it is a negative NPV loan for banks and hence, banks will seek compensation ex-ante for this loss. Banks charge upfront fees and all-in-undrawn spreads (AISU) as compensation for providing this option to borrow (Berg, Saunders, and Steffen 2016). The value of this option is directly proportional to the volatility of the underlying asset (Black and Scholes 1973) i.e., the risk of the acquisition. This implies that loan related to riskier acquisitions should have higher upfront fees and all-in-undrawn spreads (AISU). I test the relationship between the value of the option and the presence of an affiliated lender using the following specification.

$$Log(AISU)_{i,t} = \alpha_8 + \delta_8 \text{ Aff\_Lend}_{i,t} + \beta_8 \text{ Deal\_CharC}_{i,t} + \mu_8 \text{ Acq\_Char}_{i,t} + \eta_8 \text{ Loan\_Char}_{i,t} + \theta_8 \text{ Industry} + \kappa_8 \text{ Year} + \epsilon_{i,t} \quad (8)$$

The results are presented in Table VII. The positive and statistically significant coefficient on Aff_Lend suggests that affiliated lenders charge higher AISU as compensation for the higher risk of the acquisition. In other words, affiliated lenders finance complex deals, and lenders price this risk.

3.5.6 Completion Time

The life-cycle of the acquisition can be split into two phases. In the first phase, the acquirer and target are engaged in private interactions while, the second phase commences when the acquirer makes a public announcement (Boone and Mulherin 2007). Once the deal is announced, it is in the interest of the acquirer to close the deal at the earliest to stave off competing acquirers. Thus, advisers may have to exert higher level of effort to minimize completion time. The completion time is measured from the announcement date to the effective date. I regress completion time on deal and acquirer characteristics. The results of are presented in table IX.

Affiliated advisers execute deals in fewer days than independent lenders. On an average, completion time for affiliated advisers is 10 days shorter than independent advisers. The coefficient of the control variables is also consistent with findings in the literature. Deals with a greater fraction of cash payments take fewer days. Tender offers have shorter completion times than mergers, and acquisitions that require regulatory approval take longer to complete (Offenberg and Pirinsky 2015).

3.5.7 Wealth Effects

The wealth gains for the majority of M&A deals accrue to the target, and acquirers experience negative wealth effects on the announcement of a merger (Andrade, Mitchell, and Stafford 2001). In order to preserve shareholder wealth, acquirers must exercise diligence in making acquisitions. A bundled contract (advisory service and loan) provides the adviser with a greater incentive to screen and monitor the firm's investment. Hence, deals financed by affiliated lenders may be accessed in a more positive light than deals financed by unaffiliated lenders. An examination of announcement effects will shed more light on this argument.

The announcement effect is the Cumulative Abnormal Return (CAR) measured over 3 days i.e., event window of [-1, +1] and [0, +2]. The proxy for the market is the CRSP Value Weighted Market Portfolio. I regress CAR on deal and acquirer characteristics. The results are presented in table VIII.

Acquisitions financed by affiliated lenders elicit a positive response from the market. The CAR for deals financed by affiliated lenders is 0.01 (1 percent) greater than deals financed by unaffiliated lenders. The economic magnitude of this effect is $36 million[23]. The co-coefficients on the control variables are also consistent with the literature. Diversifying deals (Diversify) decrease shareholder wealth. This is consistent with the diversification discount effect. Larger acquirers (log(Assets)_Acq) pursue acquisitions with negative synergies and thus, experience lower abnormal returns (Moeller, Schlingemann, and Stulz 2004).

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[23] The average market value of an acquirer is $3.6 billion

3.6 ROBUSTNESS TESTS

In this section, I perform a robustness test to support the interpretation of the main results. The objective of this test is to validate the finding that the higher spread (AISD) on the acquisition loan is related to the contract with the M&A adviser and is unrelated to acquirer characteristics. If acquirers were financially constrained and/or suffering from hold-up problems, then all (acquisition and non-acquisition) loans from the affiliated lender in the same time window should have a higher spread.

I create a sample non-acquisition loans originated in the same time window using the procedure laid out in Section IV. Along the lines of the empirical design for the main result, I identify loans originated by affiliated and unaffiliated lenders. Using this sample, I run the regression specified in equation 2. The results are presented in Table X.

The dependent variable is the log of the AISD. The coefficient of Aff_Lend is not statistically significant at 5%. It appears that there is no difference in the pricing of non-acquisition loans originated by affiliated lenders and unaffiliated lenders. Thus, I conclude that the higher spread on the acquisition loan is related to the bundling of financial advisory and lending.

3.7 CONCLUSION

Financial advisers possess comparative advantage in identifying, structuring and executing deals in the market for corporate control. However, the incentive structure for an adviser may result in an agency problem for the acquirer. I find that bundling of advisory service and financing mitigates the agency problem between the acquirer and its adviser. This finding is consistent with Agency theory for a risk averse agent and a risk neutral principal. The adviser is compensated based on the level of effort, which would be higher when the adviser finances the acquisition. In other words, a bundled contract with lower advisory fees (immediate payoff) in lieu of higher loan interest (future payoff) will improve the alignment of interests between the adviser and acquirer.

The agency problem is more severe when the acquirer is more dependent on the adviser i.e., for complex deals. I find that advisers are more likely to finance complex M&A transactions. Along the expected lines, I find that advisers that finance acquisitions charge higher spreads (interest) on acquisition loans but accept lower advisory fees. Further, affiliated lenders impose tighter covenants and seek more collateral to protect themselves from the risk associated with complex deals.

The effectiveness of a contract can be ascertained based on the outcome. Acquirers exhibit superior abnormal returns when the deal is financed by the adviser. In addition, advisers that finance the deal demonstrate an urgency in closing the deal to stave off competition from potential acquirers. Thus, the bundling of financial advisory and lending ensures that advisers put their money where their mouth is.

Table 3.1: Lead Lenders for Acquisition Loans

The table presents the major independent(unaffiliated) lenders, and affiliated lenders. An independent lender does not act as an adviser to the M&A deal. An affiliated lender acts as an adviser and a lender to the M&A deal. The list is sorted in alphabetical order

Affiliated Lenders	Unaffiliated Lenders
Bank of America	Bank of America
Bankers Trust	Bankers Trust
Chase Manhattan Bank	Chase Manhattan Bank
Citibank	Citibank
Credit Suisse AG	Fleet Bank
Goldman Sachs & Co	J.P. Morgan Chase
J.P. Morgan Chase	Key Bank
UBS AG	Wachovia Bank
Wachovia Bank	Wells Fargo Bank

Table 3.2: Summary Statistics

The table presents the summary statistics for M&A deals and the related acquisition loan originated between 1994 and 2014. Relative size is the ratio of the transaction value to the sum of market value of the acquirer and transaction value. Advisory fee is the M&A advisory fee as a fraction of deal value. The covenant intensity index (CIX) and secured (dummy) variables are at the package level. All the continuous variables are winsorized at the 1% and 99% levels. Differences is the difference in the mean between the two groups. The corresponding p-value is provided in the last column. Variable definitions are provided in Appendix A

