The Paradox of Liquid Loans*

Nada Mora † and Rhiannon Sowerbutts ‡

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Abstract

Banks have a reduced incentive to monitor when credit is dispersed because they do not ultimately bear all the credit risk, and this arises in settings such as multiple-bank lending syndicates or when there is a secondary loan market. We present novel evidence on long run borrower performance in favour of the view that the lead bank's monitoring effort, as reflected in its syndicate lending stake, matters. Greater retained interest materially lowers the probability that the borrower defaults and improves profitability and investment-grade status three years after syndication. And this positive effect is priced in by equityholders at the time a syndication is announced. The lead bank's exposure matters more for opaque and weak firms, as well as in times of loose credit standards as reflected in loans syndicated during booms. We illustrate how credit dispersion and transfer exacerbate agency problems in a simple theoretical framework. Monitoring incentives are diluted not only by the fact that each bank is not exposed to the full credit risk, but also by the fact that there are other banks who may potentially monitor. We also show that a situation where banks stop monitoring due to the ability to sell their credit risk in a secondary market is ultimately unstable, although it may be possible for banks to shirk in the short-run.

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*The views expressed in this paper are those of the authors, and not necessarily those of the Bank of England. This paper developed in discussions with Andy Haldane and we thank him for his insight. We are also grateful to Viral Acharya for helpful comments and suggestions. All errors are our own.

†The Bank of England. Email: nada.mora@bankofengland.co.uk

‡Universitat Pompeu Fabra. Email: rhiannon.sowerbutts@upf.edu

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1 Introduction

Developments in the financial system that have enabled credit risk to be spread have allowed financial intermediaries to be better diversified and welfare improved. But credit risk dispersion exacerbates agency problems between the borrower and the lender and between the informed lender and the uninformed outside investors. Only by committing part of its scarce capital into a firm, will a bank have sufficient incentive to carry out due diligence and monitor the borrowers who would otherwise pursue their private benefits at the expense of investing in high return projects. The credibility the bank gains from retaining exposure to the borrower encourages other participants to provide funds, relying on the monitoring effort of the informed bank. This leads to the paradox of liquid loans. Diamond posits that delegated monitoring means that the banks are not able to sell their loans, as the acquirer would have to incur the cost of monitoring again. In addition, adverse selection in the type of loan the bank chooses to sell contributes to the illiquidity in the loan sale market.

But banks are now selling their loans, or at least were until July 2007[1]. For example, the credit derivatives market rapidly expanded from $1 trn outstanding in 2000 to $20 trn outstanding in 2006. And syndicated loan issuance in the US increased from $150 bn in 1987 to $1.7 trn in 2006. We, therefore, ask whether the insurance provided by a credit risk transfer market dampens the incentive of banks to assess and monitor the loans they originate (Bank of England [3]). Schumpeter [27] articulates this view eloquently, "...the banker must not only know what the transaction is which he is asked to finance and how it is likely to turn out but he must also know the customer, his business and even his private habits, and get, by frequently 'talking things over with him', a clear picture of the situation." Has this, however, become redundant as information is easier to collect at arm's length and hard information substitutes for soft information? Or does the ongoing financial crisis point to an endemic problem of lax credit standards bolstered by liquid secondary credit markets? Schumpeter goes on to say that "...traditions and standards may be absent to such a degree that practically anyone can drift into the banking business, find customers, and deal with them according to his own ideas... This in itself...is sufficient to turn the history of capitalist evolution into a history of catastrophes." We will have to wait until the

[1] Recent evidence of "disarray" in syndicated loan market was reported in the *Financial Times*, 3/2/2008, describing the failure of the banks backing a buy-out of Harrah's entertainment to syndicate $14bn of the debt.

dust settles from the homes of repossessed US sub-prime households to see whether this will have a material effect on financial intermediation.

This paper is divided into two parts. In the first, we place the incentive problem facing banks in a theoretical framework. We then take up an empirical analysis of credit risk-sharing in lending syndicates where credit is dispersed among the lead and participant banks. Our paper contributes toward understanding whether the exposure of the lead bank matters for the long run performance of the borrower. In contrast, most of the literature has focused on lending structure, pricing and short run equity reactions. There is strong support for the hypothesis that borrower performance is increasing in the interest the lead bank takes in a borrower, whether performance is measured by defaults or other long run measures of profitability and investment-grade status. This is corroborated with short run evidence from the equity market's response. The asymmetric information effect we find is economically larger and statistically significant when we instrument the lead bank's share. We also find that lower costs of monitoring help to offset the negative effects from lower lead exposure, such as when the lead bank is also based in the US or when the borrower's industry is better known. A lead bank with a greater reputation is also associated with improved performance. Lead exposure matters more for firms that are opaque or performing poorly. And interestingly, loans originated in boom times perform worse but to a lesser extent the greater the stake the lead bank retains in the borrower.

The empirical results support the theory, where we illustrate free-riding among banks in a simple strategic setting. Monitoring incentives are diluted not only by the fact that each bank is not exposed to the full credit risk, but also by the fact that there are other banks who may potentially monitor. And we go on to show that when banks can trade their loans in a secondary market with uninformed outsiders, it may be possible for them to shirk as long as the market believes that they are monitoring. This is clearly not sustainable in the long run, and sunspots can cause shifts between monitoring and not-monitoring regimes. Illustrative evidence from the US sub-prime market provides support for this view: Figure 1 plots deliquencies against the price of secondary market sub-prime loans. Even though delinquency rates rose from the middle of 2006, the price response only picked up pace in March and April 2007, as the secondary market abruptly changed its beliefs. Liquidity has since dried up and prices have fallen further by more than 70%.

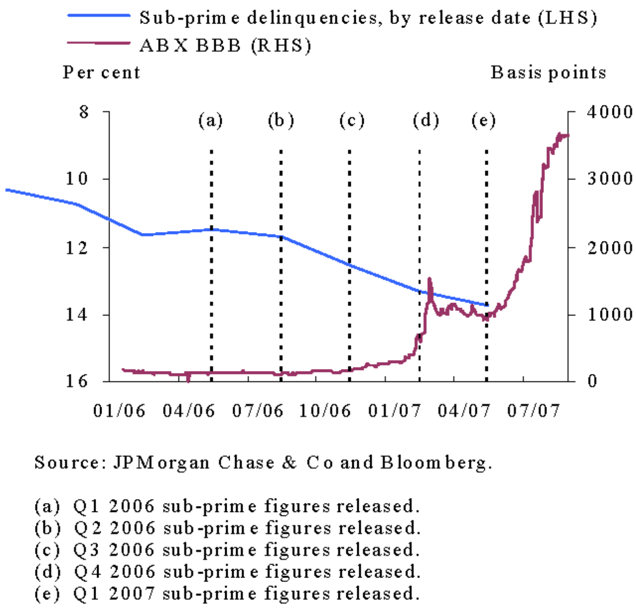

Figure 1: US Sub-Prime Delinquencies and Secondary Market Prices (ABX BBB index)

2 A Review of the Related Theory

Monitoring by many small investors is either inefficient (there is duplication) or possibly infeasible (the private benefit outweighs the cost so that in equilibrium there is no monitoring). Banks traditionally got around this problem by holding the loan, exposing the bank to the full credit risk, and monitoring on behalf of their depositors.. The delegated monitoring theory of financial intermediation (e.g. Diamond [10]) posits that banks have a comparative advantage in monitoring activities. Scale economies in monitoring (e.g. a fixed cost), small investors relative to the size of the investment project, but also low costs of delegation are among the sources of comparative advantage for the bank. Monitoring the delegated monitor is not necessary so long as the monitor is adequately diversified. Atomistic non-monitoring investors are effectively free-riding off the bank's monitoring effort in, for example, the Gorton and Pennacchi [17] framework when the bank sells part of the loan. They undertake no monitoring themselves and their returns are entirely determined by the lead bank's monitoring effort. A similar idea occurs in the seminal Holmstrom and Tirole model [19]. The holders of market debt 'free-ride' off the bank's monitoring effort. Once they know the bank is monitoring and has invested sufficient capital then the outsiders invest. The bank's monitoring increases expected returns and benefits all other security holders as all security holders are paid back equally, regardless of whether they monitored or not.

There is a considerable literature on the costs and benefits of banks' use of credit risk transfer markets. An early paper is Gorton and Pennacchi [17] who show that a bank, which seeks to sell its loan to alleviate capital constraints, retains part of the loan to maintain monitoring incentives. But its level of monitoring is reduced. Dewatripont and Maskin [9] show that this dilution of the initial bank's monitoring effort may be beneficial because unprofitable projects no longer get funded (but multiple creditors can also stop funding for profitable but slow projects).

More recent papers have focused on the adverse selection problem arising when banks use their superior information to off-load bad credits. Duffee and Zhou [12] and Morrison [23] find that credit risk transfer markets can lead to welfare reductions. For example, Duffee and Zhou [12] show that while credit derivatives make it easier for the bank to circumvent the 'lemons' problem, other markets for loan risk-sharing such as partial loan sales can break down when a credit derivatives market is introduced. More starkly, Morrison shows that credit derivatives destroy the certification value of debt and so the entrepreneur prefers to issue junk bonds and run a second-best project. Unlike Duffee and Zhou and Morrison, Parlour and Plantin [24] model the introduction of credit derivatives as endogenous. This means that a credit risk transfer market will only be liquid if adverse selection risk is sufficiently low so that a pooling equilibrium can be sustained, and banks use the market to partially insure against liquidity shocks. We explore their model in more detail in Section 3.2.

Another positive view on multiple-bank lending is offered by Carletti, Cerasi and Daltung [4], in an extension of the Diamond model. A key difference is that banks face limited diversification opportunities, so multiple-bank lending can ease banks' moral hazard problem with depositors. They suggest that multiple-bank lending can be optimal whenever the benefit of greater diversification in terms of higher overall monitoring dominates the costs of free-riding and duplication of efforts.

3 Information Asymmetry and Credit Dispersion: A Theoretical Framework

The shift away from relationship lending and toward arm's length financing means that credit risk will be increasingly dispersed. Credit risk dispersion, however, exacerbates two asymmetric information problems. The first is that between the lender and the borrower and the second is that between the lender(s) and uninformed or secondary market investors. As in Holmstrom and Tirole [19], monitoring the firm reduces the level of private benefits enjoyed by the firm and induces the firm manager not to shirk. The lender monitoring the firm, however, must be assured of a sufficient share of the firm's returns to cover the fixed monitoring cost. But when multiple banks share responsibility for monitoring the firm, the possibility of free-riding arises. Banks may choose not to monitor in the hope that another bank will monitor, and thereby, save the fixed cost of monitoring. Because of free-riding, the firm's project succeeds with a lower probability than its fundamental probability of success. We explore this case of pure-free riding in the next section in a strategic interaction between banks responsible for monitoring the firm.

A second problem exists when lenders with private information can transfer their credit risk in a secondary market, such as through loan sales or credit default swaps. Uninformed investors buying the credit in the second period do not know whether the lender is selling a lemon or has been hit with a liquidity shock and is selling a good loan. In equilibrium, the secondary market will only be liquid if the adverse selection risk is sufficiently low and banks are incentivised to monitor the firm by taking a greater stake in the project, as derived in Plantin and Parlour [24]. We show that it may be possible for a bank to shirk in the short-run by not monitoring and continuing to rely on a liquid secondary market that naively believes the bank is still monitoring. This is not sustainable in equilibrium. Sunspots can shift the market's belief, exposing banks to warehousing risk as liquidity dries up in periods following sunspots.

In a separate note[2], we combine free-riding and private information in a unified framework. The price in the secondary market now takes into account the fact that there may be more than one bank monitoring the borrower, and hence has acquired private information. A sale in the secondary market means that at least one bank is selling the loan. A critical assumption in our analysis is that the secondary market is anonymous, in that the market does not know whether the bank offloading the risk is an insider or an outsider[3], and it is also anonymous in size so that it cannot infer how much of the company's loans are being sold[4]. We show that, in this case, the secondary market price will be increasing in the num-

[2] Available upon request.

