What's Bank Reputation Worth? The Effect of Fraud on Financial Contracts and Investment

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Abstract

The risk of a reputation loss can provide an informal enforcement mechanism when contracts are incomplete. This paper provides evidence that reputation and formal incentives to monitor are substitutes in the context of syndicated credit. Monitoring in a loan syndicate is delegated to lead banks, whose formal incentives are determined by their share of the loan. Exploiting as a source of variation the reputation loss suffered by banks actively lending to firms subsequently involved in fraud scandals, we use within-firm estimators to show that monitoring banks face higher-powered contracts —higher loan shares— after a reputation loss. Despite the substitution towards higher contractual incentives, banks supply less credit and borrower financial policy and investment are affected, indicating that formal incentives are an imperfect substitute for reputation.

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I. Introduction

What drives banks' incentives to monitor is a long-standing question in research and policy on financial intermediation.[1] Assessing this question empirically gains importance as financial innovations —i.e., securitization, loan sales, loan syndication, CDSs— weaken the link between bank returns and borrower defaults, potentially diminishing banks' contractual incentives to monitor (see Keys, Mukherjee, Seru and Vig (2008), and Sufi and Mian (2009) for recent evidence). This paper explores the role of bank reputation as a non-contractual incentive mechanism to monitor.

The theoretical role of reputation in ameliorating moral hazard in contexts where contracts are incomplete has been highlighted as early as in Friedman (1962), Akerlof (1970), and Fama (1980). In the banking context, a financial institution's future cash flows from origination, information collection, and underwriting depend crucially on investors' belief that banks, both, possess an effective monitoring technology and are willing to use it on their behalf. If limits to contracting are severe, banks will have an incentive to invest to prevent events that can be associated with incompetence or misbehavior as a delegated monitor.[2] To date, however, the quantitative magnitude of reputation in financial markets remains unexplored.

This paper provides evidence that bank reputation can substitute for formal contractual incentives to monitor. It does so in the context of the syndicated credit market. Syndicated lending, in which two or more lenders provide funds to a firm under a common loan contract, provides a unique setting for analyzing reputation incentives to monitor. In a syndicated loan, one or more "lead" banks are responsible for monitoring the borrower, while the remaining "participant" banks provide part of the funding of the loan. The share of the funding provided by the lead bank is the sole source of contractual incentives to monitor. These two features simplify greatly the analysis of incentives and contracting relative to contexts in which the financial claims of the monitor and the principal differ greatly, or where contracts are complex

[1] For a survey, see Gorton and Winton (2002)

[2] Rajan (1994) points out a potential dark side to reputational concerns among lenders. These may lead to credit cycles that affect credit supply and investment, deepening economic downturns.

(i.e., debt versus equity holders). In addition, from a theory standpoint, the unobservability of monitoring, the limited contractual incentives, and the repeated nature of the syndication process give scope for reputation as a commitment device. From an econometric standpoint, syndicated loans allow implementing within-firm estimators discussed below.

To identify the role of reputation as an incentive device, we estimate the effect of a negative shock to a bank's reputation on the contractual incentives it faces in the syndicated debt market. We show in a simple theoretical framework that a reputation loss by a lender results in higher-powered contractual incentives in equilibrium when reputation and contractual incentives are substitutes. As a source of variation in lender monitoring reputation, we exploit the unprecedented series of corporate frauds that occurred between September 2001 and June 2002 in the U.S.. Beginning with the demise of Enron and culminating with that of WorldCom, at the time the largest corporate bankruptcy in history, seven high profile corporate frauds occurred during this short period.[3] The failure to detect, or unwillingness to report, the fraudulent activity that resulted in large scale investor expropriation had a potentially severe and unanticipated negative effect on the reputation of banks responsible for monitoring.

Our estimation method compares how the contractual incentives faced by banks whose reputation was tarnished changes after the fraud discoveries, relative to the contractual incentives to banks unaffected by the events. To account for potential confounding effects, we perform this comparison within the same firm. Our within-firm difference-in-differences estimator exploits two features of syndicated credit markets: 1) firms access syndicated credit markets frequently, and 2) syndicated loans have multiple lead arrangers as well as multiple participants. We compare —for the same firm— how the relative amount of lead to participant debt provided by banks that suffered a reputation loss changes with respect to those that did not. The within-firm estimator is consistent in the presence of changes in the extensive lending margin (composition of borrowing firms), and accounts for all firm-specific time series

[3] Aside from Enron and WorldCom, Adelphia Communications (4/2002), Arthur Anderson (11/2001), Global Crossing (2/2002), KMART (1/2002), and Qwest Communications International (2/2002) were involved in fraud scandals during this period.

variation, including changes in credit demand and creditworthiness, in the intensive lending margin. Accounting for potential changes in creditworthiness is particularly important in our empirical context, since corporate fraud is more likely to be discovered when borrower creditworthiness worsens.

Our results show that, conditional on participating as a lead arranger with monitoring responsibilities in a syndicated loan, banks that have their reputations tarnished take on larger loan shares. The change in contractual incentives is substantial: banks that suffer a reputation loss must increase their share of a loan by 10 percentage points, from a pre-fraud average of 30, when they participate in a syndicated loan as a lead bank after the fraud discovery. The findings suggest that monitoring reputation is a key determinant of monitoring incentives and that it substitutes for contractual incentives in the loan syndication market.

The stock returns of banks actively involved in monitoring the fraudulent companies suggest that the reputation losses are also associated with substantial bank value losses. For example, the portfolio of banks that issued new syndicated loans to Enron during the year before its fraud discovery experiences a negative abnormal return of 3% during the 20 days surrounding the announcement of the firm's bankruptcy, when compared to banks with no lending relationship to the troubled firm. The magnitude of the decline is twice as large for the banks directly responsible for monitoring as lead arrangers in the loan syndicates (J.P. Morgan Chase and CitiBank). The magnitude of the negative return is difficult to reconcile with banks' size relative to the potential direct losses due to the demise of Enron. Consistent with the monitoring reputation mechanism, the same group of banks were the target of lawsuits for alleged accounting irregularities, breaches in fiduciary duties, or negligence in monitoring and underwriting activities related to Enron.[4]

Our empirical setting allows us to explore further the real effects of non-contractual incentives to monitor through reputation. We employ the within-firm estimator in Khwaja

[4]Citigroup, for example, reported $1.66 billion in payments and $4.25 billion in forgone claims agreed upon to settle Enron-related fraud litigation in 2008, a large sum relative to the impairment write-downs of loans for $44 million in 2001. See Bloomberg.com article by Scinta, C.: "Citigroup Settles Enron Litigation for $1.66 Billion", March 26 2008.

and Mian (2008) to identify the effect of the reputation shock on the supply of credit. The estimator compares the amount of funding provided by affected and unaffected banks, before and after the fraud events, to the same firm. The estimates suggest that exposed lenders reduce substantially their credit supply after fraud is discovered. Lender participation in new syndicated debt drops by 38% during the year after the discovery of the Enron fraud when their reputation is affected.

Estimating the effect of the reputation shock on firm level outcomes, i.e., leverage or investment, requires stronger identification assumptions. To account for changes in investment opportunities, we compare outcomes of firms in the same industry, location, and size quintile, but that differ in the identity of their main lender. We show that although the flow of debt to firms whose main lenders were exposed and not-exposed to the reputation shock evolve in parallel before the Enron fraud is discovered, exposed firms' new syndicated credit as a fraction of assets drops by 0.8 percentage points (32% of the mean) during the two years after the Enron fraud discovery. The decline results exclusively from a reduction in lending by exposed banks. There is also evidence of debt substitution: non-exposed bank syndicated lending increases by 15% during the year after the shock and firm overall leverage does not change.

Despite the observed substitution, average loan spreads increase by 33 basis points after the shock (17% of the average). Also, firms increase the cash holdings in the medium run, and investment in fixed assets declines in the short run. These findings are in line with recent theoretical models that consider the role of corporate cash holdings as precautionary buffer stocks (Almeida, Campello and Weisbach (2004), Riddick and Whited (2008)). In particular, our results confirm the predictions in Bolton, Chen, and Wang (2009) that an exogenous increase in external financing costs induces cash hoarding and lower investment.