	(1) Unaffiliated Lender			(2) Affiliated Lender			(2) - (1) Differences	
	N	mean	median	N	mean	median	mean	p-value
PANEL A: DEAL CHARACTERISTICS								
Cash	488	0.35	0.00	236	0.40	0.00	0.05	0.22
Tender	488	0.14	0.00	236	0.10	0.00	-0.04	0.09
Diversify	488	0.23	0.00	236	0.16	0.00	-0.07	0.01
Regulated	488	0.63	1.00	236	0.76	1.00	0.13	0.00
Inter-State	488	0.16	0.00	236	0.23	0.00	0.07	0.03
Hostile	488	0.02	0.00	236	0.00	0.00	-0.01	0.05
Public Tgt	488	0.37	0.00	236	0.43	0.00	0.06	0.20
Relative Value	488	0.23	0.19	236	0.28	0.25	0.05	0.00
Multiple Bidders	488	0.03	0.00	236	0.05	0.00	0.02	0.18
Advisory Fee (%)	88	0.62	0.50	32	0.42	0.39	-0.20	0.00
PANEL B: ACQUIRER CHARACTERISTICS								
TobinQ_Acq	488	1.90	1.60	236	1.80	1.60	-0.10	0.09
Leverage_Acq	488	0.32	0.32	236	0.36	0.33	0.04	0.02
log(Assets)_Acq	488	6.70	6.60	236	7.20	7.10	0.50	0.00
ROA_Acq	487	0.05	0.05	236	0.06	0.06	0.00	0.41
Rating_Acq	488	0.43	0.00	236	0.64	1.00	0.21	0.00
PANEL C: TARGET CHARACTERISTICS								
Tech_Tgt	488	0.35	0.00	236	0.40	0.00	0.05	0.25
Segment_Tgt	488	2.20	1.00	236	2.30	1.00	0.10	0.01
PANEL D: LOAN CHARACTERISTICS								
Spread (AISD)	976	173	150	510	239	225	66	0.00
Covenants (CIX)	605	2.60	2.00	275	3.30	3.00	0.70	0.00
Maturity (months)	922	53	60	485	55	60	2	0.18
Amount ($ mil)	949	412	175	496	733	250	321	0.00
Secured	605	0.47	0.00	275	0.57	1.00	0.10	0.01
Revolver (Dummy)	976	0.58	1.00	510	0.43	0.00	-0.15	0.00
PANEL E: WEALTH EFFECTS								
CAR[-1,+1] (%)	463	0.61	0.25	219	1.10	0.82	0.49	0.29
CAR[0,+2] (%)	463	2.10	1.50	219	2.60	1.90	0.50	0.50
CAR[0,+3] (%)	463	2.10	1.40	219	2.50	2.40	0.40	0.64

Table 3.3: Bundling of Financial Advice and Lending

The table presents the marginal effects of the logistic regression of the likelihood that an M&A deal is financed by an affiliated lender. The dependent variable is equal to 1 when an affiliated lender finances the deal, and zero otherwise. Relative size is the ratio of transaction value to the sum of market value of the firm and transaction value. All specifications include industry and year fixed effects. Variable definitions are provided in Appendix A. Standard errors are clustered at the firm level are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Aff_lend	(2) Aff_lend	(3) Aff_lend
Cash_Pct	0.077*	0.090**	0.091**
	(0.044)	(0.044)	(0.043)
Tender	-0.024	0.017	0.018
	(0.060)	(0.058)	(0.058)
Diversify	-0.093**	-0.088**	-0.088**
	(0.043)	(0.042)	(0.042)
Regulated	0.013	-0.022	-0.023
	(0.038)	(0.038)	(0.038)
Inter-State	0.033	0.043	0.043
	(0.041)	(0.041)	(0.041)
Hostile	-0.147	-0.203	-0.202
	(0.227)	(0.220)	(0.220)
Public_Tgt	0.030	0.016	0.016
	(0.037)	(0.038)	(0.038)
Relative Value	0.463***	0.552***	0.550***
	(0.110)	(0.121)	(0.122)
Multiple Bidders	0.149*	0.136*	0.135*
	(0.080)	(0.077)	(0.077)
TobinQ_Acq		0.040*	0.040*
		(0.024)	(0.024)
Leverage_Acq		0.413***	0.414***
		(0.125)	(0.126)
log(Assets)_Acq		-0.003	-0.003
		(0.016)	(0.016)
ROA_Acq		0.129	0.131
		(0.184)	(0.184)
Rating_Acq		0.132***	0.132***
		(0.041)	(0.041)
Lending_Relation			0.032
			(0.080)
Observations	724	724	724
Pseudo. R-squared	0.148	0.202	0.202

Table 3.4: Pricing of Acquisition Loan

The table presents the results of the OLS regression of the pricing of the loan. The dependent variable is the natural logarithm of the all-in-drawn spread(AISD). Aff_Lend is equal to 1 if the M&A transaction is financed by an affiliated lender and zero otherwise. Number of Advisers is the number of M&A advisers advising the acquirer. Variable definitions are provided in Appendix A. Standard errors clustered at the loan package level are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Log(AISD)	(2) Log(AISD)	(3) Aff_Lend	(4) Log(AISD)	(5) Aff_Lend	(6) Log(AISD)
Aff_Lend	0.235***	0.192***				
	(0.039)	(0.036)				
Log(No. of Advisers)			1.164***		1.123***	
			(0.262)		(0.258)	
λ_{Aff_Lend}				0.128***		0.104***
				(0.024)		(0.022)
Cash_Pct	0.014	0.049	0.300*	0.032	0.271*	0.065
	(0.048)	(0.043)	(0.156)	(0.048)	(0.160)	(0.043)
Tender	-0.056	-0.035	0.050	-0.066	0.120	-0.037
	(0.065)	(0.059)	(0.220)	(0.066)	(0.226)	(0.060)
Diversify	-0.111**	-0.104**	-0.316**	-0.131***	-0.326**	-0.116***
	(0.045)	(0.042)	(0.146)	(0.045)	(0.149)	(0.042)
Regulated	0.004	0.018	-0.203	-0.002	-0.168	0.013
	(0.044)	(0.039)	(0.137)	(0.044)	(0.142)	(0.039)
Inter-State	0.039	0.010	0.125	0.053	0.100	0.018
	(0.044)	(0.041)	(0.148)	(0.045)	(0.151)	(0.042)
Hostile	0.073	0.209	-0.962	0.027	-0.968	0.175
	(0.146)	(0.142)	(0.655)	(0.150)	(0.693)	(0.146)
Public_Tgt	-0.068	-0.084*	0.048	-0.056	0.049	-0.069
	(0.047)	(0.044)	(0.140)	(0.048)	(0.142)	(0.044)
Relative Value	0.830***	0.677***	1.294***	0.971***	1.182***	0.773***
	(0.140)	(0.130)	(0.430)	(0.141)	(0.439)	(0.130)
Multiple Bidders	0.075	0.122	0.458	0.109	0.362	0.157
	(0.102)	(0.096)	(0.294)	(0.106)	(0.318)	(0.099)
TobinQ_Acq	0.033	0.028	0.117	0.041*	0.112	0.033*
	(0.025)	(0.020)	(0.077)	(0.024)	(0.078)	(0.020)
Leverage_Acq	1.140***	0.917***	1.330***	1.224***	1.274***	0.958***
	(0.133)	(0.126)	(0.469)	(0.136)	(0.491)	(0.127)
log(Assets)_Acq	-0.293***	-0.177***	-0.111*	-0.297***	-0.072	-0.176***
	(0.019)	(0.025)	(0.058)	(0.020)	(0.071)	(0.025)
ROA_Acq	-0.271	-0.039	0.184	-0.259	0.370	-0.020
	(0.257)	(0.230)	(0.676)	(0.258)	(0.681)	(0.230)
Rating_Acq	0.096**	0.070	0.522***	0.122**	0.487***	0.086**
	(0.047)	(0.043)	(0.148)	(0.048)	(0.150)	(0.043)
Log(maturity)		0.082***			-0.048	0.085***
		(0.023)			(0.077)	(0.023)
Log(Amount)		-0.067***			0.010	-0.065***
		(0.017)			(0.055)	(0.018)
Secured		0.389***			0.347***	0.426***
		(0.041)			(0.127)	(0.041)
Lending_Relation	0.207**	0.188**	0.349	0.212**	0.397	0.196**
	(0.092)	(0.081)	(0.282)	(0.094)	(0.287)	(0.082)
Constant	5.584***	5.711***	-1.843***	5.713***	-2.213**	5.710***
	(0.274)	(0.293)	(0.562)	(0.165)	(1.038)	(0.283)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,486	1,486	1,486	1,486	1,486	1,486
Pseudo R-squared	0.621	0.677	0.229	0.618	0.237	0.679