[3] However, a possible extension is to relax anonymity. We also intend to incorporate the possibility that banks can insure each other as well, and thereby avoid a market discount.

[4] For example, there was $12 bn of protection written on Delphi bonds via single-name and index CDS when it filed for bankruptcy in 2005, compared with $2 bn of bonds outstanding.

ber of banks. This is because the probability that any one of them suffers from a liquidity shock and has to sell increases. Another difference from a pure free-riding setting is that a bank may monitor even if the other bank(s) have monitored and ensured that the firm does not shirk. The reason for this is in order for the bank to get insider insider information (and there is empirical evidence of insider information in the CDS market, e.g. Acharya and Johnson [1]).

3.1 Limiting Case: Pure Free-Riding with No Second-Period Credit Risk Transfer

With no second period there is no possibility or need to sell claims on the secondary market. There is also no private information (that can be utilised). In this setup we model one firm borrowing from many banks. This could be in a syndicated loan or separate loans. In practice firms do borrow from several banks and the success of the bank's loan is ultimately the success of the firm. Therefore assuming that the banks' loans to the firm are perfectly correlated seems realistic. Banks are identical and make their decisions to monitor simultaneously and non-cooperatively. With fixed monitoring costs, paying any less than the cost, K, is ineffective. Threfore, a bank will choose to either monitor and pay K or not to monitor and pay 0. We assume that the firm's project has a positive net present value but that the project fails if the firm is not monitored. Monitoring increases the probability of the project's success from 0 to p and the project has a net return of R when it succeeds. We also assume that only banks can monitor the project, motivated by their comparative advantage. As the focus is on the banks' incentives we also do not focus on issues such as firm's assets or project size.

3.1.1 Mixed Strategies and Free-Riding

In this setup banks may choose not to monitor in the hope that another bank will do it, thereby saving themselves the fixed cost of monitoring. This can be illustrated as a game between two banks:

	monitor	not monitor
monitor	$\frac{pR}{2} - K, \frac{pR}{2} - K$	$\frac{pR}{2} - K, \frac{pR}{2}$
not monitor	$\frac{pR}{2}, \frac{pR}{2} - K$	$0, 0$

More generally, let n be the number of banks, z be the probability that someone else monitors, and s is the probability I monitor. Then:

$$
\begin{aligned}
z &= 1 - P(\texttt{no one else monitors}) \qquad (1) \\
&= 1 - (1-s)^{n-1}. \qquad (2)
\end{aligned}
$$

Fundamentals The 'fundamental' probability of a project's success is p. However, because of free-riding the project only succeeds with probability $(1-(1-s)^n)\,p < p$, which is below the fundamental probability of success.

Payoff from monitoring We can solve for s by comparing a bank's payoffs from monitoring and not monitoring. The probability that it monitors leaves it indifferent in equilibrium. Recall that the expected return on the project is pR, but this is distributed among the n banks. It also incurs a cost K from monitoring. So its payoff will be:

$$
p\frac{R}{n} - K \qquad (3)
$$

Expected payoff from not-monitoring

$$
z[p\frac{R}{n}] \qquad (4)
$$

The bank is indifferent between monitoring and not monitoring if:

$$
z = 1 - \frac{Kn}{pR} \qquad (5)
$$

$$
s = 1 - (\frac{Kn}{pR})^{\frac{1}{n-1}} \qquad (6)
$$

Note that s is decreasing in n.[5] The more potential monitors decreases the probability that I monitor. But the probability that *anyone* monitors, $1-(1-s)^n$ also falls. This can be seen from the probability that no one else monitors equalling $\frac{Kn}{pR}$, which is increasing in n.

It is interesting to compare this strategic setting with Diamond [10], where a bank only takes into account its own monitoring decision, and chooses to monitor with a probability of one when $p\frac{R}{n} - K \geq 0$ or $\frac{Kn}{pR} \leq 1$. However in a strategic setup, even if monitoring is privately profitable so that $\frac{Kn}{pR} \leq 1$, the incentives to free-ride mean that the banks may choose not to monitor. Monitoring incentives are, therefore, not only diluted by the fact

[5] Note that we assume that $\frac{pR}{n} - K$ (and hence z) is positive, because noone will monitor for sure otherwise. This also ensures that $\partial s/\partial n$ is negative in the feasible range for n.

that each bank is not exposed to the full credit risk but also by the fact that there are other players who may potentially monitor.

3.1.2 Efficiency

The free-riding non-cooperative outcome is not efficient. First, some projects are not funded that would have been otherwise funded if there was just one bank because of fixed costs. Projects are funded with one bank if $p^*_{one} \geq K/R$. In contrast, projects with n banks are funded only if $p^*_n \geq Kn/R > K/R$. Note that as n gets large, $pR/n - K$ becomes negative, meaning that noone will monitor and the project is not funded at all in this case. And second, projects fail that would otherwise have been successful because of free-riding. Recall that the probability the project succeeds is now $(1-(1-s)^n)\,p < p$, the fundamental probability of success. In addition, there is the possibility that monitoring effort is fruitlessly duplicated. As in the Diamond [24] framework, the efficient solution would be monitoring by a delegated monitor.[6]

3.2 Limiting Case: No Free-Riding but Private Information

In this section, we turn to another limiting case, which abstracts from free-riding problems but introduces the possibility that banks have an incentive to sell poorer quality loans to third parties when they have private information on them. The framework in this section, with respect to liquidity shocks and private information, borrows extensively from Plantin and Parlour [24]. The existence of a secondary market has an ambiguous effect on the incentive compatibility constraint of a bank in their paper. The opportunity for the bank to sell failed loans in the secondary market and shed some of its credit risk reduces its incentives to monitor. But for there to be a liquid secondary market for credit, banks cannot just be selling bad loans. A key benefit of a secondary market is that those banks suffering liquidity shocks are able to sell their existing loans. For example this liquidity shock could take the form of finding a better use of its funds, a capital requirements shock, etc. As in Gorton and Pennacchi [17] part of the motivation for the sale is a difference in financing costs. Therefore, the existence of a secondary market means that the bank does

[6] We analyse the introduction of reputation costs or of employing a rating agency to monitor the firm in a separate note, available upon request. Suppose that a bank suffers a loss of reputation when the project fails and no-one monitored the project. Intuitively, a reputable bank may still choose to monitor a project even if it is not financially viable because the cost of losing its reputation is greater. And the other banks will find it easier to free-ride in a partnership with a bank with reputational considerations. We also find that banks will be more likely to employ a rating agency when n is large and the comparative advantage of banks is small. But this is still not an efficient solution because the rating agency is a less effective monitor with a $p^{RA} < p$.

not have to worry about the liquidity shock, which discounts its second period cash flow. This makes it easier for the bank to meet the incentive compatibility constraint.

Plantin and Parlour show that the incentive compatible stake of the bank in the project rises in order to ensure that the bank continues to monitor in equilibrium. Where we contribute, is to show that it may be possible for banks to shirk in the short-run and stop monitoring even though this is not sustainable in the long run. Participants in the secondary market would eventually realise that banks are no longer monitoring and shift their beliefs, leading to a drying up of liquidity in the credit risk transfer market.

3.2.1 Assumptions and Time Line

We continue to assume that only banks can monitor the firm's project and that the project has a positive net present value if monitored but it fails otherwise. We introduce the possibility that banks are hit with liquidity shocks. As in the Parlour and Plantin framework, if a bank suffers a liquidity shock, this means that they may wish to sell the loan rather than holding it to maturity. These shocks are independent and identically distributed. For simplicity, we assume that firms and market outsiders do not suffer liquidity shocks. One key assumption is that monitoring not only increases the probability of the project's success, but also allows the bank to find out whether the project is successful or not. It therefore is a source of acquiring private information. Finally, because we abstract from free-riding, the focus is on one bank.

Time line

First period Banks originate loans and monitor the project (or not). As before, the project's fundamental probability of success is p. If the bank monitors, it obtains (perfect) information as to the future success of the project.

Second period The bank may be hit by a liquidity shock with probability q, that causes it to discount its second period cash flow by δ[7] and may also choose to reduce the exposure to the loan in some way.[8]

Third period Project returns are realised and returns are paid.

[7] This can be interpreted as wanting to ease capital/solvency requirements, or by having an alternative use for the capital, as in Parlour and Plantin.

[8] Either by selling the loan in an 'originate and distribute' model or by buying a CDS.

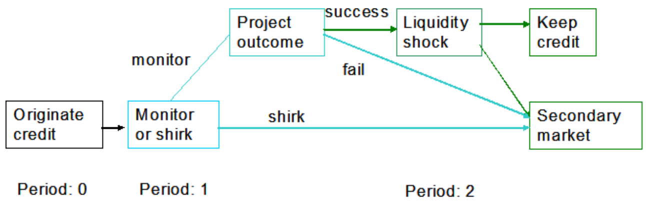

Figure 2: Timeline

3.2.2 Secondary market prices

Due to insider information there is a 'wedge' between the fundamental price of the security and its price on the secondary market, r. The market believes that monitoring is being undertaken *but* knows that it could still be sold a lemon so the price in the secondary market has an adverse selection discount, with $r \leq p$, the probability of a project's success. If the secondary market believes banks are monitoring, then the price of a security paying 1 if the firm does not default and 0 otherwise is:

$$r = \frac{pq}{1 - p + pq} \tag{7}$$

This reflects the fact that the secondary market price, r, is equal to the probability that the loan is successful given that it is being sold. The probability that a loan is successful and sold is equal to pq, while the probability that a loan is sold is equal to $(1 - p) + pq$, reflecting the combination of banks selling lemons and selling because of liquidity shocks. Note that if the bank did not acquire private information as to the success of the project as a side-effect of monitoring, then the price on the secondary market would be p. If there was perfect information in the secondary market then the secondary market would also know the project's success and be prepared to pay a price of 1 for successful projects and 0 otherwise. And finally, if the secondary market believes that banks are not monitoring: the price of the security will be 0, yielding an effectively illiquid secondary market.

Is learning the outcome necessary? The bank is equally well off in this situation if it did not find out in advance that the loan failed. The ability to sell bad loans is fully compensated for by the adverse selection discount in the secondary market. *However*, the existence of 'trusting' secondary markets allows the bank to shirk on monitoring and sell the loan as if it had monitored. We focus on the bank's tradeoff below.

Payoff from monitoring

$$p(1-q)R + (1-p)(1-q)rR + qrR - K \tag{8}$$

Payoff from not monitoring There are two cases, depending on the market's beliefs. If the market is aware or believes that the bank will stop monitoring, then the bank's payoff will be 0 as there is no secondary market. But if the market is not aware that the bank will stop monitoring, then the bank's payoff is rR. The existence of a secondary market that believes banks are monitoring weakens the incentives of a bank to monitor. This could also be interpreted as the bank and the firm colluding, by not monitoring, funding low quality projects and obtaining private benefits.

Banks do not monitor if:

$$p(1-q)R + (1-p)(1-q)rR + qrR - K < rR \tag{9}$$

$$\Rightarrow p(1-q)R(1-r) < K \tag{10}$$

Clearly, this situation is unsustainable in the long-run. However, due to the difficulties in determining whether a default was 'unlucky' or due to 'shirking', it may be sustainable in the short run.[9] Secondary markets would eventually realise that banks are no longer monitoring and shift their beliefs. This could be from observing higher-than-expected defaults or a rating agency downgrade. The regions where the bank shirks on monitoring are the 'unstable' regions, as shown in Figure 2.[10]

3.2.3 'Sunspots' and the Role of Secondary Markets

A sunspot can cause 'shifting' between regimes of monitoring and not monitoring, and between extending credit and not extending credit. Here a 'sunspot' is an event that coordinates the secondary market's beliefs to a belief that the banks have stopped monitoring.[11]. Examples include rating agency downgrades, high levels of defaults of similar credits, or discovery of fraud by a bank with similar characteristics.

[9]This could also explain why the sub-prime sector was so slow to react: a large level of defaults was expected anyway.