Existing evidence of the empirical relevance of firm reputation on contracts is focused on environments with severe contracting limitations.[5] Greif (1989, 1991), for example, argues that a reputation based mechanism mitigated agency problems among the eleventh-century

[5] See MacLeod (2007) for a recent survey.

Maghribi traders in the absence of law-based institutions. Banerjee and Duflo (p. 989: 2000) analyze the customized software industry in India, where "the legal infrastructure is widely seen as quite primitive, limiting the scope for contracts." Our results emphasize that reputation can play a significant role in shaping the economic behavior of agents in developed legal environments. Regarding external validity, it is likely that the role of reputation is potentially amplified in our empirical context, since financial markets are characterized by severe agency problems and complex contingent outcomes.

Prior work on the role of bank reputation on financial contracts explores the cross sectional correlation between bank reputation, proxied as bank market share or experience, and the characteristics of financial contracts.[6] Our central contribution is to show how contracts change when the reputation capital is depleted. The results also highlight a novel mechanism through which the banking sector can transmit and amplify real shocks. The traditional empirical work on the lending channel literature has focused on whether financing frictions exist.[7] The results in this paper highlight an important economic mechanism behind the transmission of shocks through the financial sector. Negative shocks can break down reputation as a source of non-contractual incentives and lead to a decline in the supply of capital and investment.

The rest of the paper proceeds as follows. Section II describes the empirical setting and provides a simple theoretical framework for the analysis. Section III describes the two estimation methods employed in the empirical analysis. Section IV describes the data sources and provides summary statistics. Section V presents the empirical results and Section VI concludes.

[6] See for example Fang (2005) and the references therein for studies on the correlation of bank market share with the price and quality of underwriting services. Similar references related to Venture Capital reputation can be found in Hsu (2004). In the context of syndicated lending, Sufi (2007) shows a (negative) correlation between bank market share and lead bank shares.

[7] For a theoretical treatment see Bernanke and Blinder (1988), Holmstrom and Tirole (1997) and Stein (1998). For evidence, see Khwaja and Mian (2008) and Paravisini (2008).

II. Empirical Setting and Framework

This section provides a brief description of the syndicated loan market characteristics, emphasizing those that make it an interesting laboratory to study the role of reputation in financial contracts. Then it provides an account of the corporate fraud events and their potential effect on bank reputation. Finally it provides a simple theoretical framework that delivers the implications of a lender reputation loss on the syndicated credit contracts.

A. Syndicated Lending

Syndicated credit is a common contractual arrangement in corporate capital sourcing, accounting for over 50% of the corporate finance in the U.S. during our sample period (Weidner (2000)). In a syndicated loan, two or more banks agree to jointly make a loan to a borrower under common terms and conditions. Members of the syndicate fall into one of two groups. The "lead arrangers" of the syndicate are responsible for assessing borrower creditworthiness prior to issuing the loan and monitoring the firm after the loan has been issued. The lead arrangers also negotiate the terms of the loan agreement, and administer the documentation, funding, and repayments. Lead arrangers collect an up front fee for these services. "Participant" banks in the syndicate provide funding with little or no direct contact with the borrower. After negotiating contract terms with the borrower, lead arrangers prepare documentation that contains information about the borrower's repayment prospects. Participants use this documentation to make a decision of whether to provide funding to the syndicate under the stipulated contract characteristics, and in which amount.[8]

There are three key characteristics of the syndicated loan market that make it an ideal laboratory for studying the role of reputation incentives in bank monitoring decisions. First, syndication reduces the lead bank's expected loss in case of loan default, in a similar fashion as securitization and loan sales do. As a result, syndication reduces the monitoring incentives

[8] See Dennis and Mullineaux (2000), François and Missonier-Piera (2007), and Sufi (2007) for a more detailed description of the syndicated credit market. For theory on syndication, see Wilson (1968), and Pichler and Wilhelm (2001).

relative to standard single lender credit, a setting already ailed by contracting limitations. Second, lead and participant banks have identical claims on firm cash flows except for one dimension: their relative shares of the total loan (and the lead bank fee, which is collected up-front). This simplifies greatly the analysis of incentives and contracting between the informed and uninformed lenders relative to a setting in which informed and uninformed lenders have claims with varying information sensitivity (i.e., debt versus equity holders). In the theory framework and the empirical analysis we will focus on this observable contract characteristic, lead shares, to pin down predictions that are unique to the reputation mechanism. Third, syndicate members interact repeatedly to write one time contracts to issue loans to existing or new borrowers. The lack of long term agreements among lead arrangers and participants suggests that state-contingent outcomes are too complex to allow contracting over all outcomes at a reasonable cost (Hart and Moore (1988)). Contracting limits and repeated interactions allow reputation to play a role in the syndicated credit market.

B. Corporate Frauds and Lender Involvement[9]

Two of the largest corporate frauds and subsequent bankruptcies in corporate history of the U.S. occurred during the three quarters between October 2001 and June 2002. The magnitude and scope of the scandals led to the demise of Arthur Andersen, one of the *Big Five* accounting firms, and the passage of the Sarbanes-Oxley Act of 2002, a comprehensive corporate governance legislation labeled as "the most far-reaching reforms of American business practices since the time of Franklin D. Roosevelt" by then U.S. President G. W. Bush.[10]

The Enron and WorldCom frauds entailed repeated accounting manipulations to cover liabilities, hide expenses, and create the appearance of profits and growth. Enron, for example, made use of mark-to-market accounting to overstate the value of long term contracts, and the use of special purpose entities to off-load losses and liabilities from its balance sheet (Healy

[9] The information in this section comes from Enron and WorldCom regulatory filings to the SEC, banruptcy filing documents, Enron Creditors Recovery Corporation, and press reports from *LexisNexis*.

[10] See press article: Bumiller, E., "Corporate Conduct: Bush Signs Bill Aimed at Fraud In Corporations", *The New York Times*, July 31 2002.

and Palepu (2003)). WorldCom delayed the reporting of expenses and operating costs in excess of $9 billion by classifying them as long-term investments. In both cases, sustained poor operating performance and falling stock prices led their CEOs to step down and facilitated the discovery of accounting irregularities. The SEC investigations into the frauds resulted in criminal and civil charges against top executives of both companies.

Several of the largest financial institutions in the U.S. by asset size had direct monitoring responsibilities of the two companies during the months that preceded the fraud discoveries. Enron and WorldCom received two syndicated facilities each between the fourth quarter of 2000 and the third quarter of 2001 (the four quarters preceding Enron's bankruptcy). J.P. Morgan Chase and Citigroup were the lead arrangers in Enron's $2.15 billion facilities. J.P. Morgan Chase and Bank of America Corporation were the lead arrangers in WorldCom's $4.25 billion facilities (Enron's and WorldCom's facilities had 47 and 26 participant banks respectively). Aside from their roles in the syndicated loans, lead and participant banks often acted as underwriters of Enron's and/or WorldCom's debt or equity public offerings.

These banks' involvement in the accounting irregularities was highlighted ex post by the litigation brought against them by Enron and WorldCom investors. Enron Creditors Recovery Corporation (ECRC) filed complaints against 11 major banks and financial institutions for the "alleged involvement of those banks in the fraud, breaches of fiduciary duties, and civil conspiracy that created losses in the tens of billions of dollars."[11] Citigroup alone reported $1.66 billion in payments and $4.25 billion in forgone claims agreed upon to settle Enron-related fraud litigation in 2008. Also, Citigroup and J.P. Morgan Chase were named, among others, as defendants in lawsuits related to alleged accounting irregularities in the books and records of WorldCom and the underwriting of its debt securities. In the latter, defendants were accused that they "either knew or were reckless or negligent in not knowing that the securities were sold to plaintiffs on the basis of misrepresentations and omissions of material facts concerning the financial condition of WorldCom."[12]

[11] See description of the Megaclaims litigation at:
http://www.enron.com/index.php?option=com_content&task=view&id=10&Itemid=19

[12] See J.P. Morgan Chase Co. annual report to the SEC (10K) for period ending 12/31/2002 (page 21).