Table 3.5: Advisory Fee and Lender Affiliation

This table presents the regression results specified in equation 5. The dependent variable Adv Fee is the M&A advisory fee as a fraction of the transaction value. Aff_Lend is equal to 1 if the M&A transaction is financed by an affiliated lender and zero otherwise. M&A Experience is the number of acquisitions completed by the acquirer in the 10 years prior to the current deal. Variable definitions are provided in Appendix A. Standard errors clustered at the firm level are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Adv_Fee	(2) Adv_Fee	(3) Aff_Lend	(4) Adv_Fee
Aff_Lend	-0.236***	-0.212***		
	(0.079)	(0.071)		
M&A Experience			-0.233**	
			(0.112)	
λ_{Aff_Lend}				-0.098**
				(0.046)
Cash_Pct	0.301**	0.087	-0.461	0.026
	(0.142)	(0.111)	(0.907)	(0.135)
Tender	0.220	0.154	-2.013***	0.147
	(0.143)	(0.104)	(0.618)	(0.125)
Diversify	0.084	-0.001	-3.019***	0.000
	(0.121)	(0.094)	(0.751)	(0.114)
Regulated	-0.190	-0.054	2.693**	-0.032
	(0.114)	(0.093)	(1.078)	(0.105)
Inter-State	0.320**	0.219*	1.860***	0.163
	(0.125)	(0.110)	(0.570)	(0.166)
Hostile	0.250	0.201	1.376	0.137
	(0.179)	(0.136)	(1.054)	(0.164)
Public_Tgt	-0.333**	0.035	4.254***	-0.011
	(0.150)	(0.162)	(0.850)	(0.151)
Relative Value	-0.019	-0.695**	4.503**	-1.072***
	(0.364)	(0.274)	(2.277)	(0.322)
Multiple Bidders	-0.318*	0.030		
	(0.185)	(0.162)		
Log(assets)_Acq		-0.174***	0.067	-0.185***
		(0.031)	(0.263)	(0.039)
TobinQ_Acq		-0.057**	-0.339*	-0.045**
		(0.023)	(0.179)	(0.020)
Rating_Acq		-0.095	-0.952**	-0.092
		(0.133)	(0.484)	(0.155)
Segment_Acq		0.028	0.588***	0.007
		(0.020)	(0.143)	(0.018)
Segment_Tgt		-0.016	-0.170	-0.017
		(0.031)	(0.167)	(0.036)
Constant	0.640**	1.915***	-7.915***	2.237***
	(0.247)	(0.308)	(2.575)	(0.350)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.509	0.712	0.490	0.673
Observations	120	120	120	120

Table 3.6: Non-Price Features of the Loan

The table presents the results of the regression of the non-price features of the acquisition loan at the package level. The dependent variable is the specified on the header of the column. Aff_Lend is equal to 1 if the M&A deal is financed by an affiliated lender and zero otherwise. CIX is the covenant intensity index. Secured is equal to 1 for loans that require collateral and zero otherwise. The regression is specified as an OLS and Logit in column (1) and (2) respectively. Variable definitions are provided in Appendix A. Standard errors clustered at the loan package level are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) CIX	(2) Aff_Lend	(3) CIX	(4) Secured
Aff_Lend	0.473***			0.398*
	(0.147)			(0.213)
λ_{Aff_Lend}			0.258***	
			(0.089)	
Log(Number of Advisers)		1.203***		
		(0.267)		
Cash_Pct	-0.097	0.333**	-0.046	-0.515**
	(0.175)	(0.163)	(0.173)	(0.254)
Tender	-0.103	0.038	-0.146	0.360
	(0.203)	(0.206)	(0.203)	(0.338)
Diversify	0.046	-0.425***	-0.014	-0.061
	(0.169)	(0.150)	(0.168)	(0.237)
Regulated	0.139	-0.252*	0.135	0.148
	(0.151)	(0.146)	(0.152)	(0.237)
Inter-State	0.176	0.101	0.223	0.347
	(0.168)	(0.156)	(0.174)	(0.278)
Hostile	0.567	-0.581	0.549	-1.404
	(0.471)	(0.617)	(0.472)	(0.873)
Public_Tgt	-0.098	0.076	-0.094	-0.323
	(0.157)	(0.144)	(0.159)	(0.227)
Relative Value	0.851	0.562	1.027*	1.557*
	(0.570)	(0.480)	(0.575)	(0.857)
Multiple Bidders	-0.143	0.356	-0.122	-0.586
	(0.256)	(0.270)	(0.263)	(0.457)
Log(Market_to_Book_Acq)	0.347***	0.245**	0.372***	0.718**
	(0.132)	(0.124)	(0.132)	(0.312)
Leverage_Acq	-1.477***	0.399	-1.357***	-1.363
	(0.507)	(0.466)	(0.508)	(0.920)
Log(Market_Value_Acq)	-0.873***	-0.241***	-0.893***	-1.406***
	(0.093)	(0.079)	(0.093)	(0.171)
ROA_Acq	-0.917	0.345	-0.834	-4.156**
	(0.810)	(0.750)	(0.801)	(1.962)
Rating_Acq	0.381**	0.412**	0.435**	0.520**
	(0.178)	(0.163)	(0.178)	(0.247)
Tangability_Acq	-0.766**	0.115	-0.661*	-0.954
	(0.372)	(0.346)	(0.377)	(0.592)
Perf_Pric	0.942***	0.054	0.923***	1.222***
	(0.136)	(0.119)	(0.137)	(0.241)
Ln(Deal_Amount)	0.510***	0.234***	0.530***	0.577***
	(0.084)	(0.074)	(0.084)	(0.146)
Revolver_Pkg	-0.328**	-0.167	-0.339**	0.518*
	(0.166)	(0.134)	(0.166)	(0.314)
Constant	-1.285	-5.346***	-2.622**	-2.842
	(1.316)	(1.146)	(1.173)	(2.208)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	833	814	814	833
R-squared	0.367	0.219	0.365	0.331

Table 3.7: Optionality Feature of the Loan

The table presents the results of the OLS regression of the optionality feature of the loan. The dependent variable is the natural logarithm of the all-in-undrawn spread (Ln(AISU)). Number of Advisers is the number of M&A advisers advising the acquirer. Aff_Lend is equal to 1 if the M&A deal is financed by an affiliated lender and zero otherwise. Variable definitions are provided in Appendix A. Standard errors clustered at the loan package level are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Log(AISU)	(2) Aff_Lend	(3) Log(AISU)
Aff_Lend	0.056***		
	(0.011)		
λ_{Aff_Lend}			0.029***
			(0.007)
Log(Number of Advisers)		1.233***	
		(0.283)	
Cash_Pct	0.006	0.232	0.010
	(0.012)	(0.190)	(0.013)
Tender	0.002	0.245	0.001
	(0.017)	(0.244)	(0.018)
Diversify	-0.021*	-0.478***	-0.027**
	(0.012)	(0.171)	(0.012)
Regulated	0.003	-0.152	0.002
	(0.011)	(0.161)	(0.011)
Inter-State	0.014	0.164	0.017
	(0.013)	(0.177)	(0.014)
Hostile	-0.019	-0.525	-0.026
	(0.041)	(0.671)	(0.043)
Public_Tgt	-0.015	-0.073	-0.014
	(0.013)	(0.168)	(0.013)
Relative Value	0.122***	1.229**	0.151***
	(0.038)	(0.498)	(0.038)
Multiple Bidders	0.006	0.217	0.011
	(0.026)	(0.288)	(0.027)
TobinQ_Acq	0.009	0.114	0.011
	(0.007)	(0.087)	(0.007)
Leverage_Acq	0.243***	1.005*	0.258***
	(0.039)	(0.533)	(0.040)
log(Assets)_Acq	-0.052***	0.025	-0.052***
	(0.008)	(0.089)	(0.008)
ROA_Acq	-0.053	0.126	-0.051
	(0.085)	(0.987)	(0.086)
Rating_Acq	0.012	0.592***	0.019
	(0.012)	(0.176)	(0.012)
Log(maturity)	0.094***	0.096	0.094***
	(0.008)	(0.095)	(0.008)
Log(Amount)	-0.020***	-0.168**	-0.021***
	(0.006)	(0.076)	(0.006)
Constant	1.679***	0.357	1.679***
	(0.084)	(1.326)	(0.088)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.666	0.239	0.662
Observations	719	719	719