[10]Note that the secondary market naively prices the security at $r = \frac{pq}{1-p+pq}$ in Figure 2, so that the bank will not monitor when $\frac{p(1-q)(1-p)}{1-p+pq} < \frac{K}{R}$. These are the regions where the bank shirks (in blue).

[11]Derivations are available on request for the situation where the bank takes into account the probability that the secondary market may seize up. This makes it easier to ensure that monitoring is incentive compatible for the bank.

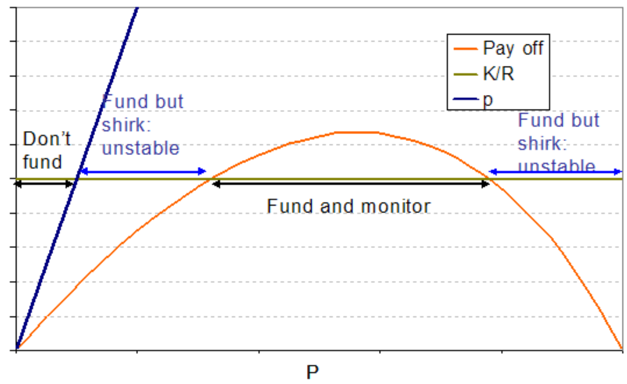

Figure 3: When credit markets believe banks are monitoring

If the secondary market believes that banks are not monitoring then only firms with $p > p^*_{ncrt} = \frac{K}{R(1-q+q\delta)}$ are funded, and the lack of a secondary market ensures these firms are monitored. Projects have to have a high probability of success to offset the probability of a large liquidity shock. Otherwise firms with $p{*}_{crt} = \frac{K}{R}$ are funded and monitored. The size of the unstable region is therefore $\frac{K}{R}\left(\frac{q(1-\delta)}{1-q+q\delta}\right)$ and increasing in q (the probability of a liquidity shock) and decreasing in δ (recall that a high value of δ is a small liquidity shock).

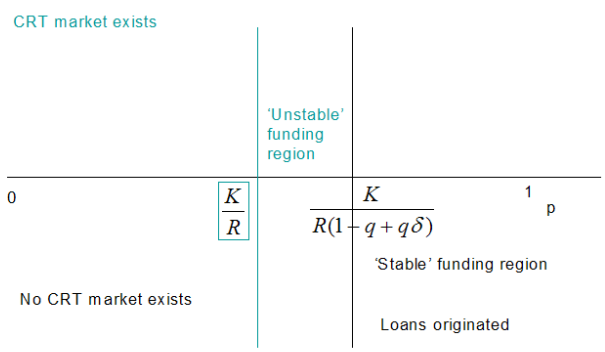

Figure 4: Funding projects: probabilities

Warehousing The timing in the model means that credits are originated in the first period with the expectation that the secondary market will still exist in the second period. However, there is a possibility that the bank will arrive into the second period suffering from *both* a liquidity shock *and* a 'sunspot'. The bank is left with a credit that it would like to sell on but the secondary market has 'dried up'.

3.2.4 Implications of a Secondary Market and Efficiency

We have seen that secondary markets allow banks to partially insure against liquidity shocks. Secondary markets, however, also allow banks to sell unsuccessful loans on the secondary market. As discussed in Plantin and Parlour, as long as the adverse selection risk is sufficiently low, a pooling equilibrium can be sustained and liquid secondary market will exist. One additional implication that the above analysis has shown is that banks may be able to stop monitoring certain credits altogether in the short run, and simply sell them on the secondary market.

The secondary market improves efficiency because it allows banks to extend credit that they would not otherwise be able to make because of a high liquidity discount. These credits still have a positive expected return but are riskier.[12] However, banks are unable to perfectly insure their liquidity shocks due to the adverse selection discount in the secondary market. This is compensated by the ability to sell 'lemon loans'. Expected returns are the same as if the bank had to fully disclose the outcome of the project before it is sold on the secondary market (because of risk neutrality).

Banks are also exposed to 'sunspot' equilibria. An ability to insure liquidity shocks and to re-sell the credit depends on the market's *belief* that banks are continuing to monitor. In this case, banks are exposed to 'warehouse' risk if the secondary market dries up. Even banks that monitored are unable to sell their loans on the secondary market and resolve their liquidity constraints. In periods following the 'sunspot' the bank and market behave as if there was no CRT.[13]

4 Information Asymmetry and Credit Dispersion: Does Lead Bank Exposure Matter?

One key aim of this paper is to test whether the lead bank's credit exposure to a borrower matters in influencing the borrower's long-run performance. As discussed earlier, the credibility the bank gains from retaining exposure to the borrower encourages other participants to provide funds, relying on the monitoring effort of the informed bank. This is empirically

[12] Alternatively it lowers the cost of credit to firms as a liquidity premium is no longer demanded.

[13] We also analyse the introduction of reputation costs in this private information setting in the Appendix. Intuitively, a static reputation cost reduces the bank's payoff from not monitoring and off-loading the loan in the secondary market. More interestingly, we endogenise reputation in a dynamic setting to capture the value of destroying access to the secondary market because of shirking. Banks which suffer liquidity shocks with high probability and large magnitude are more likely to continue to monitor as maintaining access to the secondary market for loans is more valuable.

supported in the work by Dennis and Mullineaux [8], Jones *et al* [21] and Sufi [28] who find that the lead bank retains a larger share when there may be signficant moral hazard problems and the borrower requires more monitoring in order to ensure a higher likelihood of project success.

Does this more concentrated syndicate structure, however, translate into better outcomes? Most of the existing literature has focused on short-run measures. Gorton and Pennacchi [17] support their theory on monitoring intensity with evidence of a negative relation between lead bank share and loan spreads using data on loan sales. Ivashina [20] and Focarelli *et al* [14] use data on loan syndications and find that the loan spread at origination is reduced the more the lead bank holds and therefore participant lenders accept a lower premium. Ivashina identifies this asymmetric information effect after capturing the concurrent rise in the premium demanded by the lead bank for the contribution the greater exposure makes to its overall loan portfolio credit risk. Ashcraft and Santos [2] study how this loan spread is affected by the introduction of a credit default swap on the borrower in the credit derivatives market. Just as banks have reduced incentives to monitor when they retain a lower share of a syndicated loan, so too can banks hedge their credit risk exposure by buying protection in the CDS market. The CDS market also has the advantage of offering an anonymous channel for the bank to reduce its risk. They find that while the loan (and bond) spreads of average firms are not affected by a CDS, there is a negative effect on the riskier and more opaque borrowers. Interestingly, the introduction of CDS trading on the borrower is associated with an explicit increase in the lead's share in the syndicate for riskier borrowers.

Focarelli *et al* [14]also find that the certification effect of the lead bank retaining greater exposure positively influences abnormal equity returns at the time of syndication. Therefore the benefits of the expected higher monitoring effort also accrue to equityholders outside the group of banks participating in the syndicate. Similar results are found in an earlier study on loan sales by Dahiya, Puri and Saunders [6]. Banks are found to give a negative signal about the borrower when a loan sale is announced, and the stock price of the firm falls.

Saunders and Gande [15] find mixed evidence on the incentives to monitor based on abnormal returns to new bank loan announcements in the presence of a secondary market for the borrower's loans. The positive effect of a new loan announcement is not smaller after the borrower's loan trades in the secondary market compared with before, suggesting that monitoring is not lower. But they also find that as the lead lender's stake in the loan increases, the positive equity reaction to a new loan is greater. Marsh [22]. approaches this question from the opposite side; he tests whether loan annoucements are still special if the *originating* bank is known to buy credit protection. He finds that new loan announcements by banks that are known to off-load their credit risk are no longer special. Banks are also found to use the CDS market to trade on their private information. For example, Acharya and Johnson [1] find evidence of information flows from the CDS to the uninformed equity market, and in particular for negative credit events and by non-lead banks (presumably, they have less of a disincentive not to make use of their informational advantage).

Scant evidence exists on whether greater lead bank exposure and the resulting higher monitoring effort materially raises the probability of project success. Is the long run performance in line with the positive certification inferred by the market in the short run? It is to this end that our paper contributes. The closest study addressing this question is by Dahiya *et al* who find that the negative certification at the time of a secondary loan sale is born out in the later poor performance of these borrowers. Many of the firms file for bankruptcy within three years of the loan sale, over 40% compared with 6% for firms in comparable industries, even though they are not the weakest firms at the time of sale. One limitation of their study is that their results may not be generalisable to less extreme credit risk transfer and dispersion markets such as loan syndications. Their focus is on the loan sales market, and their sample is dominated by subpar or distressed loans, where, as they note, information frictions are greatest. A second limitation of their study is the small sample of loan sales; although almost a half of the borrowers default within three years of a loan sale, this reflects 22 firms out of a loan sale sample of 53.

We examine a wide sample of borrowers with syndicated loans, relating their subsequent performance with the syndicate structure at the time of sydication. As do Dahiya *et al*, we focus on defaults as an indisputable indication of poor performance. Our measure of defaults derive from defaults on bonds as recorded by Moody's Default Risk Service Database. This is not as severe a measure as bankruptcy filings, but is presumably a negative outcome for equityholders and bank syndicate lenders in addition to the affected bondholders. And the lead bank's *ex ante* due diligence and *ex post* monitoring are intended to avoid such an event. We also examine other measures of long run performance both as a robustness check and because we were able to match less than a quarter of borrowers with bond defaults to those with loan syndications. Specifically, we look at the return on assets (EBITDA/assets) three years after syndication as well as the likelihood that the firm is rated investment grade. And we corroborate our results with the short run reaction of the stock market to the lead bank's stake in a borrower.

4.1 Empirical Framework

We relate a borrower's performance to the extent of the lead bank's exposure in the syndicate, with the latter proxied by the share of the loan held by the lead bank. We also use other measures such the number of leads, concentration of the syndicate as measured by the Herfindahl index and the exposure of the lead in dollar amount. These measures capture the null that there will be less monitoring when a credit risk transfer market is available compared with when no such insurance is available to the bank originating the loan. We interpret credit risk transfer broadly to encompass syndicates where credit is dispersed among the lead and participant banks. The advantage of using data on syndications is that the share retained by the lead bank is reported, albeit not for all deals. In contrast, there is little publicly available information on residual exposure from the use of credit default swaps or securitisations by banks. The basic specification we estimate takes the form of a probit:

$$\Pr(Default_{ij}) = f(\alpha + \beta(Lead\ Bank\ Exposure_i) + \gamma X_i + \theta Y_{ij} + Year\ Dummies + \epsilon_i), \tag{11}$$

where we are interested in the coefficient β, which is expected to be negative under the null: the greater the lead bank's exposure on loan i, the lower is the probability that borrower j with loan i defaults. We control for loan characteristics, X_i, for borrower characteristics at the time of syndication, Y_{ij}, and for syndication year dummies. Standard errors are heteroskedasticity robust, where we allow the individual loan error terms to be correlated for all loans of the same borrower.

We are also able to test other implications from the model outlined in Section 3.1. Scale economies in monitoring, small investors relative to the size of the investment project, and low costs of delegation are among the sources of a bank's comparative advantage in monitoring. Recall that for any of the n investors to have an incentive to monitor, we require that the fixed cost is sufficiently small: $K \leq \frac{pR}{n}$. There may be duplication of effort, but there is also a possibility of failure if noone monitors. We posit that the negative effects of lower lender exposure (and therefore a lower probability of monitoring), such as when n is large, will be less likely when the fixed cost of monitoring is small or when the expected net return on the firm's project is large. Higher expected return can be captured, for example, by the profitability of the borrower's industry.