C. *Theoretical Implications of a Lender Reputation Loss*

We present a brief discussion of the implications of a bank reputation loss on the structure of syndicated loans. We guide our discussion using a stylized model chosen solely to capture how the reputation loss affects lead bank shares. We also discuss the implications extensions to the simple framework.

C.1. Simple Syndication Technology

Consider a lender that has access to an investment opportunity (loan) where a \$1 investment produces an expected payoff of R. With probability $1-p$ fraud occurs and the payoff is zero. The lender has a proprietary monitoring technology that allows it to increase p (reduce the fraud probability) at some cost $f(p)$, with f increasing and convex. The magnitude of p can be interpreted in reduced form as the monitoring level.

The lender also has access to a syndication technology, that allows it to fund only a fraction s of the investment (syndicate participants invest $1-s$). The lender gains an amount $g(s)$ from syndication, where $g(1) = 0$, $g'(s) < 0$, and $g''(s) < 0$. This function captures in reduced form the diversification, regulatory arbitrage, or other benefits from syndication. In exchange for syndication the lead arranger charges an up-front fee T. Thus, the per-period profit function of the lead arranger is $T_t + s_t\left(p_t R - 1\right) - f\left(p_t\right) + g\left(s_t\right)$. For simplicity we assume that the lead arranger is a monopolist and charges the up-front fee that makes the participants break even: $T_t = \left(1 - s_t\right)\left(p_t R - 1\right)$.

C.2. Moral Hazard in Monitoring

Monitoring by the lead arranger is unobservable by the participants. Only whether fraud occurs or not can be contracted upon. In the one-period game with asymmetric information, the syndication contract characteristics T and s are chosen first, and then the lead bank makes a monitoring choice to maximize per-period profits. Thus, the lead arranger chooses

p such that:[13]

$$f'(p^o) = sR \tag{1}$$

The share s is chosen to maximize per period profits of the lead arranger subject to the break-even constraint of the participants and the incentive compatibility constraint (1). The optimal share of the lead arranger is given implicitly by:

$$\frac{g'(s^o)}{1-s^o} = -\frac{R^2}{f''(p^o)} \tag{2}$$

C.3. Reputation

The role for reputation arises in the repeated infinite-horizon game. We assume that the lead arranger and the participants are restricted to writing a sequence of one period contracts. This assumption seems restrictive given the simplicity of the payoffs, but reflects accurately the contracting environment in syndicated lending.

The following state-contingent strategies by the lead and the participants are an equilibrium that represents a Pareto improvement over the static equilibrium. The participants accept to pay a fee higher than the one implied by the one-period game at time 0 and in every period thereafter, as long as no fraud occurred in each preceding period. If fraud occurs, i.e., if the reputation of the lead arranger is tarnished, fees and shares revert to the one-period equilibrium. For simplicity we consider only the case where this reversion lasts forever (in general, a finite reversion period will be optimal). The optimization problem in the repeated game setting is given by:

$$V_t = \max_{s,T} T + s(pR-1) - f(p) + g(s) + p\beta V_{t+1} + (1-p)\beta V^o$$

where V^o is the discounted present value of one-period game profits received in perpetuity. The lead arranger's monitoring level satisfies:

[13] The superindex o stands for "one-period".

$$f'(p^*) = sR + \beta (V_{t+1} - V^o) \tag{3}$$

The incentive compatibility constraint in the infinite-horizon setting (3) implies that for any given lead share, the lead arranger chooses a higher level of monitoring than in the one-period game. The reason is that the lead arranger takes into consideration the value of the future profits that can be derived from maintaining its reputation as a good monitor. In short, reputation enhances the lead arranger's commitment power to monitor. If fraud occurs and the reputation of the lead arranger is damaged, the level of monitoring for any given contractual incentives s reverts to the lower level implied by (1).

C.4. Reputation Loss and Lead Share

Our relationship of interest is the effect of a reputation loss on the lead bank share. This relationship depends the functional form of (2).[14] Under the standard assumption that the cost of inducing monitoring effort is convex in contractual incentives, i.e., if the cost in units of s of inducing the same 1% increase in monitoring p is higher at higher levels of p, then the non-contractual incentives to monitor through reputation and the contractual incentives through lead shares are substitutes.[15] Intuitively, reputation incentives induce higher monitoring levels for free, which increases the marginal cost of contractual incentives. This implies that a reputation loss will result in larger lead bank shares in equilibrium. This is the key prediction that we take to the data to identify the reputation channel.

C.5. Discussion

A similar set of predictions can be delivered through a model where lead banks are heterogeneous in the productivity of their monitoring technologies, $f'(p)$.[16] In such specification, participants use observed fraud realizations to update beliefs about bank monitoring produc-

[14] It is straightforward to show that the optimal share in the repeated game setting is also given by (2).

[15] This occurs when $f''' > 0$ in this setting.

[16] See Fudenberg and Maskin (1982) and MacLeod (2007) for a theoretical discussion and Banerjee and Duflo (2000) for an application to the Indian custom software industry.

tivity and the share of a lead arranger is declining the lead arranger's monitoring reputation. This implies that after a fraud is observed, participants' priors about the monitoring ability of the lead arranger are revised downwards and the lead share of the loan increases. The two models have identical predictions regarding the lead arranger shares. We attempt to distinguish them empirically through their distinct predictions of a reputation loss on the secondary market prices of syndicated loans.

The framework is limited in several respects. First, we have assumed that loans have a fixed size. The introduction of variable loan size complicates the analysis because it requires considering how loan size affects monitoring costs and the repayment probability. Under the standard assumption that higher leverage amplifies moral hazard problems between the bank and the firm, then loan size will be smaller after a negative reputation shock, but the predicted change in the lead bank share is unaltered.[17]

A second restriction of our model is that it delivers predictions for a given project profitability R. In an extension with project heterogeneity, the lowest profitability projects will not be financed after the reputation shock. The change in the project quality pool after the reputation shock poses a problem for the empirical estimation in general, because project profitability is unobservable. However, the within-firm estimation discussed below fully accounts for this selection issue.

Third, we have ignored the incentive problem and reputation concerns of the participant banks regarding their own suppliers of capital. Participant banks must choose an unobservable screening effort when deciding whether to provide funds in a syndicated loan. It is possible that a bad outcome also affects the reputation of participant banks and the contracts between them and their capital suppliers. We can explore this indirectly by looking at the effect of the Enron/WorldCom events on the supply of credit of participant banks in lending syndicates to these firms.

[17] That is, the cost of monitoring is a function of loan size L: $f(p, L)$, and $f_L > 0$. Under this assumption a lower loan size may increase or decrease monitoring incentives, depending on the magnitude of f_{pL}. Thus, allowing loan size to vary may weaken or amplify the effect of the reputation loss on the share of the lead arranger relative to the fixed loan size model, but the prediction on the sign of the change remains unaltered.

III. Estimation

A. *Lead Bank Share and Credit Supply*

The key challenge in estimating the effect of a reputation shock on conditional lead shares is that the share of the lead arranger will also change in response to variations in firm creditworthiness. For example if a borrower's quality drops after the fraud events, banks' incentives to monitor/screen the firm change and so do the incentives provided to the lead arranger in equilibrium.

We adapt the within-firm estimator in Khwaja and Mian (2008) to account for this and other potential confounding effects related to time-varying firm shocks. Our estimator exploits the fact that syndicated loans have multiple lead arrangers as well as multiple participants. Intuitively, we compare —for the same firm— the change in the share of lead debt provided by banks affected by the frauds to the same change by banks unaffected by them. Our counterfactual, the change in lead shares among banks unaffected by the reputation shock, accounts for all time-varying firm characteristics.