Table 3.8: Wealth Effects-Acquirer CAR

The table presents the OLS regression of the announcement effect for the acquirer. The dependent variable is the cumulative abnormal return (CAR). The abnormal return is estimated using the CRSP Value Weighted Index. The event window is specified at the top of each column. Aff_Lend is equal to 1 if the M&A deal is financed by an affiliated lender and zero otherwise. Variable definitions are provided in Appendix A. Standard errors clustered at the industry level are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	[-1,+1]	[0,+2]	[0,+3]	[-1,+1]	[0,+2]	[0,+3]
Aff_Lend	0.009**	0.013**	0.009	0.011***	0.018***	0.014**
	(0.004)	(0.006)	(0.007)	(0.003)	(0.005)	(0.007)
CASH	0.002	0.011	0.013*	-0.002	0.006	0.009
	(0.006)	(0.009)	(0.008)	(0.006)	(0.009)	(0.008)
Tender	0.005	0.026**	0.031***	0.011	0.029**	0.032***
	(0.008)	(0.011)	(0.012)	(0.007)	(0.013)	(0.011)
Diversify	-0.013**	-0.018*	-0.015	-0.011*	-0.017*	-0.013
	(0.006)	(0.010)	(0.011)	(0.006)	(0.010)	(0.011)
Hostile	0.016	0.034*	0.027*	0.013	0.035*	0.026**
	(0.016)	(0.019)	(0.015)	(0.016)	(0.018)	(0.012)
Public_Tgt	-0.013**	-0.040***	-0.039***	-0.012*	-0.034***	-0.031**
	(0.007)	(0.011)	(0.010)	(0.007)	(0.013)	(0.013)
Relative Value	0.008	0.021	0.009	0.006	0.018	0.004
	(0.019)	(0.035)	(0.032)	(0.014)	(0.035)	(0.034)
Leverage_Acq	0.017	0.024	0.034	0.017	0.025	0.035
	(0.022)	(0.027)	(0.028)	(0.024)	(0.030)	(0.032)
log(Assets)_Acq	-0.005***	-0.014***	-0.015***	-0.004***	-0.013***	-0.015***
	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)	(0.003)
Tgt_Subsidiary	-0.001	0.015	0.015	0.001	0.020**	0.021**
	(0.005)	(0.010)	(0.010)	(0.006)	(0.009)	(0.010)
Book-to-Market	-0.018*	-0.024**	-0.024**	-0.013	-0.023**	-0.023**
	(0.011)	(0.009)	(0.010)	(0.012)	(0.010)	(0.011)
ROA_Acq	-0.039	-0.061*	-0.054	-0.020	-0.059	-0.046
	(0.028)	(0.034)	(0.047)	(0.026)	(0.048)	(0.066)
Run-Up				0.003	-0.009	-0.020***
				(0.003)	(0.007)	(0.007)
Constant	0.069***	0.115***	0.115***	0.060***	0.105***	0.105***
	(0.017)	(0.032)	(0.033)	(0.014)	(0.029)	(0.033)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.176	0.261	0.254	0.167	0.256	0.255
Observations	680	680	680	621	621	621

Table 3.9: M&A Completion Time

The table presents results of the OLS regression analysis of completion time. The completion time is the number of days between the M&A announcement date and the effective date. The sample includes only deals with completion time greater than 10 days. Aff_Lend is equal to 1 if the M&A deal is financed by an affiliated lender and zero otherwise. Variable definitions are provided in Appendix A. Standard errors clustered at the adviser level. t-statistics are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Speed	(2) Speed
Aff_Lend	-8.202**	-9.013**
	(3.378)	(4.033)
Cash_Pct	-21.373***	-20.725***
	(4.872)	(5.501)
Tender	-33.228***	-30.810***
	(8.391)	(9.177)
Diversify	-1.855	-3.646
	(5.113)	(5.660)
Regulated	12.126**	9.438
	(5.293)	(6.052)
Inter-State	13.207**	11.104
	(5.974)	(6.765)
Hostile	120.961***	122.449***
	(43.117)	(43.642)
Public_Tgt	15.043**	12.772*
	(6.855)	(7.538)
Relative Value	163.888***	171.495***
	(20.205)	(21.665)
Multiple Bidders	10.582	3.282
	(17.916)	(18.685)
TobinQ_Acq	6.330***	6.286**
	(2.386)	(2.605)
log(Assets)_Acq	16.161***	16.221***
	(2.640)	(3.031)
Rating_Acq	5.031	4.748
	(6.451)	(6.463)
Top-Tier	-0.577	0.475
	(5.940)	(6.387)
Run-Up		3.485
		(4.175)
Constant	-53.671***	-52.866**
	(19.216)	(21.385)
Industry FE	Yes	Yes
Year FE	Yes	Yes
Pseudo R-squared	0.347	0.339
Observations	684	637

Table 3.10: Non-Acquisition Loans

The dependent variable is the log of the All-in-drawn spread (LSPREAD). Aff_Lend is equal to 1 if the M&A deal is financed by an affiliated lender and zero otherwise. Variable definitions are provided in Appendix A. All regressions include industry, year and loan type fixed effects. Standard errors clustered at the package level. t-statistics are in parentheses. ***, **, and * stand for significance level at the 1%, 5% and 10% respectively.

	(1) Ln(AISD)	(2) Ln(AISD)
Aff_Lend	0.207	0.300*
	(0.197)	(0.164)
Cash_Pct	0.071	0.058
	(0.131)	(0.120)
Tender	-0.161	-0.182
	(0.185)	(0.171)
Diversify	-0.101	-0.027
	(0.124)	(0.106)
Regulated	0.063	0.143
	(0.158)	(0.142)
Inter-State	-0.192	-0.100
	(0.116)	(0.112)
Hostile	-0.530**	-0.683***
	(0.216)	(0.179)
Public_Tgt	0.116	0.140
	(0.127)	(0.107)
Relative Value	0.421	0.548
	(0.495)	(0.487)
Multiple Bidders	0.050	-0.224
	(0.199)	(0.178)
TobinQ_Acq	-0.013	-0.082
	(0.091)	(0.089)
Leverage_Acq	1.152***	0.744*
	(0.417)	(0.414)
log(Assets)_Acq	-0.352***	-0.191***
	(0.050)	(0.053)
ROA_Acq	-1.581*	-0.852
	(0.813)	(1.234)
Rating_Acq	-0.004	-0.018
	(0.181)	(0.129)
Log(maturity)		0.050
		(0.050)
Log(Amount)		-0.066
		(0.047)
Secured		0.797***
		(0.146)
Lending_Relation	0.577***	0.102
	(0.206)	(0.208)
Constant	6.672***	6.685***
	(0.572)	(0.901)
Observations	204	204
Adj. R-squared	0.753	0.822

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APPENDIX A

VARIABLE DEFINITIONS

VARIABLE DEFINITIONS FOR CHAPTER 1

VARIABLE	DEFINITION
Aff_Lender	An indicator variable that takes a value of one if the lead lender is the underwriter to the IPO, and zero otherwise.
Leverage	The leverage ratio at the end of fiscal year prior to the current loan, calculated as book value of total debt to book value of total assets.
Tangibility	The borrower's asset tangibility at the end of fiscal year prior to the current loan, calculated as Net Property, Plant, and Equipment (PP&E) scaled by Total Assets.
Ln(assets)	Natural log of the total assets of the borrower at the end of fiscal year prior to the current loan.
Profit	Ratio of the Earnings before Income and Taxes (EBIT) scaled by Total Sales.
Rated	An indicator variable that takes a value of one if the borrower's S&P long-term issuer credit rating is available, and zero otherwise.
Term Spread	The Term Spread is the difference between the yield of a 10-year Treasury constant maturity bond and a 3-month Treasury constant maturity bill