Elements affecting the cost of monitoring include the opacity of the borrower, which has been captured in the syndicate structure literature with an indicator for public firms and firms with third party credit ratings. In addition, borrowers in younger industries or industries with less tangible assets and more R&D expenditures would require greater monitoring effort. A borrower will also be better known and less opaque if it has previously borrowed in the syndicated market. The cost of monitoring will also be less for a lead bank if it were a previous lead for the borrower. This "distance" of the lead bank to the borrower can also be captured literally if the two share the same country or state. One observation from the relationship lending literature (for example, Degryse and Ongena [7]) is that relationship lending is decreasing in the distance between a lender and a borrower. And Petersen and Rajan [25] attribute the increasing physical distance between US small businesses and their banks as a shift from relationship to arm's length lending, which has been facilitated by easier access to hard information. A third proxy of distance of a lender from a borrower is the informational investment the lender has made in the borrower's industry. One novel idea we test is whether the cyclical state of the economy affects the cost of monitoring, so that the cost of monitoring is procyclical. Suppose that recessions are cleansing and it is difficult for a low quality borrower to imitate a high quality borrower in bad times. But it is easier for this low quality borrower to masquerade as a high type in boom times, necessitating a higher effort on the part of the lender to discriminate. So we expect that loans originated in boom times subsequently perform worse. We evaluate each of these hypotheses below.

4.2 Data and Descriptive Statistics

We begin with a brief description of the data sources we use. Data on syndicated loans for US borrowers are collected from Loan Pricing Corporation's Dealscan, which covers the period from 1987 to the middle of 2007. We focus on deals where a ticker is available for the borrower (or the borrower's parent company) in order to merge the data with Compustat firm characteristics and Moodys information on bond defaults. This reduces the available sample from 79054 to 32841 loan deals. Descriptive statistics are shown in Table 1. The average loan size in the 1997–07 period is $623 million, with a loan spread of 185 basis points above LIBOR and a maturity of 44 months. There are 7.9 lenders, on average, forming a syndicate, of which 3.7 are in a lead role (of which, an even fewer number are lead arrangers) and 4.2 take a participant role. Some deals have more than a hundred lenders, with a maximum of 288 participant lenders and two leads on one deal.

The lead bank is defined as the bank recorded in Dealscan under "Lead Arranger", as does Sufi (2007). When there is more than one lead arranger on a deal, we calculate the lead's share as the average. There were up to 9 lead arrangers in our sample. The average share of the loan retained by the lead bank has gone down over time; 27.8% during 1997-07 compared with 30% over the sample. Table 1 also depicts various measures that we think affect monitoring costs. The average borrower in the sample had around 3.4 previous syndicated loans, and for roughly 40% of the deals, the lead bank had been a previous lead for the borrower. Note that when we have more than one lead arranger, the indicator takes the value one when any of the leads was a previous lead. A similar method is used to indicate whether the lead bank is in the same country and state as the borrower (Dealscan reports the geographical location of both).

The Dealscan data is merged with Compustat data for firm-level information, including profits (measured as EBITDA/assets), book leverage and size of assets. We also collect the investment-grade status of a firm from Compustat, which is used as one measure of long run performance. Borrowers and borrowers in industries with more tangible assets and less R&D expenditures will be less risky and opaque. We also posit that older borrowers and industries will be better known and require a lower informational investment. Compustat does not record the date of establishment of a company, so we proxy this using the first year when Compustat records information on a firm. The average age of a firm is roughly 25 years in the 1997–07 Dealscan-Compustat matched dataset.

We finally match Moodys bond defaults with the syndicated loan deals of a borrower. Moody's Default Risk Service Database records historical information on bond ratings and defaults for close to 26000 issuers (as of end-2007 update). Of these issuers, about 1200 record a default. Compustat CUSIP identifiers are recorded for some issuers in Moodys but it is not complete and has numerous errors. Therefore, we cross-checked and hand-matched defaulting issuers with matching firms in Compustat. We ended up with 894 unique defaulting firms (some of the defaulting issuers could not be matched and some issuers matched to the same company in Compustat). After obtaining the unique Compustat identifier, we merged the Moodys data with Dealscan. This resulted in matching only about 200 defaulting firms with 1426 loan deals in the sample (and 922 from 1997-07). A second constraint is that the share retained by the lead bank is not available for all deals in Dealscan as observed in Table 1. This translated into a usable sample of about 115 defaulting firms with information on their lenders' exposure on syndicated deals. We also assume that the remaining firms did not default[14]. Because of these data limitations on tracking defaults to lead bank's exposure at origination, we also run robustness checks on other long run performance measures.

4.3 The Lead Bank Makes a Difference

4.3.1 The Likelihood of Borrower Defaults

Table 2 presents probit estimates of our primary equation of interest, relating the share of a syndicated loan held by the lead bank to a borrower's likelihood of default at some point in the future[15]. We express the share retained by the lead bank in logs, as do Focarelli *et al* [14]. This captures our prior that increases in lead bank share from low exposures are expected to have a greater effect than an increase from high exposures, where a bank is sufficiently incentivised to monitor the borrower. Columns (1) – (5) are meant to be illustrative as they do not control for many loan characteristics. At a first pass, lead bank exposure does not appear to significantly affect the probability that a borrower defaults (column (1)). But lead banks are known to hold a larger share of the loans of riskier and more opaque borrowers (Sufi [28]), who are also expected to default more. We, therefore, include the spread on drawn funds for a loan deal in column (2), which captures the borrower's perceived risk. The loan spread depends on the lead bank share, with the asymmetric information effect pushing down the spread the more the lead bank retains. But the lead bank demands a risk diversification premium, which pushes the spread up. This has plagued the literature relating the spread to the lead bank's share in order to identify the asymmetric information effect (see Ivashina [20], for a novel instrument of lead bank share). By controlling for the loan spread in column (2), we can isolate whether a lead bank mitigates asymmetric information problems by retaining a greater share of the loan. The coefficient estimate is now significantly negative, providing support for our null that a borrower is less likely to default the greater the share retained by its lead. And the sig-

[14]Our results would be biased toward finding *no* effect for lead bank exposure if the firms that we assume not to default are contaminated with defaults.

[15]Results in the tables are presented for the last decade, from 1997-2007. Results are qualitatively similar for the period from 1987 when the Dealscan dataset begins, but are overall of a lower statistical significance (available upon request). This could be on account of sampling as more defaults are recorded later in the sample, but a more interesting explanation is that explicit lead bank retention of a borrower's loan has become necessary to incentivise the lead to monitor the borrower. There are implicit ties between banks and borrowers when relationship lending is dominant and the costs of monitoring are low. But as financial intermediation has transitioned from relationship to arm's length banking (see Boot and Thakor, 2000, and Rajan, 2005), the lead bank has to explicitly commit greater funds into the borrower's project to ease agency problems.

nificantly positive coefficient on the loan spread captures the borrower's riskiness and its greater chance of defaulting.

Nonetheless, there may still be some observable risk characteristics at the time of syndication that the loan spread is not fully pricing in. Therefore, the negative effect may simply reflect reverse causality in that a high default probability causes the lead bank to demand a lower share. We control for a number of loan and borrower characteristics in the following columns presented in Table 2. A more convincing test is to instrument the lead bank's retained share with a variable affecting the lead bank's exposure decision but which is not related to the overall riskiness of the borrower. Ivashina [20] constructs two such instruments. One is the contribution of the loan to the credit risk of the lead bank's loan portfolio and the second is a measure of the lead bank's lending limit. For example, a lower lending limit shifts the lead's diversification demand curve inwards, allowing the asymmetric information curve to be identified. We use this instrument, which is empirically proxied by the 75th percentile dollar size of the lead bank's share on its loans in the previous three years[16]. Our prior is that the instrument should help in identifying the asymmetric information effect, rather than working against the effect observed in column (2). This follows from the evidence in, for example, Sufi [28] that lead banks retain a larger share of the loans of riskier borrowers. And least squares regressions of the loan spread on the lead bank share have typically found a positive relationship, suggesting that the dominant effect is the positive association between an increase in the lead bank's share and its credit risk exposure.

The first stage regression is shown in column (3). The lead bank lending limit has the expected positive and significant effect on the share retained. We also include the deal amount, which has a negative effect on the share. Both results are consistent with Ivashina's. We also find that a higher loan spread is positively related to the lead bank's share, confirming our prior. The instrumental variables regression follows in column (4), and it substantiates the existence of asymmetric information. The effect is now economically more significant as shown in column (3) compared with column (5), where the lead share is not instrumented. The coefficients reported are the marginal effects evaluated at the mean of the independent variables (the mean lead bank share is roughly 30%, see Table 1). A marginal increase in the lead bank's share reduces the probability of default by 32% compared with 0.49% when not instrumenting. The economic association between the loan

[16]The credit risk contribution instrument is more difficult to construct and requires information about historical industry default correlations to construct a covariance matrix of the lead's existing loan portfolio.

spread and subsequent default is now greater and there is a negative association between the deal amount and default.

We report the results of more rigorous specifications in columns (6) through (8), where we control for year and industry dummies and loan characteristics from Dealscan in column (6) and also include firm characteristics from Compustat in columns (7) and (8). The lead bank share continues to exert a negative influence on the likelihood of default, although it is not significant at standard confidence levels when not instrumented. The instrumental variables estimate is significant at the 10% level, and implies a marginal reduction of about 16% when evaluated at the mean.

Most controls enter with the expected sign. In addition to a higher loan spread at origination being associated with a greater likelihood of a borrower's default, so too are indicators for whether a loan is secured or has a guarantor (though not significant). These measures capture the perceived riskiness of the borrower at the time of syndication, with lenders demanding collateral and guarantees in the event of a default. One surprising result is that rated borrowers are more likely to default, but this turns negative in the instrumental variables probit. The first stage regression reveals that the lead bank holds more of the loans of unrated borrowers, which is consistent with the prior literature describing syndicate structure. We also include indicators for loan purpose type. Firms with higher profitability (as measured by earnings to assets) at the time of syndication are less likely to default, while leveraged firms are more likely to default, but these are not statistically significant. Large firms, as measured by asset size, appear to be significantly associated with a higher likelihood of default but this is not robust to instrumental variables. The first stage regression documents a negative relationship between firm size and lead share. We also control for other factors such as the sales size of the firm at the close of the deal, whether the deal includes a term loan and whether there is more than one tranche on the deal[17] (see Sufi [28]). Results are not reported in the interest of space, but none of these measures are significant and the effect of lead bank share is robust to their inclusion[18].

The results presented in Tables 3 explore how factors affecting the costs of monitoring relate to borrower default. We test the hypotheses we outlined above in Section 4.1. We expect the cost of monitoring to be lower for a lead bank that was a lead on one of a borrower's previous syndications. This is shown to be the case in column (1) of Table 3.

[17]Results are also robust to including equity returns, market to book ratio, sales growth, tangible assets, age, a dummy for investment grade and industry dummies based on Compustat data.

[18]We don't include an indicator of senior loans because over 95% of the syndicated deals have senior status.

Borrowers that are better known because they have previously borrowed in the syndicated market are not found to be less likely to default (the coefficient on the number of previous loans is significantly positive). Column (2) looks at the lead bank's reputation and how much informational investment it has made in the borrower's industry. Borrowers with more reputable leads are less likely to default (reputation is proxied by the lead bank's market share in the previous year as in Sufi [28]). The cost of monitoring is expected to fall the more the lead has lent to borrowers in the same industry, and there is evidence to support this hypothesis. And the likelihood of a borrower defaulting is less when there are more borrowers in the same industry. This indicates that these borrowers are easier to monitor overall, regardless of the lead bank's information, because they are in better known industries by other syndicate lenders.

We examine other elements influencing the cost of monitoring in column (3). All borrowers in the sample are based in the US, but lead banks can be based outside the US. We find that when the lead bank is also located in the US, the probability of default decreases by 2%. Borrowers sharing the same state as their lead bank are also less likely to default but the result is not robust to including state dummies. Loans syndicated during upturns in the business cycle are more likely to default. But this effect is mitigated when a lead retains a greater stake in the borrower on loans syndicated during booms (column (5)). The instrumental variables probit is in column (7), where we include all these measures jointly. Significant cost measures are the lead's reputation, industry distance, and whether it was a previous lead for the borrower. Interestingly, the same country dummy and GDP growth at the time of syndication are no longer significant. However, they contribute indirectly to the lead bank's share: the lead keeps a greater interest in borrowers in their country and keeps less during upturns.