We estimate the following within-firm difference-in-differences specification:

$$\bar{y}_{ijl}^{post} - \bar{y}_{ijl}^{pre} = \alpha_i + \beta_0 . ExposedBank_j + \beta_1 . LeadDebt_l + \beta_2 . ExposedBank_j . LeadDebt_l + \varepsilon_{ijl} \quad (4)$$

The variable y_{ijl} is (log) flow of new syndicated debt by bank type j ($j = 1$ for banks affected by the reputation shock) to firm i. The subindex l captures the fact that banks can supply debt as a lead arranger or a participant in a syndicated loan ($l = 1$ if lead). In line with Khwaja and Mian (2008) and Bertrand, Duflo, and Mullainathan (2004), we collapse the pre-fraud and post-fraud periods into one observation to reduce the bias introduced by serial correlation. Thus, the dependent variable is the change in the average flow of syndicated credit from bank j, with syndicate role l, to firm i, before and after the beginning of the fraud scandal wave in the third quarter of 2000. The pre-fraud period includes the eight calendar quarters before the Enron bankruptcy announcement. We use a 1-year and a 2-year

post-fraud periods in the estimations to explore the dynamics of the shock on credit outcomes.

The first right-hand side variable is a firm fixed effect (FE). Including the FE in the first differenced equation is equivalent to introducing firm-quarter dummies in a panel estimation. In other words, the firm FE accounts for all time varying determinants of debt flow levels. The first right-hand side variable of interest, $ExposedBank$, is a dummy equal to one for exposed banks (when $j = 1$). The coefficient on this variable represents the proportional change in debt flows by banks exposed to the fraud events relative to not-exposed banks, to the same firm. The coefficient on this variable, β_0, is the within-firm estimator of the effect of the shock on the supply of credit from Khwaja and Mian (2008).

The second right-hand side variable, $LeadDebt$, is a dummy equal to one for debt supplied by banks in a lead role in the syndicate. Its coefficient, β_1, represents the average change in lead debt flow relative to participant debt flow to the same firm before and after the fraud events. Our main variable of interest is the interaction between the exposed bank dummy and the lead debt dummy. The coefficient on this variable, β_3, reflects how the proportion of lead to participant debt flows changes differentially for banks affected by the corporate frauds relative to banks whose reputations were not exposed.

B. Identifying Assumptions and Bias

Within-firm estimators are robust to firm selection issues because they are obtained from variation in the intensive lending margin. The estimate of the effect on the supply of credit, β_0, is obtained only from the subset of firms that receive syndicated credit from banks affected and unaffected by the reputation shocks before and after the scandals. The estimate for the effect on the lead bank shares, β_2, is obtained from firms that also receive lead and participant debt from both types of banks before and after the shock. Thus, within-firm estimates are consistent even if a reputation loss induces banks to lend to different types of firms.

To understand the identification assumptions behind the within-firm estimators it is useful to spell out under which circumstances they are violated. It is easier to begin with β_0, the estimate for the effect on the supply of credit. This coefficient is negative if the reputation

shock induces banks to reduce their credit supply. The magnitude of this coefficient represents the proportional credit supply reduction, as long as banks whose reputation remained intact do not increase their credit supply in response. If non-affected banks supply more funding to the syndicate in response, β_0 will be biased upwards. This can occur in practice because the negative credit supply shock by affected banks induces the firm to demand more credit from other banks. This upward bias is, however, bounded. In the extreme case where non-affected banks fully substitute the lending reduction by affected banks, the estimated parameter β_0 will be twice the true effect of the reputation shock on the supply of credit. We take this effect into consideration when interpreting the results and explore directly whether substitution occurs using an alternate identification strategy, discussed in the next subsection.

The estimate of the reputation shock on the proportion of lead debt, β_2, will be biased if the change in lead shares of banks affected by the reputation shock in turn affects the lead shares of unaffected banks. This can occur if there are strategic complementarities in the monitoring activities of affected and unaffected lead arrangers. Existing research suggests that lead bank activities are strategic complements, since lead banks have specialized roles within the syndicate (François and Missonier-Piera (2007)). This implies that the within-firm estimate of β_2 will be biased downwards. Intuitively, the bank that suffers the reputation shock monitors less in equilibrium, which reduces the incentives of the unaffected bank to monitor, which in turn leads to larger lead shares for unaffected banks in equilibrium. Thus, we expect our estimates of β_2 to be conservatively biased.[18]

C. Firm Level Outcomes

Within-firm estimates cannot be obtained for firm level outcomes (i.e. total syndicated funding, leverage, investment). To account for variation of investment opportunities in the estimation of the effect of the reputation shock on firm level outcomes, we compare firms in the same industry, location, and size quintile, but that differ in the identity of their main

[18] This bias is, however, of second order relative to the direct effect of the reputation shock. The reason is that the decline in the effected banks' monitoring level is net of the additional incentives provided by the increase in lead shares.

lender. To illustrate the estimation procedure with an example, consider two firms in our sample: Cone Mills Corp. and Guilford Mills Inc..[19] Both firms are in the textile industry, headquartered in North Carolina, and with total (market) assets between $300 and $400 million in January 2002. Both firms are plausibly subject to the same demand and input shocks at any given time. The firms differ in that Cone Mills' main lender at the time (Bank of America) was a syndicated lender to WorldCom, while Guilford Mills' main lender (Wachovia) was not. The identification strategy relies on the assumption that firm specific changes in investment opportunities are, on average, unrelated to the identity of their main lender after controlling for industry, location, and size specific shocks. We validate this assumption below by showing that outcomes of the exposed and not-exposed firms evolve in parallel prior to the fraud events.

Thus, we estimate the effect of the reputation shock on firm level outcomes using the firm fixed effects panel specification:

$$y_{it} = \gamma.ExposedFirm_i.Post_t + \alpha_i + \left(\delta_i^{SIC2} + \delta_i^{state} + \delta_i^{sizeQ}\right) Post_t + \omega_{it} \tag{5}$$

The dependent variable is an outcome for firm i at quarter t. The right-hand side variable of interest is the interaction between a dummy equal to one if the firm is classified as exposed to the shock (as discussed below), and a dummy equal to one for the post-shock period (after the third quarter of 2000). The interaction coefficient represents the change in outcomes of the exposed firms relative to the not-exposed firms, our measure of the effect of the shock. To account for credit demand shocks we include a full set of industry, state of incorporation, and size quartile dummies, interacted with the post-shock period dummy. These account for average outcome changes that are common across all firms in the same industry, location, and size.

[19] We deliberately chose small, *bank-dependent*, firms for this example. A bank credit supply shock can plausibly affect the financing costs only for firms whose marginal source of finance is bank debt. In unreported results we show that only firms with no access to public debt markets (no commercial paper rating) are affected in our sample.

IV. Data and Variable Definitions

A. *DealScan*

The DealScan database is collected by Reuters/Loan Pricing Corporation from SEC and Federal Reserve filings, and directly from private debt markets. The initial sample contains information on 69,055 loan facilities (78% syndicated) issued by 5,868 different lenders to U.S. firms from 1990 to 2005. In theory, it is straightforward to obtain the loan amounts outstanding using information on the facility initiation date, the amount of each facility, the shares of each lender in the facility. In practice, however, the data on the lender shares is incomplete or missing in 69% of the facilities. We exclude from the analysis sample all facilities that are missing all information on lender shares (44%). Because the within-firm estimates compare syndicated loans to the same firm before and after the fraud events, they are internally consistent in the presence of potential selection issues that may arise due to missing data. However, syndicates with complete share information are on average larger, both in loan amount and number of participants, than those with missing information.[20] Thus, our analysis sample is not representative of the universe of syndicated loans.

We impute lender shares for the facilities where shares are incomplete to increase the sample size, although our results are robust to this imputation.[21] After the imputation 56% of facilities have complete lender share information. Using the sample with complete information we construct a database including lender shares, DealScan lender ID, DealScan borrower firm ID, and other facility information.

[20] The median syndicated facility with complete (incomplete) share information has 7 (3) banks and an amount of $150 million ($70 million).