Default Spread	The Default Spread is the difference between the yield of a seasoned Moody's Aaa Corporate Bond and a seasoned Moody's Baa Corporate Bond
Real GDP growth	The real GDP growth in the current quarter in 2009 dollars.
Credit Line	It is a dummy variable that takes the value 1 if the loan is a credit line/revolver and zero otherwise.
Return on Assets	The borrower's return on assets determined as the earnings before interest and taxes (EBIT) scaled by total assets.
Covenant Intensity Index	CIX from (Bradley and Roberts 2015) with values ranging from 0 to 6.
Invest_bank	It takes the value 0 if the lender is a FDIC-insured institution and 1 otherwise.
Bank_Capital	Bank_Capital is defined as equity capital divided by GTA. Capital adequacy refers to the amount of a bank's capital relative to its assets.
Bank_Size	The natural log of gross total assets (GTA) of the bank.
UW_Rank	The Carter-Manaster ranking(underwriting) of the underwriter
Cash	The borrower's cash and cash equivalents at the end of fiscal year prior to the current loan scaled by total assets.
Ln(AISD)	Natural log of the All-in-drawn spread of the syndicated loan
Perf_Pric	An indicator variable that takes a value of one if loan agreement includes performance pricing features, and zero otherwise.

Sole Lender	An indicator variable that takes a value of one if the loan is funded by a sole-lender, and zero otherwise.
Log(Amt)	Natural log of the facility amount.
Log(Maturity)	Natural log of the maturity of the facility in months.
Log(Deal_Amt)	Natural log of the package amount.
Volatility_12M	The standard deviation of the daily stock return measured over a 12-month period prior to the deal active date.
Relationship	$\frac{\sum_{t=-5\ years}^{t=0\ years} Amount\ Borrowed\ by\ firm\ i\ from\ Lender\ j}{\sum_{t=-5\ years}^{t=0\ years} Amount\ Borrowed\ by\ firm\ i}$
Secured	An indicator variable that takes a value of one if the loan is secured by collateral, and zero otherwise.
Market-to-Book	The borrower's Market-to-book ratio determined as the market value of assets (Total Assets + Market Value of Equity – Book Value of Equity) scaled by the book value of assets.
All-in-drawn spread	Basis point spread over LIBOR plus the annual fee and the up-front fee spread, if there is any.
Underpricing	The change from Primary Offer Price to Secondary Break Price in percent (%)
Primary Offer Price (% of Par)	The price that closes a loan deal in the primary market.
Secondary Break Price (% of Par)	The price of a loan when it breaks into the secondary market.
ΔP (bps)	$\Delta P = P_{sec} - 100$; P_{sec} is either equal to $PRC_{FirstDay}$ or $PRC_{30DayAvg}$

$PRC_{FirstDay}$	The first market price of the loan observed at least 1 month after origination.
$PRC_{30DayAvg}$	The 30-day average market price of the loan measured at least 1 month after origination.
$\Delta P_{FirstDay}$	$\Delta P = PRC_{FirstDay} - 100$
$\Delta P_{30DayAvg}$	$\Delta P = PRC_{30DayAvg} - 100$
IPO_number	$\frac{\sum_{t=-1\ year}^{t=0\ years} Number\ of\ IPOs\ underwritten\ by\ lender\ j}{\sum_{t=-1\ year}^{t=0\ years} Number\ of\ IPOs}\ X\ 100$
IPO_amount	$\frac{\sum_{t=-1\ year}^{t=0\ years} Proceeds\ of\ IPOs\ underwritten\ by\ lender\ j}{\sum_{t=-1\ year}^{t=0\ years} Proceeds\ of\ IPOs}\ X\ 100$

VARIABLE DEFINITIONS FOR CHAPTER 2

VARIABLE	DEFINITION
PTGP	Propensity to go Public(PTGP) is the ratio of the number of firms in a size category in a state completing an IPO to the total number of firms in the same size category in a state
UP	Underpricing/ first-day return/initial **return** is defined as the percentage change from the offer price to the closing price on the first trade date
Age	The number of years since founding date as of the IPO offer date
Tech /Hitech	The Tech dummy takes a value of one (zero otherwise) if the firm was in the technology or internet business
Primary	Primary dummy equals one (zero otherwise) if the offering is a 100% pure primary (i.e., no secondary shares sold).
Toptier	The prestigious underwriter dummy variable equals one (zero otherwise) if the IPOs lead underwriter has a rank of 8 or above on the 0-9 Carter and Manaster (1990) scale.
Nasdaq15	The lagged 15-day Nasdaq return is the compounded percentage return on the Nasdaq Composite index (excluding dividends) during the 15 trading days prior to the offer date.
Revision	It is the offer price minus the midpoint scaled by the mid-point. The midpoint is the midpoint of the original filing price range.

Bubble	The Bubble dummy takes on a value of one (zero otherwise) if the IPO occurred during 1999-2000
VC	VC dummy equals to 1 if the IPO is backed by a venture capital (VC) fund
Ln(Assets)	It is the natural log of the firm's assets in real terms (inflation-adjusted to a base of year 2004)
NASDAQ	It is a dummy for IPOs that list on the NASDAQ exchange.
Capex	$\frac{PPENT_t - PPENT_{t-1} + Depreciation_{t-1}}{PPENT_{t-1}}$
g_{asset}	$\frac{AT_t - AT_{t-1}}{AT_{t-1}}$
FCP	It is a dummy equal to 0 if the primary purpose of the proceeds is repayment of debt or debt related obligations and 1 otherwise
FCD	It is a dummy equal to 0 if the firm has paid dividends in the year prior to the IPO and 1 otherwise
FCYN	It is a dummy equal to 0 if the Age of the firm is greater than 5 years and 1 otherwise
Assets	It is the assets of the firm in USD millions
Cash Flow	It is the income before extraordinary items plus depreciation

Sales	It is the sales of the firm in USD millions
EBIT	It is the ratio of earnings before income and taxes scaled by total assets
Investment	It is the ratio of capital expenditure scaled by total assets
LT Debt	It is the ratio of the long-term debt to total assets
Secured Debt	It is the ratio of the secured debt to total assets
R&D intensity	R&D expenses to Total Assets.
Q-prox	It is the ratio of the average Market to Book ratio of equity in an industry in a given year. The industry classification is based on Fama-French 10 industry classification scheme.
Casheq	It is the ratio of cash and cash equivalents to Total Assets.
Size	It is the natural log of real assets of the firm
Cflo	It is the ratio of Cash Flow to Total Assets.
FC / CFC	It is dummy that equals 1 for financially constrained firms and 0 otherwise
Treatment	It is dummy that equals 1 after states deregulate banking and 0 otherwise
Unemployment	Unemployed percentage of the labor force
GDP growth	The annual GDP growth in the state over a year

CEA Index	The Coincident Economic Activity Index combines four state-level indicators to summarize current economic conditions in a single statistic. The four state-level variables in each coincident index are non-farm payroll employment, average hours worked in manufacturing by production workers, the unemployment rate, and wage and salary disbursements deflated by the consumer price index (U.S. city average).