4.3.2 Long Run Profitability and the Likelihood of Investment Grade Status

In this section we turn to other measures of borrower performance in the long run as a robustness check on our results for defaults. As mentioned earlier, the matched default sample is a limited one. Moreover, default events may be endogenous in that they depend on the negotiation between the creditors and the firm. For example, when there are fewer lenders and the lead bank has a higher share, publicly observable default may be less likely because of private workouts and loan renegotiations. It is a mitigated concern in our study because we use bond defaults and bondholders are typically dispersed creditors. But it is important to test whether our hypothesis holds for a broader set of long-run borrower performance. Specifically, we focus on return on assets (EBITDA/assets) three years after syndication as well as the likelihood that the firm is rated investment grade, presenting results in Tables 4 – 6. As with previous regressions, we control for loan, firm characteristics and industry and year dummies. It is also important to control for the long run performance of comparable firms. We do this by including the borrower's industry median firm ROA three years after syndication. As expected, both the borrower's ROA at the time of syndication and the industry's long run performance are positively associated with higher ROA for the borrower. But column (1) of Table 4 shows that the share retained by the lead bank does not appear to positively influence return on assets (ROA) three years on. We instrument the lead share with the lead's lending limit in column (2) and the effect is now positively significant at the 10% level: a higher lead share improves long run profitability. The coefficient estimate implies that an increase in the lead share from the 25th to the 75th percentile improves the borrower's future performance by 0.08, all else fixed.

Theory also suggests that the lead bank's interest matters most for firms needing higher monitoring effort. We, therefore, ask whether the lead bank matters for improving the profitability of poorly performing borrowers. And we find support for this hypothesis in column (3): the coefficient on the interaction of a borrower's ROA at the time of syndication with its lead bank share is significantly negative, so that lead exposure (and presumably, its monitoring) is more important for weaker firms. The coefficient on the lead bank's share now enters with a significantly positive sign[19]. The negative coefficient on the interaction term means that a lead bank, holding the average lead share, will increase the future ROA of a firm starting out at the 25th percentile of ROA by 0.02 more than a firm starting out at the 75th percentile of ROA, all else fixed[20]. This is quantitatively large when comparing with an average ROA of 0.115 in this period. A similar result is obtained for the number of leads. A higher number of lead banks hurts the future performance of all firms (and not just the worst performing ones at the time of syndication). But as with the results for lead bank exposure, the impact is greater on firms with poor operating performance. For example, an increase in the number of banks in a lead role from the 25th to the 75th percentile (i.e., from 1 to 4 banks) on average worsens future ROA by 0.0012 (column (4)). But this increase adversely affects the ROA of a poorly performing borrower by 0.0068 more than a strong one (based on the interaction term in column (5)).

[19]The results are robust to instrumenting the lead bank share in the interaction specification.

[20]Note that the average lead share in the period from 1997 to 2007 was equal to 27.8% (or 3.02 in logs). And the 25th percentile for ROA was 0.077 compared with 0.164 for the 75th percentile ROA. Therefore the differential effect is equal to $-0.0825 \times (3.02) \times (0.077 - 0.164) = 0.022$.

Table 5 relates the cost of monitoring proxies to the borrower's profitability. As with the results on borrower defaults, profitability is positively affected by the lead bank's reputation (column(2)) and if the lead bank is also based in the US (column (3)). And borrowers who took out loans originated during booms perform worse in the future, controlling for GDP growth three years on (column (4)). We also find that this adverse effect is offset when the lead bank takes a greater stake in the loan during upturns, as shown in column (5). The coefficient on the interaction of lead bank share with year-on-year GDP growth at the time of syndication is positive, though not significant at standard confidence levels. The same-country dummy and GDP growth at the time of syndication are no longer significant when instrumenting the lead bank share (column (7)), but these two variables affect the lead bank's retained share, consistent with the results of the default probits. The instrumented lead share coefficient is 0.065, which compares with the coefficient in Table 4 (column (2)) and is statistically significant at the 10% level.

The next set of results are shown in Table 6, and these take the form of probit estimations for whether a borrower has an investment-grade rating status three years after syndication (based on Compustat rating information: data280). And these, too, support the conclusion that lead bank exposure matters for the borrower's future performance, as summarised by its rating. A marginal increase in the lead bank's share raises the probability that a borrower will have an investment-grade rating in the future by 16% (on a mean of 57.9%). We also control for borrower's investment-grade status at the time of syndication, and the share of firms in the borrower's industry that are investment grade three years later. Note that the instrumented lead bank share has a positive effect but is not statistically significant at standard confidence levels (column (2)). It is however significant at the 10% level over the full sample from 1987.

Lead bank exposure does not appear to be more important for subinvestment-grade borrowers compared with investment-grade borrowers (the interaction term in column (3) is not significant). In line with previous results, it is the number of leads and not the number of participants that matters. The greater the number of leads, the worse off is the borrower, and its magnitude is strengthened when controlling for the average share held by lead banks (column (4)). The signs on the dummy for same country and for GDP growth are aligned with our earlier results, but are not statistically significant. Other measures of monitoring (not reported) are also insignificant with the exception of previous loans which enters positively.

The results are robust to controlling for the rating dummies in the year of syndication.

These are nine rating dummies for AAA, AA,..., D. Degrees of freedom are reduced but the marginal effect on the lead bank share is roughly unchanged (equal to 14%). The coefficient on the lead share is also unchanged when we re-estimate the instrumental variables regression for profitability in Table 4, column(2) but including rating dummies (the sample of observations is reduced to 1050 compared with the original 1775). The coefficient remains 0.07 and is significant at the 10% level. A similar result holds when re-estimating the interaction of lead bank share with firm profitability (Table 4, column (3)). The lead's effect on the likelihood of borrower default is also robust (the instrumental variables effect in Table 2, column (8) remains 15% and even the non-IV effect is statistically significant and equal to 0.56%).

4.3.3 Equity Market Reaction to the Announcement of a Syndicated Loan

In this section, we focus on the short run response of the equity market to a loan syndication. The results are tabulated in Table 7. The market reacts more positively to news of loan syndications in which the lead bank retains a greater share of the loan. We take the loan announcement date to be the earliest of the set of dates recorded in Dealscan (these are deal active, completion, deal input, closed and launch dates) following Saunders and Gande [15]. We then calculate abnormal returns in the event window as $AR_{jt} = R_{jt} - (\hat{\alpha} + \hat{\beta} R_{mt})$, where R_{jt} is the rate of return for the stock of borrower $j$on day t, and R_{mt} is the rate of return on CRSP's dividend-inclusive value-weighted market index (of NYSE, AMEX, and NASDAQ stocks) on day t, which is the market return also used by Saunders and Gande [15]. We generate estimates for α and β by regressing R_{jt} on R_{mt} in the period $T_0 - 150$ to $T_0 - 30$, where T_0 is the announcement date in the daily CRSP sample spanning 1997 to 2006. The regressions reported in Table 7 present the results for abnormal returns on the day after the syndication announcement, which elicit the greatest response (as in Focarelli *et al* [14], and Saunders and Gande [15])[21].

The coefficient on the lead bank's share in column (1) is statistically significant at the 1% level and equals 0.19%, implying that a bank retaining the 75th percentile share has a 0.226% higher abnormal return the day after the syndication announcement compared

[21]Regressions are also estimated after trimming the top and bottom 5% of the dependent variable (these are -4.5% and 5.1% abnormal returns; similar results are obtained when trimming the top and bottom 2.5%). This is to avoid results driven by outliers in the dependent, which vary greatly as observed in Table 1 (mean abnormal returns are 0.126%, with a range from -38% to 77%). For example, the number of participants appears to have a strong significant negative effect on abnormal returns (but not the number of leads), but this effect is not robust to removing these outliers.

with a bank retaining the 25th percentile[22]. The magnitude of this coefficient is unchanged and is statistically significant at the 5% level when firm controls are included. These are profitability, leverage, and size as in the previous tables. They are lagged to ensure that there is no contemporaneous correlation with equity returns, but this is not material. The results, therefore, provide more evidence in favour of the ameliorating influence of lead bank exposure on a borrower's performance. And this positive effect is priced in by equityholders at the time a syndication is announced. The results are also in line with those of Focarelli *et al* [14] who document a similar result for their sample of borrowers from over 80 countries. They find a somewhat larger effect, but this would be natural in a sample of firms that include many from outside the US, where opacity problems are expected to be greater[23]. The results also resonate with the classic results of James (1987) and Lummer and McConnell (1989) who find support for the specialness of bank loans.

Other measures influencing the cost of monitoring that we explored earlier are not associated with a significant equity response[24]. While there is a positive response when the lead lender is in the same country as the borrower (or same state) and there is a negative response during boom times, these results are not significant at standard confidence levels. The lead bank's reputation does not elicit a positive response, indeed, the coefficient is negative albeit insignificant. Industry characteristics influencing expected project returns and costs of monitoring generally enter with the expected signs but are also insignficant. Borrowers with a higher number of previous syndicated loans have a positive equity response. More interestingly, lead banks taking a greater stake in borrowers with few previous loans draw out a more positive equity market reaction. For example, the coefficient on the lead bank share increases from 0.18% to 0.22% when narrowing the sample to those borrowers with at most one previous loan in the syndicated market. This highlights the importance of lead bank exposure for less known borrowers. This is mirrored in the results for unrated firms. The coefficient on lead bank share for unrated borrowers rises to 0.33% in column (3) compared with only 0.09% for rated borrowers (rated borrowers elicit 0.91% higher abnormal returns, regardless of lead bank interest).

Finally, a higher number of leads elicits a negative equity market reaction, as shown in

[22]The 75th percentile of lead bank share during the 1997-2007 sample is 36.7% (3.596 in logs) compared with 11.1% (2.407 in logs) for the lead bank share at the 25th percentile (see Table 1). The comparative effect is therefore, $0.0019 \times (3.596 - 2.407) = 0.00226$.

[23]Further, they allow the standard errors of loans to be correlated for all borrowers in the same country. But it is important to cluster standard errors not only on the country but also on all the loans by the same borrower. Therefore, our results provide additional support for a statistically significant effect.

[24]These results are not reported in the interest of space, but are available upon request.

column (4). These results are significant at standard levels of significance when proxying syndicate concentration with a Herfindahl index, which enters with the expected positive sign. When controlling for the lead bank share or the Herfindahl index, the negative reaction to the number of leads is greater and implies a 0.02% lower abnormal return when the number of leads increases by one bank. As with borrower defaults, it is the number of leads that matters and not the number of participants, which is line with the theory that uninformed participants rely on lead banks to carry out ex ante due diligence and monitor the borrower.

4.3.4 Adverse Selection or Moral Hazard?

We have so far uncovered evidence of the asymmetric information effect and shown that it matters for long-run borrower performance. It is more difficult to make out whether the identified effect reflects private and *unobservable* information that the lead bank gained from its *ex ante* assessment of the borrowers or whether the lead bank gains access to private information about its borrowers *ex post* and over the duration of the loan. In the first case, there is the problem of adverse selection in that the lead bank has the incentive to syndicate poor loans. In the second case, moral hazard means that the lead bank makes an active contribution to the performance of the borrower when it is sufficiently incentivised to monitor the project. We have therefore used the term "monitoring" in its broad sense when discussing the empirical results.

Isolating an active bank decision that comes with the lead having a greater lending share can help to support the moral hazard view. We expect there to be a greater sensitivity between refinancing decisions and future performance when the lead bank *initially* took a greater stake[25]. The literature on the benefits of bank debt points out that borrowers are better able to access the liquidity they need when they run into difficulties and are in an informed bank-finance relationship. We are working on tracking borrower-lead syndicate relationships dynamically in order to test whether previous effort by the lead bank matters for its current decisions and the borrower's future performance. There are two dimensions to this test. First, deals on which the lead was a previous lead should have a greater sensitivity with future performance than deals on which the lead was not a previous lead. Second, conditional on refinancing with the same lead(s), deals with a higher previous lead share should perform better than deals with a lower previous lead share.