[21] The imputation proceeded in the following five steps. 1) Facilities with incomplete lead bank shares (0.08%): we assign the median value of available lead bank shares to each lead bank without a share in the same facility. At the end of this step, the information of the shares of lead banks is either all complete or all missing. 2) Facilities with all missing lead bank shares, but with some participant bank shares (0.26%): we first assign the median value of available participant bank shares to each participant bank without a share. The unassigned share we distribute evenly across the lead banks. 3) Facilities with complete lead bank shares but all or some missing participant bank shares (1.47%): assign the remaining share equally amongst all participant banks without a share. 4) Facilities without lead banks and the lender shares are all or partially missing (23.31%): assign the remaining share equally among all banks without a share. 5) Facilities with all lead bank shares missing but all participant bank shares complete (0.28%): assign the remaining share equally among all lead banks

B. Definition of Bank Exposure and Summary Statistics

Table I shows the list of the top 40 syndicated lenders by number of facilities during the four quarters before the Enron Bankruptcy. The table shows the fraction of syndicated lending to Enron, WorldCom, and other firms involved in corporate fraud scandals. The table shows a substantial overlap in the set of banks that had a lending relationship with Enron, WorldCom and the other fraudulent firms. For this reason we cannot exploit the variation induced by each fraud independently. We define a lender as exposed to a fraud event if it participated in loan facilities to Enron (49 banks) or WorldCom (28 banks) during the four quarters prior to Enron's bankruptcy. The magnitude and statistical significance of the results is robust to an exposure definition that also includes lending relationships to Adelphia Communications, Global Crossing, KMART, and Qwest Communications International, whose frauds were uncovered during the same period.

We define bank exposure using lending relationships established before the beginning of the corporate fraud wave because the likelihood of lending relationships will be endogenously affected by fraud discovery. In some specifications, we define a lender as exposed if it is the *lead* arranger to Enron or WorldCom during the same period. Note from Table I that exposed banks are the largest players in the syndicated market both by number of facilities and by volume of lending. The fraction of the syndicated lending flow allocated to the fraudulent firms, 0.0092, is small on average. Among the exposed banks, this fraction is relatively smaller for the largest banks in the sample and the lead banks.

We hand-match the lender names in DealScan with the lender names in National Information Center, a repository of financial data and institution characteristics collected by the Federal Reserve System. We obtain the RSSN ID from this site which is then used to match DealScan with Call Report data to obtain lender financial statements. Among the 5,868 lenders in the full DealScan sample, 193 banks are identified to have unique RSSN ID and appear in the Call Report in the third quarter of 2001. These 193 banks are then collapsed at the parent bank level to have 100 unique RSSN ID for their parent banks. We finally hand-match these 100 parent banks to CRSP, to obtain a subsample of sixty-seven public

banks.[22]

Figure 1 plots the cumulative value-weighted returns of the portfolios of banks classified as exposed and not-exposed to Enron and WorldCom during the 20 trading days surrounding each company's bankruptcy announcement. Panel A shows that banks classified as exposed to Enron experience on average a 2% decline in returns relative to the not-exposed banks around Enron's bankruptcy. The decline in returns is around 5% for banks exposed as lead arrangers to Enron. Similar patterns are shown in Panel B around the WorldCom bankruptcy. These plots indicate that our exposure classification provides a meaningful proxy for the vulnerability of bank returns to shocks to Enron and WorldCom. The magnitude of the estimated effect is difficult to reconcile with the size of the direct exposure of these banks to Enron and WorldCom through syndicated lending shown in Table I.

We limit the firm population to firms that had at least one loan facility reported in DealScan between the fourth quarter of 2000 and the first quarter of 2002 and that are not in financial or utility industries. In some specifications we will also exclude firms in the telecommunications, energy, electrical equipment, and software industries, all potentially directly related to Enron, WorldCom, and the other fraudulent firms through commercial links. Table II presents the descriptive statistics of the structure of the syndicated loans to our final sample of firms during the four quarters before the Enron bankruptcy. The fraction of total syndicated credit financed by banks in the lead role is 29.7% (panel 1). In contrast, the unweighted average fraction of lead arranger participation over the full firm sample is 70.6% (panel 2). This is in line with existing evidence on the syndicated loan market that documents a larger lead bank share in loans to smaller firms. Also, the lead bank share in the subsample of syndicated debt by exposed banks is 37.7%, reflecting the fact that exposed banks in our sample lend to larger firms on average.

Some specifications rely on classifying firms according to their exposure through their main lenders. We define a firm to be exposed to the corporate frauds if it had at least one

[22] Among the 100 parent banks, nine (eight) banks are exposed to Enron (WorldCom) under the first definition; two (two) banks are exposed to Enron (WorldCom) under the second definition.

loan facility between the fourth quarter of 2000 and the first quarter of 2002 in which at least one participant in the syndicate is exposed to Enron or WorldCom, and zero otherwise.[23]

To obtain firm financial statement data we hand-match the firm names in DealScan with firm names in COMPUSTAT - North America. Among firms that had at least one loan facility between the fourth quarter of 2000 and the first quarter of 2002, 1,368 are private firms and 1,358 are publicly-traded firms with unique GVKEY in COMPUSTAT. After excluding private firms and firms in the mentioned industries, our final firm sample includes 1,193 public firms. Table III presents the firm descriptive statistics during the four quarters before the Enron bankruptcy. Firms classified as exposed (587) are larger on average than non-exposed firms, as measured by market capitalization. This is expected since exposed banks are larger and tend to lend to larger firms. The amount of syndicated credit scaled by firm assets, however, is the same on average among exposed and not-exposed firms, and so is leverage. We show evidence below that our specifications account for observed and unobserved differences across exposed and not-exposed firms that are related to syndicated lending and other outcomes.

V. Empirical Results

A. Unconditional Evidence

Figure 2 shows the time series of the fraction of debt as a lead arranger for exposed and not-exposed banks in our sample, conditioning on deals where a bank participated as a lead arranger. The pre-Enron means have been removed from the series to facilitate the comparison. The two vertical lines mark the beginning and end of the corporate fraud wave. The plot shows that the conditional share as lead arrangers of exposed and not-exposed banks evolve in parallel before the frauds. After the fraud wave, the share as lead arrangers of exposed banks increases relative to not-exposed banks. The increase is substantial: there

[23] In unreported robustness checks we use an alternate definition, in which a firm is classified as exposed if at least one lead arranger of the facility was exposed to Enron (WorldCom). All the results are unchanged.

is a 10 percentage point difference in the lead shares of exposed and not-exposed banks a year after the fraud wave.

Figure 3 plots the time series of the unconditional flow of new syndicated credit by exposed and not-exposed banks during the same period. Panel A plots total funding, and panels B and C plot separately funding as lead and as a participant in a syndicate. The figures show that the syndicated debt flow of exposed and not-exposed banks move together until the third quarter of 2001, when the debt of exposed banks declines relative to not-exposed banks. The lending decline occurs regardless of the role of the bank in the syndicate and also appears to be substantial: exposed bank syndicated debt grows on average at a 40% to 50% slower rate than not-exposed bank debt during the two years following the Enron scandal.

Figures 2 and 3 together imply that exposed banks supply less syndicated credit overall, and in particular supply less credit as lead arrangers after the fraud events. But conditional on being a lead arranger, exposed banks take larger share of a loan and thus face higher contractual incentives to monitor. These stylized facts are consistent with the predicted effect of a lender reputation loss when reputation and contractual incentives are substitutes. In the next subsection we confirm these results formally.