VARIABLE DEFINITIONS FOR CHAPTER 3

VARIABLE	DEFINITION
Aff Lend	It is equal to 1 if the lead lender and M&A adviser are related, and zero otherwise.
Cash	It is equal to 1 for where the method of payment is 100% cash, and zero otherwise
Tender	It is equal to 1 if the mode of acquisition is a tender offer, and zero otherwise
Diversify	It is equal to 1 if the acquirer and target have the same first SIC digit and 0 otherwise
Regulated	It is equal to 1 if the deal is subject to regulatory approval, and 0 otherwise
Inter-State	It is equal to 1 if the acquirer and target are from different states and 0 otherwise
Hostile	It is equal to 1 if the deal is hostile and 0 otherwise
Public_Tgt	It is equal to 1 if the target is listed and 0 otherwise
Relative Value	It is the ratio of transaction value to the sum of market value of the acquirer and transaction value.
Multiple Bidders	It is equal to 1 if multiple bidders are pursuing a target, and 0 otherwise
Adv Fee	M&A advisory fee as a percentage of the transaction value

CAR (%)	Cumulative abnormal return (%) of the bidding firms' stock in the event window. The returns are calculated using the market model with the market model parameters estimated over the period starting 100 days and ending 10 days prior to the announcement. The CRSP value-weighted index return is the market return.
Completion Time	Number of calendar days between the announcement date and to the effective date
AISD	The all-in-drawn spread is defined as the spread in excess of a benchmark (usually LIBOR). It corresponds to the total cost (interest rate and fees) paid over LIBOR for each dollar drawn down under the loan commitment. It is the annual cost to a borrower for drawn funds and it compensates the bank for the credit risk it bears when the borrower draws down on its credit line.
CIX	The covenant intensity index by Bradley & Roberts (2015) that takes the value between 0 and 6
Maturity	The maturity of the loan facility in months
Amount	The dollar value of the loan facility
Deal Amount	The dollar value of the loan package
Secured	It is equal to 1 if the loan is secured, and 0 otherwise
Revolver	It is equal to 1 if the loan is a revolving credit facility and 0 otherwise
Revolver_Pkg	It is equal to 1 if the loan package includes a revolving credit facility and 0 otherwise

Perf_Pric	It is equal to 1 if the loan includes a performance pricing provision
AISU	All-in Spread Undrawn is defined as total (fees and interest) annual LIBOR for each dollar available under a commitment
TobinQ _Acq	Market value of assets to book value of assets of the acquirer
Leverage	Total liability to market value of assets of the acquirer
Assets_Acq	Book value of total assets (AT) of the acquirer
ROA_Acq	It is the ratio of earnings before interest, taxes and depreciation (EBITDA) to the total assets (AT)
Rating_Acq	It is equal to 1 if the acquirer has an S&P long term credit rating , and zero otherwise
Market Value Acq	It is the market value of common stock. The market value is the product of the closing price (PRCC C) and the number of shares
Market to Book Acq	It is the ratio of market value of equity to the book value of equity of the acquirer
Lending Relation	I follow Bharath et al. (2007) to construct a continuous measure of the strength of the relationship. $$LendingRelation = \frac{\text{Number of loans to borrower i by bank m in last 5 years}}{\text{Total Number of loans by borrower i in last 5 years}} \times 100$$
Number of Advisers	Number of acquirer financial advisers participating in a deal
Top-Tier	It takes the value 1 if the M&A adviser is in the top quartile in share and zero otherwise
M&A Experience	The number of M&A deals completed by the acquirer in the 10 years prior to the current acquisition
Segment_Tgt	Number of 4-digit SIC segments of the target
Tech_Tgt	It is equal to 1 if target is a hi-tech firm, and 0 otherwise

Run-Up	Market-adjusted buy-and-hold return of the bidding firms' stock over the period beginning 205 days and ending 6 days prior to the

APPENDIX B

PROOFS FOR PROPOSITIONS IN CHAPTER 1

PROOF FOR PROPOSITION 1:

Note that the inside lender will always offer r_F to firms with an F signal at equilibrium because a lender will lose money for these firms. An outside lender will always offer one rate to all firms since it does not observe the signal at t=t1. Furthermore, an outside lender will not offer a lower or higher rate than the rate the inside lender offers to firms with an S signal. An outside lender does not offer a lower rate because it will lose money if this rate is below r_p. If the rate is greater than r_p, there is no reason for the inside bank to offer a higher rate than the outside lender because the inside bank can increase its profit by at least matching the outside lender's rate. Similarly, an outside lender does not offer a higher rate at equilibrium because doing so does not attract any firms with an S signal and will attract all firms with an F signal. The outside lender will thus always lose money for doing so. Note that the outside lender can always offer r_F and only lend to firms with an F signal. Doing so will break-even for the outside lender.

So, for any possible equilibria, below we first consider the cases where both the insider lender and an outside lender offer the same rate to firms with an S signal. Denote the rate offered to firms with an S signal by the inside bank as r. At the end we consider the case where an outsider lender offers r_F to all firms and show that this case cannot be part of any equilibrium either.

First, any $r \leq r_p$ cannot be an equilibrium. The reason is simple. If an outside lender offers $r \leq r_F$, all firms with an F signal will go to an outside lender. Because r_p is the break-even rate for all firms, and because an outside lender attracts all firms with an F signal by offering $r \leq r_F$, an outside lender will be better off by offering r_F. If r is dominated by r_F for an outside lender, such a rate cannot be an equilibrium.

Second, consider $r_p < r < r'$, where $r' = \frac{\frac{1}{2}p_p r_S + (1-p_p) r_F}{1-\frac{1}{2}p_p}$. Note that r' is the break-even rate for an outside bank to offer the same rate as that the inside bank offers to a firm with an S signal. For the population, the proportion for firms with an S signal is p_p. Since a firm will choose the insider and outside lenders randomly, the proportion of firms with an S signal that will choose the outside lender is simply $\frac{1}{2}p_p$. Note that the proportion of firms with an F signal is $1 - p_p$, and all these firms will go to the outsider lender. For the outside lender to break-even, we have

$$\frac{\frac{1}{2}p_p}{(1-p_p)+\frac{1}{2}p_p}(r' - r_S) + \frac{1-p_p}{(1-p_p)+\frac{1}{2}p_p}(r' - r_F) = 0 \qquad \text{(A1)}$$

We have $r' = \frac{\frac{1}{2}p_p r_S + (1-p_p) r_F}{1-\frac{1}{2}p_p}$ from Eq. (A1). Given that an outside lender needs at least r' to break-even, an outside lender will be better off by offering r_F. So $r_p < r < r'$ cannot be an equilibrium.

Third, consider $r' \leq r \leq r_F$. In this case, an outsider lender earns positive profits by offering r to all firms. Note that $r > r_S$, so the inside bank can apparently better off by offering firms with an S signal a rate of $r - \varepsilon$, where ε is an arbitrarily small positive number, to attract more firms with an S signal. So $r' \leq r < r_F$ cannot be an equilibrium.

Finally, consider the case where an outside bank offers r_F and the insider bank offers a rate of r''. In this case, if r''<r', no outside will deviate from offering r_F, but the inside bank can be better off by offering $r'' + \varepsilon$. If $r'' \geq r'$, the outside bank can earn a positive profit by matching the rate r''. Again, no equilibrium exists when an outside bank offers both r_F.

To summarize, the above cases show that there exist not rate offerings for the inside and outside banks that at least one of them will have incentives to deviate. Thus, there will be no equilibria in pure strategies. QED.

PROOF FOR PROPOSITION 2:

The outside lender can compete for good firms by randomizing its bids and thereby outbidding the informed lender for the good firms. The outcome of this strategy is that outside lenders will occasionally earn positive expected profits, but also incur losses when they lend to bad firms at lower rates such that their expected profits are zero on average. More specifically, an outside lender will offer r_F with a probability of $p(F)$, where $p(F)$ is the probability for a signal of failure in Period 1. With a probability of $p(S)$, the outside lender randomizes the rate offered to a firm over a distribution of g_O(r). The outside lender will occasionally offer favorable terms to some bad firms and in the process make a loss on lending to bad firms. But, the outside lender will compete with the inside lender for the good firms by randomly offering a rate lower than r^S, the rate offered by the insider bank to firms with a signal of success. Because $r^S > r_S$ (r_S is the expected rate for firms with a signal of success), for the outside lender on an average, the loss on lending to bad firms will offset the gain on lending to good firms.