A preliminary step in this direction is presented in Table 8. We focus on deals whose

[25]We thank Viral Acharya for this suggestion.

loan purpose type was refinancing. Therefore, the sample size is reduced. The dependent variables are the likelihood of default, profitability, likelihood of investment grade rating, and short-run abnormal equity returns, respectively. A larger lead bank share is associated with a greater economic sensitivity with future performance as well as higher short-run abnormal returns. For example, the marginal effect on lead share is 1.4% compared with 0.65% in Table 2. Abnormal returns are twice as sensitive to lead bank share on refinancing deals compared with all deals. But we are still inferring from contemporaneous deal information that the lead bank was previously involved with the borrower when it is a refinancing deal type. We intend to get a better picture from explicitly accounting for dynamics.

5 Conclusion

We uncover evidence of information asymmetry in the syndicated lending market, in a manner consistent with the theoretical framework outlined in Section 3 and the related theory on agency problems. Borrower performance depends on lead banks and *not* uninformed participants banks. Moreover, what matters is the lead bank's exposure to the borrower, so that the lender applies higher monitoring effort when its capital at stake is greater. A limitation of the Dealscan data on syndications is that the exposure is recorded at origination of the loan, and does not indicate how this share varies over the duration of the loan. Jones *et al* [21] have access to such data from SNC examiner-based credit quality data, and find that asymmetric information continues to matter after origination. Esty and Megginson [13] and Gande and Saunders [15] also state that lead banks rarely sell their loans so as not to negatively affect the relationship with both the borrower and other syndicate participants. This means that the lead bank will not be likely to shirk in the presence of a secondary loan market, even if other syndicate participants exploit the secondary market to reduce their exposure. We also expect that other credit dispersion and transfer markets will be more prone to information failures, both stemming from moral hazard and adverse selection. Markets such as securitisations and CDS are more opaque and anonymous. For example, Downing *et al* [11] find a lemons problem in the mortgage-backed securities market. The underlying pools chosen to back multi-class securities produce lower rates of return compared with those selected for single-class securities.

The focus of the empirical section was on exposing whether and how monitoring effort improved project return. This should also produce a higher secondary market price, and in particular for those loans whose returns are more sensitive to the lender's monitoring effort and are less prone to private information use. An additional implication of the Plantin and Parlour model is that banks with more outside opportunities (i.e. those hit with liquidity shocks) will be less likely selling because of private information. And they illustrate with how a CDS market develops endogenously as banks are faced with tighter capital or liquidity constraints, such as when Basel 1 was introduced. We did not analyse bank characteristics[26] formally to test these ideas. But one insight from this theory relates to how banks' funding constraints vary over the business cycle. If boom times are times when outside opportunities are greatest, then the secondary market price should be also be higher. But good times will also be associated with a higher cost of monitoring and therefore a lower price. The empirical evidence in Section 4 leans in favour of the latter view, but this merits more research.

We also intend to explore the sustainability of selling lemons in future work. We expect to see some switching and jumps in the secondary market, as we move across regimes of 'monitoring' and 'not monitoring'. This was illustrated for the sub-prime case in the introduction, and should be relevant for earlier events like Enron. The response to a credit event should be greater for those firms affected. We also expect it to be more for firms with the same bankers as the affected firms, as it is the bank that loses its certification ability, not the firm.

It is important to finally emphasise that while the adverse effects of credit dispersion and secondary markets have taken center stage in this paper, this does not mean they are welfare-reducing. After all, these credit risk-sharing markets provide a form of valuable insurance for lenders as it frees up capital and enables credit expansion[27]. As Rajan [26] emphasises, this has meant increasing access to finance for firms and households as well as serving to decrease financial transaction costs. Moreover, Rajan and Plantin and Parlour argue that the shift from a relationship-based banking system to one of arm's length finance is endogenous and has been facilitated by technical, regulatory and institutional change. Rajan, nonetheless, offers a nuanced perspective on why financial developments may not have made the world safer. He argues that while banks are retaining first-loss positions (limiting moral hazard) and off-loading "plain vanilla" risks to outsiders (limiting adverse selection), they are specialising in their comparative advantage, which is in illiquid transactions. Moreover, they may be engaging in excessive risk taking because of

[26]With the exception of taking advantage of the geographical location of banks in the Dealscan data set.

[27]The positive link between active credit risk management and lending is supported in several recent empirical papers, including Cebenoyan and Strahan [5], Goderis *et al* [16], and Hirtle [18].

managerial incentives to take on tail risk and herd with other managers.

Appendix: Maintaining the existence of a credit risk transfer market with reputation

We add a 'reputation cost' of V[28] if the market finds out that the firm failed *due to the bank's failure to monitor the credit.* Alternatively this could be considered a probability of being discovered shirking on monitoring. Although observing the bank's monitoring effort is impossible ex-ante it may be possible to determine *after* the firm has failed.[29]

For simplicity this is set at a constant V. The bank will not monitor if:

$$p(1-q)R + (1-p)(1-q)rR + qrR - K \quad < \quad rR - V \tag{12}$$

$$\Rightarrow \quad p(1-q)R(1-r) < K - V \tag{13}$$

Reputational concerns can therefore induce the bank to continue monitoring.

In the set-up above and in section 3.2 the game is only played once. We now consider the bank's incentives to maintain access to a credit risk transfer (CRT) market. Note that the bank is better-off with the existence of a CRT (even for loans that would be monitored anyway) as it allows the bank to hedge against liquidity shocks by selling the loans to an outsider. If the bank suffers a liquidity shock δ is the new discount rate in the second period. The effective expected discount rate in the first period is $1 - q + q\delta = \beta$.

The difference in expected payoff in each period (ex-ante) when a CRT market exists (compared to when it does not) is

1. $p(1-q)R + (1-p+pq)rR - K - ((1-q+q\delta)pR - K) = q(1-\delta)pR$ for credits that would be originated anyway
2. $p(1-q)R + (1-p+pq)rR - K$ for credits that would not have been originated if a CRT market did not exist.

If V is the value of destroying access to the CRT market through shirking and being discovered then, under this framework

1. $V = \sum_{t=1}^{\infty} \beta^t q(1-\delta)pR$ where $\beta = 1 - q + q\delta$

[28]This could also be thought of as the cost of the secondary market for this bank's loans being shut off.

[29]Recent visual cases that come to mind are Enron's accounting fraud, and alleged chanelling of non-compete funds by Hollinger International executives, use of company private jets.

2. $V = \sum_{t=1}^{\infty} \beta^t p(1-q)R + (1-p+pq)rR - K$

Market participants do not require a commitment device to punish the bank for shirking. Having observed that a bank has stopped monitoring, market participants are no longer prepared to pay a 'monitoring' price as they would make an expected loss. Banks which suffer liquidity shocks with high probability and large magnitude are more likely to continue to monitor as maintaining access to the secondary market for loans is more valuable.

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Table 1: Descriptive Statistics

	Number	Mean	sd	Min	25 ptile	Median	75 ptile	Max
Syndicated Loan Characteristics, Dealscan, 97 - 07								
Spread on drawn funds (all-in-spread), basis points	21650	184.88	135.73	-95.00	75.00	162.50	255.00	980.00
Deal amount, US$ million	24174	623.00	1500.00	0.14	82.50	224.00	600.00	37200.00
Maturity, months	22336	43.745	25.656	1.000	18.000	44.000	60.000	366.000
Borrower sales size at close of deal, US$ million	22395	4170.00	15500.00	0.16	219.00	754.00	2670.00	549000.00
Secured	14770	0.722	0.448					
Guaranteed	24178	0.082	0.274					
Rated	24129	0.553	0.497					
Loan purpose type								
Working capital and corporate purposes	24177	0.482	0.500					
Acquisitions	24177	0.188	0.390					
Debt repayment	24177	0.149	0.356					
Backup line	24177	0.099	0.299					
Other	24177	0.083	0.275					
Syndicate Structure, Dealscan, 97 - 07								
Number of lenders	24135	7.894	8.959	1	2	5	10	290
Number of leads	24135	3.669	3.942	0	1	2	5	46
Number of participants	24135	4.225	7.031	0	0	2	6	288
Lead bank share of loan retained, in %, all sample	10196	30.041	23.69	0.00	12.00	22.20	42.80	100.00
in logs	10196	3.072	0.946	-4.605	2.485	3.100	3.757	4.605
Lead bank share of loan retained, in %, 97 - 07	5968	27.758	23.395	0.000	11.100	19.925	36.450	100.000
in logs	5968	3.016	0.789	-4.605	2.407	2.992	3.596	4.605
Lead bank retained amount, in US$ million	5968	86.9	187.0	0.0	27.4	45.0	83.4	7250.0
Overall syndicate concentration, Herfindahl	6232	0.240	0.239	0.000	0.080	0.146	0.328	1.000
Lead bank lending limit, in US$ million	21185	107.7	100.2	1.5	55.5	84.9	125.0	2052.0
Indicators of Monitoring Costs								
Previous Loans	24177	3.428	3.913	0.000	1.000	2.000	5.000	40.000
Lead was a previous lead (dummy)	23423	0.413	0.492					
Lead bank reputation, lead bank's market share in previous year	21846	0.063	0.078	0.000	0.003	0.024	0.111	0.323
Lead bank industry information, share of loans to borrower's industry in previous year	19668	0.279	0.222	0.000	0.113	0.241	0.371	1.000
Dealscan borrowers in same industry (2 digit) as the borrower	24059	0.036	0.026	0.000	0.014	0.029	0.051	0.113
Lead in same country (US) (dummy)	23383	0.934	0.248					
Lead in same state (dummy)	19374	0.162	0.369					
GDP growth, year-on-year in the quarter of syndication	23670	0.0297	0.0125	0.0023	0.0187	0.0313	0.0404	0.0473
Firm Characteristics, Compustat, 97-06								
Profitability (EBITDA/assets)	16875	0.115	0.250	-20.000	0.077	0.116	0.164	0.906
Investment Grade Status	10547	0.568	0.495					
Total assets, book value US$ million, in logs	17915	7.426	2.033	-6.908	6.065	7.349	8.772	14.449
Leverage, book debt/assets	17878	0.354	0.285	0.000	0.193	0.333	0.477	15.000
Age of firm, ln(1+years)	19315	3.245	0.558	2.398	2.773	2.996	3.871	4.043
R&D expenditures to assets	7891	0.034	0.079	0.000	0.000	0.010	0.035	2.190
Tangible assets (net) to assets	16766	0.322	0.248	0.000	0.111	0.262	0.504	1.000
Defaults, Moodys								
All sample, 1987-2006	32841	0.043	0.204					
1997-2006	24177	0.038	0.192					
Abnormal Equity Returns, CRSP								
1997-2006	16030	0.00126	0.03771	-0.38183	-0.01154	-0.00049	0.01120	0.76894

Table 2: Lead Bank Syndicate Exposure and the Likelihood of a Borrower's Default

Probit Estimation (the dependent variable is whether a borrower subsequently defaults on its bonds), 1997 - 2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Instrumenting with lead bank lending limit					
			1st stage	IV	Not instrumented			IV
Lead bank share, logs	-0.0037	-0.0065		-0.3249	-0.0049	-0.0028	-0.0019	-0.1596
	(1.18)	(2.52)**		(2.37)**	(2.32)**	(1.51)	(1.15)	(1.84)*
Spread on drawn funds		0.0050	0.1192	0.0422	0.0048	0.0035	0.0035	0.0204
		(4.73)***	(9.40)***	(2.61)***	(4.14)***	(2.09)**	(2.18)**	(1.99)**
Deal amount, logs			-0.3745	-0.1165	0.0023	0.0005	-0.0031	-0.0472
			(39.18)***	(2.31)**	(1.50)	(0.28)	(2.13)**	(1.91)*
Lead bank lending limit			0.0004					
			(2.33)**					
Secured						0.0002	0.0004	0.0002
						(0.06)	(0.10)	(0.07)
Loan with Guarantor						0.0048	0.0036	0.0020
						(0.51)	(0.46)	(0.26)
Maturity, logs						-0.0005	0.0009	-0.0099
						(0.25)	(0.55)	(1.51)
Rated						0.0081	0.0046	-0.0140
						(1.98)**	(1.26)	(1.38)
Purpose: corporate						-0.0065	-0.0076	-0.0402
						(1.31)	(1.69)*	(1.95)*
Purpose: acquisitions						-0.0083	-0.0077	-0.0156
						(2.26)**	(2.48)**	(2.45)**
Purpose: refinancing						-0.0049	-0.0052	-0.0099
						(0.99)	(1.33)	(1.82)*
Purpose: backup line						-0.0063	-0.0070	-0.0201
						(1.28)	(1.86)	(2.17)**
Profitability (ROA)							-0.0275	-0.0170
							(1.28)	(0.97)
Leverage							0.0108	0.0035
							(1.28)	(0.36)
Size, log of assets							0.0041	-0.0057
							(2.70)***	(1.07)
Dependent variable mean	0.0118	0.0116		0.0111	0.0111	0.0202	0.0276	0.0301
Number of loans	5870	5601	5219	5219	5219	2923	2136	1795
Pseudo R^2	0.01	0.04	0.51	0.08	0.04	0.19	0.28	0.31

Notes:
Coefficients reported are marginal effects evaluated at the mean.
Robust z-statistics in parentheses, with standard errors clustered on the borrowing firm.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Columns (6) - (8) also include year and industry dummies.
The omitted loan purpose type is other purpose.