B. Reputation and Contractual Incentives

Table IV presents the estimated coefficients of specification (4), which measures the effect of the Enron/WorldCom events on the supply of credit and lead shares. The first coefficient, on the *ExposedBank* dummy is negative and significant across all specifications. The magnitude, -0.35, implies that the proportion of exposed bank debt to not-exposed bank debt in new syndicated lending decreased by 35% during the year after the Enron fraud (Table IV, column 1). The magnitude increases to 48% when the post period is expanded to two years after the Enron fraud (Table IV, column 2). These estimates imply that the fraud discovery had a negative effect on the credit supply of the banks that had a lending relationship with Enron and WorldCom during the year before the fraud discovery. The magnitude of the estimates is consistent with the unconditional evidence from Figure 3, and is robust to

excluding from the sample firms in the energy, electrical equipment, and software industries, which potential commercial ties to Enron and WorldCom (Table IV, panel 2).

The estimated coefficient on the interaction term, $ExposedBank.LeadDebt$, is positive and of the same magnitude in all specifications and subsamples. The estimate is significant in all subsamples when estimated using the two-year post-Enron estimation period. The positive estimate implies that, conditional on being a lead arranger, banks with a lending relationship with Enron/WorldCom must retain a larger fraction of a syndicated loan after the frauds were discovered. The estimated magnitude of the coefficient, 0.33, indicates that banks that suffer a negative reputation shock must increase the fraction of a loan they retain as a lead arranger by close to 10 percentage points relative to the pre-fraud mean of 30.1%. This represents a substantial increase in the syndicate composition and the contractual incentives to monitor. The sign and magnitude of the coefficient are consistent with the hypothesis that non-contractual incentives provided through reputation and contractual incentives provided through larger loan shares are substitutes in the context of syndicated lending.

We next investigate the heterogeneity of the effect of the reputation shock across banks that had a direct monitoring role as lead arrangers to Enron and WorldCom and those with participant roles in the syndicated loans before the fraud discoveries. To do so we repeat the estimation of specification (4) introducing a separate indicator for banks that were exposed as lead arrangers and as participants in syndicated loans before Enron events. Note that bank type j had two potential values per firm i (exposed and not-exposed) in specification (4), while it has three potential values (exposed as lead, exposed as participant, and not-exposed) in the new specification. The point estimates are presented in Table V.

Regarding the main coefficients, the point estimates indicate that the negative reputation shock had a larger negative effect on the supply of credit of banks with a lead role in syndicates prior to the frauds. However, the difference is not statistically significant at the standard levels. The estimates of the interaction coefficients indicate that only banks exposed as lead arrangers experience a statistically significant increase in contractual incentives through larger lead shares after the fraud events. The point estimates suggest that the increase in

contractual incentives is roughly twice that experienced by banks exposed as participants. Although this relative magnitude of the effect is robust across all specifications, the difference is again not statistically significant. Thus, the cross sectional result are at most suggestive that the reputation shock had a larger effect on the credit supply and lead shares of banks with a substantial monitoring role before the fraud events.

C. Effect on Credit Supply

The estimated magnitude of the main coefficients of specification (4) suggests that banks that suffer a negative reputation shock reduce the supply of credit. Although debt substitution biases upwards the within-firm estimates, in the most conservative scenario of full substitution in which the estimates are two times the real decline in lending, our estimates imply that the flow of new syndicated credit declines by 24%. This result suggests that reputation plays a significant role in the enforcement of syndicated loan contracts. Formal enforcement through contractual incentives is a poor substitute, and the depletion of reputation capital can potentially lead to an overall decline in credit availability. In this section we explore further the composition of the supply shock, the prevalence of substitution, and the consequences of the reputation shock for the overall availability of external financing to the affected firms.

We begin by corroborating a direct implication of the results so far on the supply of credit by lead arranger and by participants in new syndicated loans. Since a reputation loss implies in equilibrium that lead arrangers take on larger loan shares, the resulting substitution from participant to lead debt will have an amplifying (attenuating) effect on the decline in the unconditional flows of participant (lead) debt.

To verify this we estimate specification (4) including only the $ExposedBank$ dummy to estimate the effect on the supply of credit using new lead debt and new participant debt separately as dependent variables. Note that this specification aggregates the data at the bank-firm pair level. We verify that the results discussed in the previous subsection are robust to this change in columns 1 and 2 of Table VI, which report the estimates of the collapsed specification using all new syndicated credit. Columns 3 through 6 of Table VI

report the estimated coefficients using new lead debt and new participant debt. The point estimates of the effect on the supply of lead credit are negative but extremely noisy and not statistically distinguishable from zero in all specifications. In contrast, the estimated effect on the supply of participant debt is negative and significant in all specifications.

This compositional effect on the supply of credit is consistent with the reputation account and is difficult to reconcile with other potential sources of variation in the supply of credit. Several events with major potential economic implications occurred concurrently with the corporate fraud wave (i.e., general decline in the telecommunications industry, terrorist attack on the World Trade Center, Argentine default). If the lenders exposed to the fraudulent firms were also disproportionately exposed to other shocks, our estimation can pick up the effect of those events on the supply of credit. However, a credit supply reduction that is due, for example, to an increase in the banks' cost of capital, has no direct implications for the lead/participant composition of syndicated loans.[24]

To explore the effect on borrowers' overall credit availability and external cost of finance we turn to the firm FE panel specification (5). This estimation relies on comparing firms classified as exposed to the Enron/WorldCom events through their main lenders, to firms that were not. Table III showed that exposed firms are larger and pay lower syndicated loan spreads than not-exposed firms. This implies that the two groups of firms are likely to differ in other unobservable dimensions. If these unobservable firm characteristics vary over time and are related to the demand for credit and investment, the identification assumptions of this difference-in-differences estimation are suspect. However, if these unobserved characteristics are time-invariant or are balanced across the two groups, specification (5) provides an unbiased estimate of the effect on firm outcomes.

To verify whether the identification assumptions are likely to hold unconditionally, we

[24]In our simple model of Section II, a change in the cost of financing affects only the decision of whether to finance the project or not, and thus lead bank shares for a given project are unaffected. In the extension with heterogeneous projects, an increase in the cost of financing implies that the lowest profitability projects are not funded, but does not change the lead arranger's share for a given project profitability. In the extension with project scale, a financing cost increase will lead to a smaller loans for any given firm, which potentially lowers moral hazard and monitoring costs and leads to smaller lead arranger shares.

plot in panel A of Figure 4 the time series of the average new syndicated loan flows scaled by firm assets. The pre-Enron means have been removed to ease the comparison. The flow of syndicated credit evolves in parallel before the Enron events for the exposed and not-exposed firms, which provides validation to the difference-in-differences identification assumptions. Also, the new origination amounts for the exposed firms drop relative to the not-exposed firms in the short run after the Enron events and remain lower on average in the long run.

Table VII presents the estimated effect on total new syndicated debt flows scaled by firm assets. Column 1 shows that total new debt declines by 0.8 percentage points of total assets, which represents a 32% decline relative to the pre-Enron average from Table III. The magnitude of the decline is consistent with the results from the within-firm estimation. To explore further the dynamics of the credit flow changes we include an interaction between the exposed firm dummy and a post dummy that turns to one during the second year after the Enron events (Table VII, column 2). This interaction represents the debt change during the second year relative to the first after the shock. The first year coefficient is negative while the second is positive. This indicates that the bulk of the decline in debt flows occurs during the year after the Enron events, and that there is a partial reversal afterwards. This is consistent with the unconditional patterns observed in panel A of Figure 4.

To explore the extent of substitution, we estimate separately the effect of the reputation shock on syndicated debt flows from exposed and not-exposed banks. Columns 3 and 4 of Table VII show the results for exposed banks, which parallel those on total debt flows. The fraud events reduce the flow of new syndicated credit from exposed banks. This decline occurs mostly during the year after the Enron events, with a partial reversal afterwards. The fraud events have no effect on the debt flow from not-exposed banks to exposed firms during the year after the reputation shock (Table VII, columns 5 and 6). During the second year, however, the flow of debt from not-exposed banks increases. These estimates are consistent with substitution and imply that firms increased their demand for credit from not-exposed banks after the supply of credit from exposed banks declined.