The inside lenders anticipate the behavior of the outside lender and respond by randomizing the rate over a distribution of g_i^S(r) for firms that signal "S" and thus earn a minimum abnormal profit of $(r_p - r_S)$. It is not optimal for inside lenders to offer less than r_p because an outside lender offers at least r_p as shown in the proof for Proposition 1. Further, the inside lender will always offer r_F to firms that signal "F" because offering any rates below r_F results in a loss and thus cannot be optimal for the inside bank.

Be we follow the strategy of von Thadden (2004) to characterize the equilibrium strategies for both the insider and outside lenders.

Bidding Strategy of the Inside Bank

The inside bank earns zero profit from lending to firms with an F signal, so the profit of the inside bank can be written as:

$$P_i^S(r) = \text{p(outside lender bids greater than } r^S)[p(S)(1 + r^S) - (1 + \bar{r})]$$

$$= (1 - G_O(r^S))[p(S)(1 + r^S) - (1 + \bar{r})]$$

where $G_O(r^S)$ is the c.d.f for the outside bank's bidding, i.e., the probability that the outside lender bids less than or equal to r^S.

Note that the probability of success for the pool of borrowers available to the outside bank is p_p. If the outside bank bids less than r_p, it will draw more "F" firms from the inside lender. This will lower the pooled probability of success. Hence, the lower limit for the bids of the outside firm is r_p. The inside lender will anticipate the outside lender's bidding constraint and will never bid less than r_p when the signal is "S". Thus, the lower limit for the inside lender is r_p when bidding for "S" firms.

The upper limit for the inside lender is r_F when bidding for "S" firms. If the inside lender bids r_X ($r_X > r_F$) for "S" firms, then the outside lender can earn a profit on good and bad firms on offers r(ϒ) ϵ (r_F, $r_X - \varepsilon$). However, the outside lender makes a zero profit and so the upper limit for the inside lender is r_F. We can rewrite the payoff for the inside lender as follows:

$$P_i^S(r^S) = (1 - G_O(r^S))[p(S)(1 + r^S) - (1 + \bar{r})] = c > 0, where\ r^S \in [r_p, r_F) \quad \text{(A3)}$$

Bidding Strategy of the Outside Bank

Profit of the outside bank,

P_O(r) = Prob(inside lender bids greater than "r").[p(ϒ).(1+r) - (1+$\bar{r}$)]

= Prob(inside lender bids greater than "r" ∩ ϒ=S).[p(S).(1+r) - (1+$\bar{r}$)] +

Prob(inside lender bids greater than "r" ∩ ϒ=F).[p(F).(1+r) - (1+$\bar{r}$)]

= Prob(inside lender bids greater than "r" | ϒ=S) . Prob(ϒ=S).[p(S).(1+r) - (1+$\bar{r}$)]+

Prob(inside lender bids greater than "r" | ϒ=F) . Prob(ϒ=F).[p(F).(1+r) - (1+$\bar{r}$)]

= Prob(inside lender bids greater than "r" | ϒ=S) . pP.[p(S).(1+r) - (1+$\bar{r}$)] +

Prob(inside lender bids greater than "r" | ϒ=F) . (1- pP).[p(F).(1+r) - (1+$\bar{r}$)]

= (1 - G_i^S(r)). p_P.[p(S).(1+r) - (1+$\bar{r}$)] + (1 - G_i^F(r)). (1- p_P).[p(F).(1+r) - (1+$\bar{r}$)]

Where G_i^{Υ}(r) is the c.d.f i.e., the probability that the inside lender bids less than or equal to "r"

The inside bank will always bid rF when the signal is “F”. Hence, G_i^F(r) = 0.

P_O(r) = (1 - G_i^S(r)). p_P.[p(S).(1+r) - (1+$\bar{r}$)] + (1- p_P).[p(F).(1+r) - (1+$\bar{r}$)]

= (1 - G_i^S(r)). p_P.[p(S).(1+r) - (1+$\bar{r}$)] + (1- p_P).[p(F).(1+r) - (1+$\bar{r}$)]

The outside bank makes a zero abnormal profit. Hence, P_O(r) = 0.

(1 - G_i^S(r)). p_P.[p(S).(1+r) - (1+$\bar{r}$)] + (1- p_P).[p(F).(1+r) - (1+$\bar{r}$)] = 0 where r ϵ [rP, rF] …………(4)

Rearranging the terms in equation (2),

$$G_i^S(\mathrm{r}) = \frac{[\mathrm{p}_P.p(S) + (1-\mathrm{p}_P).p(F)](1+r) - (1+\bar{r})}{\mathrm{p}_P.[p(S).(1+r) - (1+\bar{r})]}$$

But, $p(S) = \frac{p_H^2\,\theta + p_L^2\,(1-\theta)}{p_P}$ and $p(F) = \frac{(1-p_H)p_H\,\theta + (1-p_L)p_L(1-\theta)}{1-p_P}$

$$G_i^S(\mathrm{r}) = \frac{[\theta.\mathrm{p}_H + (1-\theta).\mathrm{p}_L](1+r) - (1+\bar{r})}{\mathrm{p}_P.[p(S).(1+r) - (1+\bar{r})]}$$

Substituting p_P = θ.p_H + (1-θ).p_L

$$G_i^S(\mathrm{r}) = \frac{(1+r) - (1+\mathrm{r}_P)}{[p(S).(1+r) - (1+\bar{r})]}$$

$$G_i^S(\mathrm{r}) = \frac{r - \mathrm{r}_P}{[p(S).(1+r) - (1+\bar{r})]}$$

The final step in characterizing the mixed strategy Nash equilibrium is extracting the p.d.f by differentiating the above equation. Hence,

$$g_i^S(\mathrm{r}) = \frac{p(s)(1+\mathrm{r}_P) - (1+\bar{r})}{[p(S).(1+r) - (1+\bar{r})]^2}$$

We obtain the c.d.f for the outside lender as follows

When r = r_P , then $G_O(r_P) = 0$

$P_i^S(r_P)$ = (1 - 0).[p(S).(1+ r_P) - (1+$\bar{r}$)] = c

Substituting c = p(S).(1+ r_P) - (1+$\bar{r}$) in (1) we obtain,

$P_i^S(r)$ = (1 - G_O(r)).[p(S).(1+r) - (1+$\bar{r}$)] = p(S).(1+ r_P) - (1+$\bar{r}$)

$$G_O(r) = \frac{p(S).(r - r_P)}{[p(S).(1 + r) - (1 + \bar{r})]}$$

$$G_O(r) = p(S).\ G_i^S(r) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

$$g_O(r) = p(S).\ g_i^S(r) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

PROOF FOR PROPOSITION 3:

Profit of the outside bank when firm signals “S”, $P_O^S(r)$

= Prob(inside lender bids greater than “r” ∩ ϒ=S).[p(S).(1+r) - (1+$\bar{r}$)]

= Prob(inside lender bids greater than “r” | ϒ=S) . Prob(ϒ=S).[p(S).(1+r) - (1+$\bar{r}$)]

= Prob(inside lender bids greater than “r” | ϒ=S) . p_P.[p(S).(1+r) - (1+$\bar{r}$)]

= (1 - G_i^S(r)). p_P.[p(S).(1+r) - (1+$\bar{r}$)] ……………………………………(7)

Profit of the inside bank when firm signals “S”, P_i^S (r)

= Prob(outside lender bids greater than "r").[p(S).(1+r) - (1+$\bar{r}$)]

= (1 - G_O(r)).[p(S).(1+r) - (1+$\bar{r}$)]

= (1- p(S).G_i^S(r)).[p(S).(1+r) - (1+$\bar{r}$)] …………………………………...……(8)

A comparison of equation (7) and (8) suggests that P_i^S (r) > P_O^S(r) .