Table 3: Costs of Monitoring and the Likelihood of a Borrower's Default

Probit Estimation (the dependent variable is whether a borrower subsequently defaults on its bonds), 1997 - 2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7) IV	(8) 1st stage
Lead bank share, logs	-0.0018	-3.65E-07	-0.0018	-0.0021	0.0043	-0.0010	-0.0587	
	(1.16)	(1.08)	(1.14)	(2.34)**	(1.35)	(1.41)	(3.80)***	
Spread on drawn funds	0.0032	7.20E-07	0.0032	0.0019	0.0020	0.0023	0.0073	0.1053
	(2.21)**	(2.36)**	(2.18)**	(2.30)**	(2.40)**	(3.28)***	(4.27)***	(4.19)***
Deal amount, logs	-0.0031	-3.95E-07	-0.0027	-0.0018	-0.0018	-0.0014	-0.0164	-0.2750
	(2.23)**	(1.37)	(1.89)*	(1.55)	(1.63)	(1.58)	(4.01)***	(15.24)***
Lead bank lending limit								0.0008
								(3.72)***
Secured	0.0001	9.27E-08	0.0008	0.0014	0.0013	0.0006	0.0005	0.0033
	(0.02)*	(0.12)	(0.23)	(0.52)	(0.50)	(0.31)	(0.56)	(0.10)
Loan with Guarantor	0.0032	dropped	0.0041	-0.0009	-0.0011	dropped	dropped	0.0116
	(0.46)		(0.53)	(0.24)	(0.31)			(0.30)
Maturity, logs	0.0011	2.59E-07	0.0008	-0.0004	-0.0005	-0.0001	-0.0032	-0.0560
	(0.78)	(0.86)	(0.48)	(0.37)	(0.43)	(0.14)	(3.25)***	(3.14)***
Rated	0.0041	1.71E-06	0.0045	0.0013	0.0011	0.0035	-0.0054	-0.0753
	(1.31)	(2.04)**	(1.26)	(0.48)	(0.43)	(1.59)	(2.56)***	(2.40)**
Purpose: corporate	-0.0077	-1.11E-06	-0.0079	-0.0139	-0.0134	-0.0075	-0.1258	-0.1986
	(1.90)*	(0.95)	(1.80)*	(3.46)***	(3.43)***	(2.27)**	(4.39)***	(2.97)***
Purpose: acquisitions	-0.0071	-9.33E-07	-0.0079	-0.0048	-0.0047	-0.0027	-0.0061	-0.1724
	(2.65)***	(1.74)*	(2.80)***	(2.20)**	(2.16)**	(1.40)	(3.78)***	(2.27)**
Purpose: refinancing	-0.0055	-5.66E-07	-0.0055	-0.0023	-0.0023	-0.0011	-0.0038	-0.1429
	(1.62)	(0.82)	(1.47)	(0.82)	(0.82)	(0.44)	(3.23)***	(2.09)**
Purpose: backup line	-0.0061	-6.75E-07	-0.0071	-0.0049	-0.0048	-0.0025	-0.0076	-0.2597
	(1.83)*	(1.21)	(2.01)**	(2.15)**	(2.08)**	(1.33)	(4.00)***	(3.47)***
Profitability (ROA)	-0.0246	-6.20E-06	-0.0249	-0.0186	-0.0189	-0.0130	0.0021	0.1269
	(1.28)	(2.11)**	(1.20)	(2.03)**	(2.12)**	(2.51)**	(0.53)	(0.99)
Leverage	0.0094	1.15E-06	0.0099	0.0085	0.0083	0.0041	0.0012	-0.0315
	(1.37)	(0.76)	(1.30)	(2.16)**	(2.14)**	(1.14)	(0.67)	(0.42)
Size, log of assets	0.0033	6.73E-07	0.0039	0.0023	0.0023	0.0017	-0.0027	-0.0618
	(2.38)**	(2.45)**	(2.58)***	(2.19)**	(2.19)**	(1.91)*	(2.58)***	(4.64)***
Ln(1+previous loans)	0.0038					0.0012	-0.0003	-0.0187
	(1.70)*					(0.92)	(0.36)	(0.98)
Lead was a previous lead	-0.0044					-0.0017	-0.0017	-0.0087
	(1.74)*					(0.98)	(2.20)**	(0.34)
Lead bank reputation		-5.24E-06				0.0001	-0.0340	-0.6349
		(2.25)**				(0.01)	(3.74)***	(3.81)***
Lead bank industry information		-2.43E-06				-0.0090	-0.0074	-0.0509
		(2.33)**				(2.66)***	(4.18)***	(0.76)
Share of borrowers in same industry		-1.97E-05				-0.0681	-0.0536	-0.4465
		(1.62)				(2.18)**	(3.47)***	(0.82)
Same country			-0.0147			-0.0167	0.0006	0.0590
			(1.74)*			(1.85)*	(0.56)	(0.79)
GDP growth, year-on-year				0.4049	0.9200	0.3404	-0.0648	-2.8860
				(3.61)***	(3.34)***	(4.37)***	(1.04)	(3.13)***
Lead bank share x GDP growth					-0.1756			
					(2.01)**			
Dependent variable mean	0.0276	0.0205	0.0277	0.0182	0.0182	0.0205	0.0208	
Number of loans	2136	2294	2132	3243	3243	2291	2259	2838
Pseudo R^2	0.29	0.38	0.28	0.25	0.26	0.33	0.39	0.53

Notes:

Coefficients reported are marginal effects evaluated at the mean.

Robust z-statistics in parentheses, with standard errors clustered on the borrowing firm.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Also included are industry and year dummies (year dummies are omitted when GDP growth at time of syndication is included).

The omitted loan purpose type is other purpose.

Table 4: Lead Bank Syndicate Exposure and Long Run Borrower Profitability

The dependent variable is the return on assets (EBITDA/assets) of a borrower three years after syndication, 1997-2007

	(1)	(2) IV	(3)	(4)	(5)
Lead bank share, logs	-0.0010	0.0734	0.0089		
	(0.42)	(1.68)*	(1.89)*		
Lead bank share x Profitability			-0.0825		
			(2.43)**		
Number of leads				-0.0004	-0.0034
				(1.65)*	(4.88)***
Number of participants				-0.00004	-0.0001
				(0.39)	(0.58)
Number of leads x Profitability					0.0261
					(4.46)***
Spread on drawn funds	-0.0011	-0.0078	-0.0011	-0.0031	-0.0030
	(0.59)	(1.49)	(0.59)	(2.72)***	(2.80)***
Deal amount, logs	0.0030	0.0251	0.0032	0.0045	0.0045
	(1.34)	(1.82)*	(1.51)	(3.04)***	(3.13)***
Secured	9.3E-06	0.0036	0.0002	-0.0046	-0.0032
	(0.00)	(0.74)	(0.06)	(1.76)*	(1.26)
Loan with Guarantor	-0.0061	-0.0099	-0.0060	-0.0055	-0.0050
	(1.25)	(1.45)	(1.23)	(1.53)	(1.40)
Maturity, logs	0.0023	0.0027	0.0022	0.0007	0.0009
	(1.29)	(1.13)	(1.25)	(0.49)	(0.66)
Rated	0.0057	0.0078	0.0046	0.0025	0.0013
	(1.52)	(1.45)	(1.24)	(0.96)	(0.53)
Purpose: corporate	0.0020	0.0154	0.0026	0.0012	0.0021
	(0.33)	(1.50)	(0.43)	(0.29)	(0.52)
Purpose: acquisitions	0.0048	0.0176	0.0058	0.00001	0.0018
	(0.72)	(1.64)	(0.86)	(0.00)	(0.41)
Purpose: refinancing	-0.0004	0.0102	0.0006	0.0018	0.0029
	(0.07)	(1.13)	(0.09)	(0.42)	(0.70)
Purpose: backup line	0.0062	0.0233	0.0067	0.0051	0.0055
	(0.95)	(1.84)*	(1.01)	(1.09)	(1.21)
Profitability (ROA)	0.3526	0.3608	0.6095	0.1792	0.1174
	(9.99)***	(8.63)***	(4.94)***	(4.31)***	(2.79)***
Leverage	0.0366	0.0476	0.0350	0.0321	0.0305
	(3.94)***	(2.99)***	(3.90)***	(4.31)***	(4.20)***
Size, log of assets	-0.0063	-0.0015	-0.0061	-0.0073	-0.0065
	(3.96)***	(0.46)	(4.00)***	(5.67)***	(5.72)***
Industry profitability, 3 years later	0.0546	0.0631	0.0531	0.0498	0.0494
	(2.15)**	(1.99)*	(2.10)**	(2.53)**	(2.55)**
Ln(1+previous loans)					
Lead was a previous lead					
Lead bank reputation					
Lead bank industry information					
Share of borrowers in same industry					
Same country					
GDP growth					
GDP growth, 3 years later					
Lead bank share x GDP growth					
Observations	1909	1775	1909	5045	5045
R-squared	0.35	0.37	0.36	0.25	0.27

Notes:
Robust t-statistics in parentheses, clustered on the borrowing firm.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Regressions are estimated after trimming the top and bottom 5 percentile of the dependent variable.
Also included are industry and year dummies. The omitted loan purpose type is other purpose.