The negative reputation shock can cause a decline in the supply of credit through differ-

ent channels. One possibility is that monitoring requires investment in acquiring firm specific information, which implies that switching lead banks entails substantial costs. Another possibility is that the loss of reputation induces sharp declines in bank value and affects bank ability to raise capital in the short run, which then affects credit supply. A third possibility is that the reputation loss breaks down reciprocal agreements between lead arrangers and participants documented in Cai (2009). We cannot distinguish through which channels reputation affects credit supply in our empirical context.

D. Evidence from Loan Prices

Panel B of Figure 4 plots the time series of the average spread (relative to LIBOR) of new syndicated loans to exposed and not-exposed firms. The spreads evolve in parallel before the Enron events. There is no obvious short term relative change in spreads paid by the exposed firms during the year after the Enron events. However, spreads are 20 to 30 basis points higher on average two years after the fraud discoveries. The increase in new loan spreads occurs concurrently with the substitution of financing from exposed to not-exposed banks documented in the previous subsection. This suggests that substitution across financing sources comes at a cost in loan prices.

To confirm this formally we estimate the parameters of specification (5) using loan spreads as the dependent variable (Table VIII, columns 1 and 2). The sample size drops for this estimation because it excludes all firm-quarter pairs where no loan occurs. The estimated effect over the entire two-year post period indicate that loan spreads increase by 33 basis points on average after the Enron/WorldCom events, or 17.4% of the pre-Enron sample average (column 1). The overall results indicate that firms whose main lenders were exposed to the fraud events experienced an increase in their external financing costs.

Since syndicated loans are traded in the secondary market, we can also estimate the effect of the reputation shock on the market prices of the loans after they are issued. Secondary market prices can allow us, in principle, to distinguish the economic mechanism behind the reputation shock. If the corporate frauds reflected poorly on the monitoring ability of

the exposed banks, we expect that the same events will reflect poorly on the quality of the loans issued by exposed banks prior to the fraud discovery. On the other hand, in a pure moral hazard model where bank monitoring effort is unobservable, reputation serves as a commitment mechanism and bad outcomes will trigger reversion to the one shot game contract and monitoring levels, but will not affect the assessed quality of the loans issued prior to the fraud discovery.

Secondary market loan price quotes are available from the Loan Syndications and Trading Association (LSTA) Mark-to-Market Pricing service. The unit of observation in the LSTA database is a pair between a loan facility and a quotation date. For each observation, it provides information on quote date, a loan identification number that uniquely identifies a loan facility and the borrower, number of quotes, average of the bid (ask) quotes, and the average of average bid (ask) quotes. A noteworthy caveat is that the LSTA database provides loan quotations rather than actual transaction prices. Thus, the estimated effects must be interpreted as changes in the willingness to pay for the listed loans. Also, the database reveals the facility ID and/or LIN rather than the identity of the loan sellers and buyers. This implies that we cannot distinguish which part of the syndicated loan the quote applies to, and we must perform the secondary market price analysis at the firm level.[25]

Panel C of Figure 4 plots the time series of the median bid price for all of the firm loans, measured as percentage points of par, averaged across firms exposed and not-exposed to the fraud events through their lenders (pre-Enron means removed). The plot suggests that the median quotes for exposed firms declined by 2 to 3 percentage points after the Enron events. The absolute value of the change is an order of magnitude larger than the one implied by the change in spreads for new loans shown in panel B of Figure 4. However, the DID estimate for the effect of the frauds on the secondary market bids, shown in columns 3 and 4 of Table VIII, is 3.6 percentage points but not statistically significant. Overall, the market price evidence

[25] Out of 30,738 unique facilities in DealScan that were originated during 1999-2004 to U.S. firms, 3,033 facilities are traded during 1999-2004 and matched to LSTA database using one of the two common fields: facility ID and/or LIN. We are able to match 416 out of our firm population data to the LSTA data. There are 4,529 facility-quarter pairs with at least one quote for these 416 unique borrowers.

is suggestive that the fraud events reflected poorly on the quality of borrowers associated with the affected banks, but transaction in the secondary market occur infrequently and the estimates are too imprecise to reach definitive conclusions.

E. Financial Policy and Investment

Table IX shows the estimated effect of the Enron/WorldCom events on firm financial policy and investment obtained over the subsample of publicly traded firms. In unreported estimations we verify that the results discussed so far hold on this subsample of firms. The point estimates indicate that the reputations shock has a negative effect on firm leverage (Table IX, columns 1 and 2), but the effect is only marginally significant in some specifications. This suggests that firms are able to substitute the decline in syndicated debt with other debt financing.

The estimated effect on cash (scaled by assets) is negative but insignificant in the short run, but positive and significant during the second year after the Enron/WorldCom events across all specifications (Table IX, columns 3 and 4). The magnitude indicates that cash holdings increase by 0.7 percentage points as a proportion of total assets, or 8.6% of the sample average. These estimates suggest that firms' propensity to hold liquid assets changes in the medium run.

Finally, investment flow in fixed assets drops substantially during the year of the Enron/WorldCom events, by 0.15 percentage points relative to total assets, or 8.8% of the sample mean (Table IX, columns 5 and 6). The estimates also indicate that investment flows return to their original path two years after the events.

The overall findings suggest that the loss of reputation of a primary lender have a significant short term effect on firms' external cost of financing. There is evidence of substitution towards syndicated credit from unaffected banks and from non-syndicated financing sources. This suggests that the Enron and WorldCom events did not cause, or occur concurrently with, a generalized shortage of credit through all financing sources. However, substitution to other sources does come at a cost. Although we cannot measure the effect of financing costs

from other sources, the evidence on syndicated loan prices suggests the cost of substituting financing sources is substantial.

Firms' financial policy also reacts to the increase in external financing costs. Firms appear to hoard cash in the medium run, which is consistent with theories of precautionary cash stocks. Precautionary cash allows firms to undertake valuable projects when outside financing is costly or unavailable. The higher precautionary stocks and financing substitution potentially explain why investment suffers only in the short run. Corporate financing and cash policies can mitigate the effect of the lender reputation loss on investment in the long run.

VI. Conclusion

This paper provides evidence that bank monitoring reputation is a key determinant of the supply of credit, the characteristics of financial contracts, and investment. We exploit the Enron and WorldCom corporate frauds in 2001 and 2002 as a source of variation in their lenders' monitoring reputation. Using a within-firm estimator, we find that the fraud discoveries cause a substantial decline in the supply of credit by banks with a prior lending relationship to these firms. The decline is larger if the exposed lender was also a directly responsible for monitoring in syndicated lending. Consistent with the reputation channel, we find that exposed banks take on larger lead arranger shares conditional on participation as a lead arranger in a syndicated loan after the shock.

Our paper highlights the potential consequences of fraud on investment. Fraud involves expropriation of investors. Thus, an increase in its expected incidence can have large consequences on the supply of capital. The results in this paper show that this effect is particularly strong through the banking sector.

The results of this paper are related to the academic and policy debate on the determinants and regulation of bank risk taking behavior. Evidence that competition lowers bank "charter values" (future rents) and can induce excessive risk taking and instability of the fi-

nancial sector has motivated regulation that limits bank competition and the use of leverage through reserve requirements.[26] The call for regulation is based on the premise that depositors, insulated from risk through deposit insurance, are banks' marginal suppliers of capital. However, the financial innovations mentioned on the introductory paragraph imply that the marginal funding of modern financial institutions comes less from depositors, and more from sophisticated —and uninsured— investors. Our results show that in such an environment, market forces can induce a bank to increase its stake when its incentive to take risk increase.

The 2008 financial crisis that followed our sample period, however, suggests that these market forces alone do not induce sufficient monitoring. This is striking considering the magnitude of the value losses that result from a reputation loss implicit in our estimates. A 10 percentage point increase in lead banks shares implies a substantial decline in capital intermediation through the syndicated debt market, which allocates more than $1 trillion of debt per year. Furthermore, in the worst case scenario where the entire loss estimated in the event studies is attributed to reputation capital, a reputation loss results in a 5 to 8% decline of a bank's total market capitalization. To induce adequate monitoring, financial regulation must increase bank potential losses in case of malfeasance discovery, either through penalties or minimum capital requirements, that exceed the costs implied by these estimates.