PROOF FOR PROPOSITION 4:

Probability that a firm signaling "S" borrows from the inside bank =

$$\int_{r_P}^{r_F} \text{Prob(outside lender bids greater than "r"). Prob(inside lender bids "r"} | \Upsilon = \text{S)}\ dr$$

$$= \int_{r_P}^{r_F} (1 - G_O(\text{r})).\, g_i^S(\text{r})\ dr \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Probability that a firm signaling "S" borrows from outside bank

$$= \int_{r_P}^{r_F} \text{Prob(inside lender bids greater than "r"} \mid \Upsilon$$

$$= \text{S) . Prob(outiside lender bids "r")}\ dr$$

$$= \int_{r_P}^{r_F} (1 - G_i^S(\text{r})).\, g_O(\text{r})\ dr$$

$$= \int_{r_P}^{r_F} (1 - (G_O(\text{r})/p(S)).\, \text{p(S)}.\, g_i^S(\text{r})\ dr$$

$$= \int_{r_P}^{r_F} (p(S) - (G_O(\mathrm{r})).g_i^S(\mathrm{r})\, dr \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.\dots (10)$$

A comparison of equation (9) and (10) indicates that firms that signal “S” are more likely to borrow from the inside lender (where p(S) ≥ $G_O(\mathrm{r})$). The probability that a firm signaling “F” is offered a rate below r_F from outside bank is as follows:

$$= \int_{r_P}^{r_F} \text{Prob(inside lender bids greater than “r” | Υ}$$

$$= \text{F) . Prob(outiside lender bids "r")}\ dr$$

$$= \int_{r_P}^{r_F} (1 - G_i^F(\mathrm{r})).g_O(\mathrm{r})\, dr$$

$$= \int_{r_P}^{r_F} (1 - 0).\mathrm{p(S)}.g_i^S(\mathrm{r})\, dr$$

$$= \int_{r_P}^{r_F} p(S)\, .\, g_i^S(\mathrm{r})\, dr$$

$$= p(S). \int_{r_P}^{r_F} g_i^S(\mathrm{r})\, dr$$

= p(S) ………………...……(11)

The probability that a firm signaling “F” is offered r_F from both the inside and outside bank is 1 – p(S). Put differently, for $1 - p(S)$ of the firms with an F signal, they will borrow randomly from either the inside or the outside bank.

So the overall probability for a firm with an S signal to borrow from an outside bank is $\frac{1}{2}(1-p(S))+p(S)$, and the probability for borrowing from the inside bank is $\frac{1}{2}(1-p(S))$. A comparison of the two probabilities indicates that firms that signal “F” are more likely to borrow from the outside lender.

APPENDIX C

EMPIRICAL DESIGN IN CHAPTER 1

The choice of the lender may not be a random choice. We model this decision using a modified two-stage Heckman regression ((Li and Prabhala 2007))

$$\text{Aff\_Lender} = \begin{cases} 0, & Z_i\alpha + \eta_i \leq 0 \\ 1, & Z_i\alpha + \eta_i > 0 \end{cases}$$

$$\Pr(\text{Aff\_Lender}_{ij}) = \alpha_0 + \alpha_1 \text{UW\_Rank}_{ij} + \alpha_2 Controls + \eta_i \quad (5)$$

UW_Rank is the Carter-Manaster ranking (underwriter) of the underwriter. In the second step (Eq (8)), we model the spread on the loan (AISD) as a function of private information.

$$E(Spread_i | Aff_{Lender} = 1) = E[(\beta_0 + \beta_2 Controls + \varepsilon_i) \mid Aff\_Lender = 1]$$

$$E(Spread_i | Aff\_Lender = 1) = E[(\beta_0 + \beta_2 Controls + \varepsilon_i) \mid Z_i\alpha + \eta_i > 0]$$

$$E(Spread_i | Aff\_Lender = 1) = \beta_0 + \beta_2 Controls + E[\varepsilon_i | Z_i\alpha + \eta_i > 0]$$

Let $\varepsilon_i = \pi\eta_i + \nu_i$

$$E(Spread_i | Aff\_Lender = 1) = \beta_0 + \beta_2 Controls + E[\pi\eta_i + \nu_i | Z_i\alpha + \eta_i > 0]$$

$$E(Spread_i | Aff\_Lender = 1) = \beta_0 + \beta_2 Controls + E[\pi\eta_i \mid Z_i\alpha + \eta_i > 0]$$

$$E(Spread_i|Aff\_Lender = 1) = \beta_0 + \beta_2 Controls + \pi E[\eta_i \mid Z_i\alpha + \eta_i > 0]$$

$$E(Spread_i|Aff\_Lender = 1) = \beta_0 + \beta_2 Controls + \pi E[\eta_i \mid \eta_i > -Z_i\alpha]$$

$E[\eta_i \mid \eta_i > - Z_i\alpha] = \sigma_\eta^2 \frac{\phi(Z\hat{\alpha})}{\Phi(Z\hat{\alpha})}$

$= \sigma_\eta^2 \lambda_1$

$$E(Spread|Aff\_Lender = 1) = \beta_0 + \beta_1 \lambda_1 + \beta_2 Controls \quad (6)$$

Similarly, $E(Spread|Aff\_Lender = 0) = \beta_0 + \beta_1 \lambda_0 + \beta_2 Controls$ (7)

Where $E[\eta_i \mid \eta_i \leq - Z_i\alpha] = \sigma_\eta^2 \frac{-\phi(Z\hat{\alpha})}{1-\Phi(Z\hat{\alpha})}$

$= \sigma_\eta^2 \lambda_0$

We can combine equations (6) and (7).

$$E(Spread|Aff\_Lender) = \beta_0 + \beta_1 \lambda_{Aff\_Lender} + \beta_2 Controls \quad (8)$$

$$\lambda_{Aff\_Lender} = Aff\_Lender\, \lambda_1 + (1 - Aff\_Lender)\, \lambda_0$$

The inverse Mills ratio term (λ_{Aff_Lender}) that accounts for self-selection is equal to E(ηi | Lender Type), which is an updated estimate of the private information. Hence, by including the corrected key independent variable (λ_{Aff_Lender}), we are actually testing for relevance of private information. A positive coefficient on λ_{Aff_Lender} would suggest that private information has a greater explanatory power for firms that borrow from inside lenders than firms that borrow from outside lenders. In other words, it is plausible that lenders that possess private information on good firms can are extract rents in the near future.

APPENDIX D

SAMPLE CONSTRUCTION PROCEDURE FOR CHAPTER 2

SAMPLE CONSTRUCTION PROCEDURE FOR HYPOTHESIS “A"

Step 1: Select ALL IPOs from SDC that fulfill the following criteria

Dates: 01/01/1990 to 12/31/2012

Exclude

Closed-end Fund/Trust: Exclude All Closed-end Fund/Trusts

Depositary Issues Best Efforts

REIT Traded only on OTC Private Placements Foreign Firms

Penny Stocks (Offer Price <5)

Financial firms (SIC code between 6000 and 6999) and utilities (SIC code between 4900 and 4949)

Step 2: Aggregate number of IPOs by financial constraints (FC/NFC) and size in each state for a year.

Step 3: Merge the IPO data with state-level firm data from U.S. Bureau of Economic Analysis (BEA).

Step 4: Merge the above data with macro variables published by the Federal Reserve

SAMPLE CONSTRUCTION PROCEDURE FOR HYPOTHESIS “B"

Step 1: Select ALL IPOs from SDC that fulfill the following criteria

Dates: 01/01/1990 to 12/31/2012

Exclude

Closed-end Fund/Trust: Exclude All Closed- end Fund/Trusts and REIT

Depositary Issues

Best Efforts

Traded only on OTC Private Placements Foreign Firms

Penny Stocks (Offer Price <5)

Financial firms (SIC code between 6000 and 6999) and utilities (SIC code between 4900 and 4949)

Step 2: Collect initial returns data from CRSP and match with the IPO data from SDC by using the 6-digit CUSIP. In some cases, where first day closing prices are unavailable, I use the bid/ask price (denoted by a negative price in CRSP).

Step 3: I obtain firm characteristics from COMPUSTAT and merge it with the sample from step 2.

Step 4: I use the date of adoption of the IBBEA from Rice and Strahan (2010) and merge it with the sample from Step 3.

Step 5: The age of the frim from Jay Ritter’s website is incorporated in the sample