Table 5: Costs of Monitoring and Long Run Borrower Profitability

The dependent variable is the return on assets (EBITDA/assets) of a borrower three years after syndication, 1997-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							IV	1st stage
Lead bank share, logs	0.0087	0.0104	0.0084	0.0088	0.0041	0.0097	0.0645	
	(1.86)*	(2.11)**	(1.79)*	(1.91)*	(0.72)	(2.03)**	(1.64)*	
Lead bank share x Profitability	-0.0813	-0.0900	-0.0824	-0.0819	-0.0842	-0.0873		
	(2.40)**	(2.57)**	(2.44)**	(2.46)**	(2.55)**	(2.57)**		
Spread on drawn funds	-0.0011	-0.0008	-0.0010	-0.0007	-0.0007	-0.0003	-0.0086	0.1193
	(0.57)	(0.40)	(0.54)	(0.40)	(0.37)	(0.17)	(1.50)	(6.77)***
Deal amount, logs	0.0031	0.0016	0.0029	0.0030	0.0030	0.0016	0.0200	-0.2859
	(1.45)	(0.67)	(1.35)	(1.42)	(1.42)	(0.67)	(1.74)*	(15.97)***
Lead bank lending limit								0.0006
								(2.72)***
Secured	0.0003	0.0008	0.0003	0.0002	0.0002	0.0010	0.0041	-0.0506
	(0.08)	(0.20)	(0.09)	(0.05)	(0.05)	(0.25)	(0.80)	(1.39)
Loan with Guarantor	-0.0056	-0.0054	-0.0052	-0.0050	-0.0049	-0.0037	-0.0080	0.0711
	(1.11)	(1.03)	(1.06)	(1.05)	(1.04)	(0.70)	(1.17)	(1.59)
Maturity, logs	0.0023	0.0018	0.0023	0.0028	0.0028	0.0025	0.0018	0.0067
	(1.29)	(0.94)	(1.27)	(1.55)	(1.57)	(1.26)	(0.79)	(0.32)
Rated	0.0043	0.0019	0.0041	0.0049	0.0049	0.0023	0.0069	-0.0322
	(1.15)	(0.47)	(1.10)	(1.31)	(1.31)	(0.57)	(1.32)	(0.90)
Purpose: corporate	0.0023	-0.0014	0.0034	0.0039	0.0040	0.0004	0.0106	-0.1541
	(0.38)	(0.22)	(0.56)	(0.64)	(0.66)	(0.07)	(1.16)	(2.54)**
Purpose: acquisitions	0.0058	0.0045	0.0065	0.0038	0.0040	0.0020	0.0134	-0.1712
	(0.86)	(0.65)	(0.96)	(0.56)	(0.58)	(0.28)	(1.25)	(2.71)***
Purpose: refinancing	0.0003	-0.0011	0.0014	-0.0011	-0.0009	-0.0027	0.0065	-0.1360
	(0.05)	(0.18)	(0.22)	(0.17)	(0.15)	(0.44)	(0.72)	(2.18)**
Purpose: backup line	0.0069	0.0052	0.0072	0.0071	0.0070	0.0066	0.0181	-0.1736
	(1.04)	(0.79)	(1.07)	(1.07)	(1.04)	(0.97)	(1.69)*	(2.51)**
Profitability (ROA)	0.6047	0.6188	0.6082	0.6053	0.6117	0.6060	0.3397	-0.0939
	(4.91)***	(4.95)***	(4.96)***	(5.03)***	(5.11)***	(5.01)***	(8.24)***	(0.50)
Leverage	0.0350	0.0370	0.0350	0.0335	0.0335	0.0349	0.0460	-0.1762
	(3.89)***	(3.90)***	(3.91)***	(3.79)***	(3.79)***	(3.72)***	(2.93)***	2.44)**
Size, log of assets	-0.0062	-0.0054	-0.0059	-0.0059	-0.0059	-0.0053	-0.0020	-0.0678
	(4.07)***	(3.33)***	(3.87)***	(3.85)***	(3.85)***	(3.29)***	(0.65)	(4.67)***
Industry profitability, 3 years later	0.0529	0.0470	0.0534	0.0603	0.0613	0.0555	0.0721	-0.2629
	(2.11)**	(1.77)*	(2.11)**	(2.41)**	(2.45)**	(2.12)**	(2.43)**	(1.34)
Ln(1+previous loans)	0.0019					0.0021	0.0028	-0.0116
	(0.90)					(0.91)	(0.92)	(0.58)
Lead was a previous lead	-0.0020					-0.0051	-0.0039	-0.0118
	(0.64)					(1.50)	(0.88)	(0.38)
Lead bank reputation		0.0532				0.0462	0.0784	-0.4819
		(2.80)***				(2.45)**	(2.66)***	(3.21)***
Lead bank industry information		-0.0057				-0.0073	0.0055	-0.1094
		(0.77)				(0.95)	(0.53)	(1.56)
Share of borrowers in same industry		-0.1432				-0.1285	-0.0955	-0.7417
		(1.78)*				(1.61)	(1.00)	(1.21)
Same country			0.0132			0.0048	-0.0075	0.1767
			(2.38)**			(0..73)	(0.70)	(2.48)**
GDP growth				-0.2414	-0.6999	-0.2470	-0.1299	-2.0656
				(2.19)**	(2.04)**	(2.09)**	(0.77)	(1.85)*
GDP growth, 3 years later				0.1812	0.1829	0.2470	0.4429	-2.4321
				(1.56)	(1.58)	(2.02)**	(2.50)**	(2.09)**
Lead bank share x GDP growth					0.1547			
					(1.32)			
Observations	1909	1620	1906	1909	1909	1618	1591	1591
R-squared	0.36	0.39	0.36	0.35	0.35	0.38	0.05	0.54

Notes:
Robust t-statistics in parentheses, clustered on the borrowing firm.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Regressions are estimated after trimming the top and bottom 5 percentile of the dependent variable.
Also included are industry and year dummies. The omitted loan purpose type is other purpose.

Table 6: Lead Bank Syndicate Exposure and Long Run Likelihood of an Investment Grade Rating

Probit Estimation (the dependent variable is whether a borrower has an investment grade rating three years after syndication), 1997 - 2007

	(1)	(2) IV	(3)	(4)
Lead bank share, logs	0.1603	1.0368	0.1429	0.1428
	(3.54)***	(1.32)	(2.44)**	(3.07)***
Lead bank share x Investment-grade			0.0291	
			(0.38)	
Number of leads				-0.0123
				(2.02)**
Number of participants				0.0031
				(0.81)
Spread on drawn funds	-0.1066	-0.2179	-0.1055	-0.1086
	(2.62)***	(1.89)*	(2.55)**	(2.66)***
Deal amount, logs	0.1269	0.3294	0.1277	0.1560
	(3.46)***	(1.75)*	(3.42)***	(3.79)***
Secured	-0.0274	-0.0567	-0.0273	-0.0162
	(0.36)	(0.72)	(0.36)	(0.22)
Loan with Guarantor	-0.1619	-0.1310	-0.1631	-0.1684
	(1.68)*	(1.25)	(1.69)*	(1.75)*
Maturity, logs	-0.0818	-0.0541	-0.0809	-0.0841
	(2.64)***	(1.57)	(2.60)***	(2.64)***
Rated	0.2173	0.3576	0.2176	0.1973
	(2.20)**	(2.50)**	(2.20)**	(2.01)**
Purpose: corporate	0.0633	0.0855	0.0657	0.0569
	(0.46)	(0.62)	(0.48)	(0.42)
Purpose: acquisitions	-0.1416	-0.1439	-0.1377	-0.1417
	(1.16)	(1.15)	(1.14)	(1.20)
Purpose: refinancing	-0.0472	-0.1461	-0.0455	-0.0537
	(0.42)	(1.07)	(0.40)	(0.49)
Purpose: backup line	-0.0767	-0.0367	-0.0730	-0.0875
	(0.58)	(0.27)	(0.55)	(0.67)
Profitability (ROA)	1.8030	2.0304	1.8028	1.8231
	(2.90)***	(3.03)***	(2.90)***	(2.95)***
Leverage	-0.1655	-0.0876	-0.1647	-0.1637
	(0.57)	(0.32)	(0.56)	(0.56)
Size, log of assets	0.0148	0.0782	0.0151	0.0197
	(0.45)	(1.22)	(0.46)	(0.61)
Investment-grade	0.7279	0.6661	0.6822	0.7343
	(10.32)***	(7.21)***	(3.57)***	(10.39)***
Industry investment-grade share, 3 years later	0.5548	0.5852	0.5538	0.5609
	(2.33)**	(2.31)**	(2.33)**	(2.31)**
Dependent variable mean	0.5788	0.5846	0.5788	0.5788
Number of loans	1142	1088	1142	1142
Pseudo R^2	0.61	0.59	0.61	0.61

Notes:
Probit Estimation, coefficients reported are marginal effects evaluated at the mean.
Robust z-statistics in parentheses, with standard errors clustered on the borrowing firm.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Also included are industry and year dummies.
The omitted loan purpose type is other purpose.

Table 7: Lead Bank Syndicate Exposure and Abnormal Returns

The dependent variable is the abnormal return on the equity of a borrower in the day following the announcement, 1997 - 2006

	(1)	(2)	(3)	(4)
Lead bank share, logs	0.0019	0.0019	0.0033	0.0015
	(2.67)***	(2.34)**	(3.14)***	(1.65)*
Number of leads				-0.0002
				(1.32)
Number of participants				-0.00001
				(0.21)
Spread on drawn funds	0.0002	0.0005	0.0006	0.0005
	(0.36)	(0.73)	(0.80)	(0.76)
Deal amount, logs	0.0002	0.0013	0.0013	0.0016
	(0.44)	(2.05)**	(2.19)**	(2.43)**
Secured	0.0010	0.0005	0.0005	0.0005
	(1.02)	(0.44)	(0.49)	(0.44)
Loan with Guarantor	0.0021	0.0016	0.0017	0.0016
	(1.91)	(1.31)	(1.39)	(1.31)
Maturity, logs	-0.0007	-0.0008	-0.0008	-0.0008
	(1.25)	(1.41)	(1.39)	(1.36)
Rated	0.0008	0.0015	0.0091	0.0014
	(0.77)	(1.32)	(2.41)**	(1.20)
Lead bank share x Rated			-0.0024	
			(1.99)**	
Purpose: corporate	-0.0006	-0.0026	-0.0026	-0.0028
	(0.21)	(0.82)	(0.84)	(0.88)
Purpose: acquisitions	-0.0011	-0.0037	-0.0037	-0.0039
	(0.34)	(1.10)	(1.09)	(1.14)
Purpose: refinancing	-0.0002	-0.0023	-0.0023	-0.0026
	(0.06)	(0.69)	(0.67)	(0.77)
Purpose: backup line	-0.0004	-0.0025	-0.0026	-0.0026
	(0.12)	(0.73)	(0.78)	(0.75)
Profitability (ROA), first lag		-0.0094	-0.0086	-0.0095
		(1.92)*	(1.76)*	(1.94)*
Leverage, first lag		-0.0011	-0.0009	-0.0010
		(0.38)	(0.32)	(0.37)
Size, log of assets, first lag		-0.0009	-0.0009	-0.0008
		(2.16)**	(2.18)**	(1.99)**
Number of loans	2954	2480	2480	2480
R-squared	0.02	0.03	0.03	0.03

Notes:
Robust t-statistics in parentheses, clustered on the borrowing firm.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Regressions are estimated after trimming the top and bottom 5 percentile of the dependent variable.
Also included are industry and year dummies. The omitted loan purpose type is other purpose.

Table 8: Adverse Selection or Moral Hazard?

Restricting the sample of deals to refinancing deals

	(1)	(2)	(3)	(4)
	Dependent variable:			
	Pr (Default)	Profitability	Pr(Investment Grade)	Abnormal Equity Return
Lead bank share, logs	-0.0139	0.0135	0.2773	0.0044
	(1.68)*	(1.90)*	(5.47)***	(2.17)**
Spread on drawn funds	0.0100	0.0044	-0.0685	-0.0013
	(3.64)***	(1.21)	(0.71)	(0.84)
Lead bank share x Profitability		-0.1043		
		(2.05)**		
Deal amount, logs		0.0025	0.2476	0.0015
		(0.59)	(2.85)***	(0.81)
Secured		-0.0128	-0.0009	-0.00002
		(1.90)*	(0.01)	(0.01)
Loan with Guarantor		-0.0095	-0.1816	-0.0006
		(0.81)	(2.07)**	(0.10)
Maturity, logs		0.0032	-0.2873	0.0031
		(0.72)	(3.06)***	(1.59)
Rated		0.0079	0.1663	-0.0005
		(1.17)	(1.39)	(0.15)
Profitability (ROA)		0.7020	2.9545	0.0246
		(4.46)***	(3.02)***	(1.46)
Leverage		-0.0026	-0.9964	0.0070
		(0.16)	(3.01)***	(0.89)
Size, log of assets		-0.0065	-0.0460	0.0003
		(2.17)**	(0.60)	(0.28)
Number of loans	1006	444	200	322
R-squared	0.04	0.33	0.79	0.09

Notes:
Robust t-statistics in parentheses, clustered on the borrowing firm.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Regressions for long-run profitability and abnormal returns are estimated after trimming the top and bottom 5 percentile of the dependent variable, respectively.
Also included are industry and year dummies. The omitted loan purpose type is other purpose.