References

Akerlof, George A., 1970, "The market for 'lemons': Quality uncertainty and the market mechanism," *Quarterly Journal of Economics* 84, 3, 488-500.

Almeida, H. and T. Philippon (2007) "The Risk Adjusted Cost of Financial Distress," *Journal of Finance* 62, 6, 2557-2586.

Almeida, Heitor, Murillo Campello, and Michael S. Weisbach, 2004, "The cash flow sensitivity of cash," *Journal of Finance* 59, 1777-1804.

Bernanke, Ben, and Alan Blinder, 1988, Credit, money, and aggregate demand, *American Economic Review* 78, 435-439.

[26] See references and discussion in Boyd and De Nicolo (2005).

Bolton, Patrick, Hui Chen, and Neng Wang, 2009, "A unified theory of Tobin's q, corporate investment, financing, and risk management," Columbia University Working Paper.

Boyd, John H., and Gianni De Nicolo, 2005, "The theory of bank risk taking and competition revisited," *Journal of Finance* 60, 1329-1343.

Cai, Jian, 2009, "Competition or collaboration? The reciprocity effect in loan syndication," Olin Business School working paper.

Dennis, Steven, and Donald Mullineaux, "Syndicated Loans," *Journal of Financial Intermediation* 9, 404–426.

Fama, Eugene, 1980, "Agency problems and the theory of the firm," *Journal of Political Economy* 88, 288-307.

Fang, Lily H., 2005, "Investment Bank Reputation and the Price and Quality of Underwriting Services," *Journal of Finance* 60, 6, 2729-2761.

Pascal, François, and Franck Missonier-Piera, 2007, "The agency structure of loan syndicates," *Financial Review* 42, 227-245.

Friedman, M., 1962, *Capitalism and Freedom*, University of Chicago Press.

Fudenberg, Drew, and Eric Maskin, "The Folk Theorem in Repeated Games with Discounting or with Incomplete Information," *Econometrica* 54, 3, 533-554.

Gorton, Gary, and Andrew Winton, 2002, Financial Intermediation, in George Constantinides, Milton Harris, and Rene Stulz, eds.: *Handbook of the Economics of Finance* (North Holland, Amsterdam).

Greif, Avner, 1989, "Reputation and coalitions in medieval trade: Evidence on the Maghribi traders," *Journal of Economic History* 49, 857-882.

Greif, Avner, 1991, "The organization of long-distance trade: Reputation and coalitions in the Geniza documents and Genoa during the eleventh and twelfth centuries," *Journal of Economic History* 51, 459-462.

Hart, Oliver and Moore, John, "Incomplete contracts and renegotiation," *Econometrica* 55, 755-85.

Healy, Paul, and Krishna Palepu, 2003, "The fall of Enron," *Journal of Economic Perspectives* 17, 2, 3-26.

Holmstrom, Bengt, and Jean Tirole, 1997, Financial intermediation, loanable funds and the real sector, *Quarterly Journal of Economics* 112, 663-691.

Hsu, David H., 2004, "What do entrepreneurs pay for venture capital affiliation?," *Journal of Finance* 59, 1805-1844.

Keys, Benjamin J., Tanmoy K. Mukherjee, Amit Seru, and Vikrant Vig, 2008. Did securitization lead to lax screening? Evidence from subprime loans, *Quarterly Journal of Economics* forthcoming.

Khwaja, Asim, and Atif Mian, 2008, Tracing the impact of bank liquidity shocks: Evidence from an emerging market, *American Economic Review* 98, 1413-1442.

Leuz, Christian, and Catherine Schrand, 2009, "Disclosure and the Cost of Capital: Evidence from Firms' Responses to the Enron Shock," University of Chicago Working Paper.

MacLeod, Bentley, 2007, "Reputations, Relationships, and Contract Enforcement," *Journal of Economic Literature* 45, 595-628.

Paravisini, Daniel, 2008, "Local bank financial constraints and firm access to external finance," *Journal of Finance* 63, 2161-2194.

Pichler, Pegaret and William Wilhelm, 2001, "A theory of the syndicate: Form follows function," *Journal of Finance* 56, 2237–2264.

Rajan, Raghuram, 1994, Why bank credit policies fluctuate: A theory and some evidence, *Quarterly Journal of Economics* 109, 399-441.

Riddick, Leigh, and Toni Whited, 2008, The corporate propensity to save, Journal of Finance forthcoming.

Stein, Jeremy, 1998, An adverse selection model of bank asset and liability management with implications for the transmission of monetary policy, *RAND Journal of Economics* 29, 466-486.

Sufi, Amir, 2007, Information asymmetry and financing arrangements: Evidence from syndicated loans, *Journal of Finance* 62, 629-668.

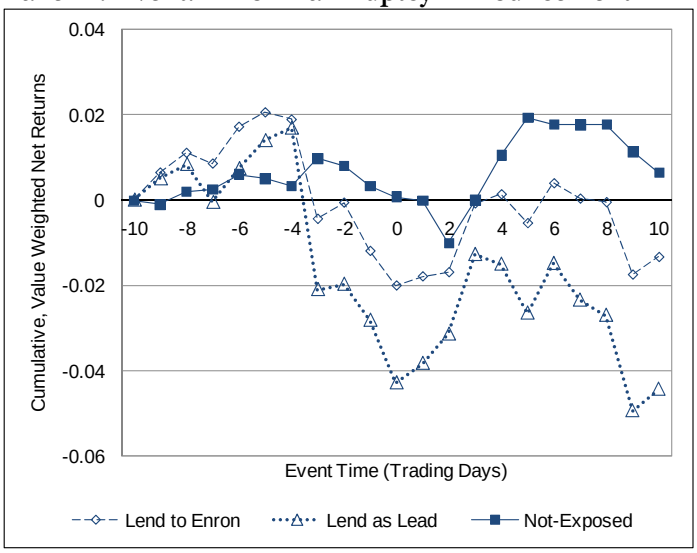
Sufi, Amir, and Atif Mian, 2009, The consequences of mortgage credit expansion: Evidence from the U.S. Mortgage default crisis *Quarterly Journal of Economics* Forthcoming.

Weidner, David, 2000, "Syndicated Lending Closes Out '90s on a Tear," *The American Banker*, January 10, Page 1.

Wilson, R.B., 1968, "The theory of syndicates," *Econometrica* 36, 119-132.

Figure 1
Lender Cumulative Net Return during 20 Trading Days around Enron/WorldCom Bankruptcies, by Lender Role in Enron/WorldCom Syndicated Lending

Panel A. Event: Enron Bankruptcy Announcement



Panel B. Event: WorldCom Bankruptcy Announcement

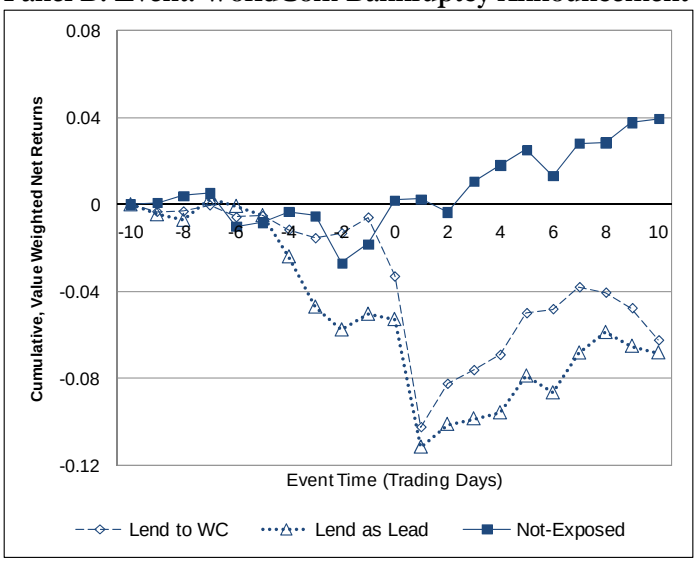
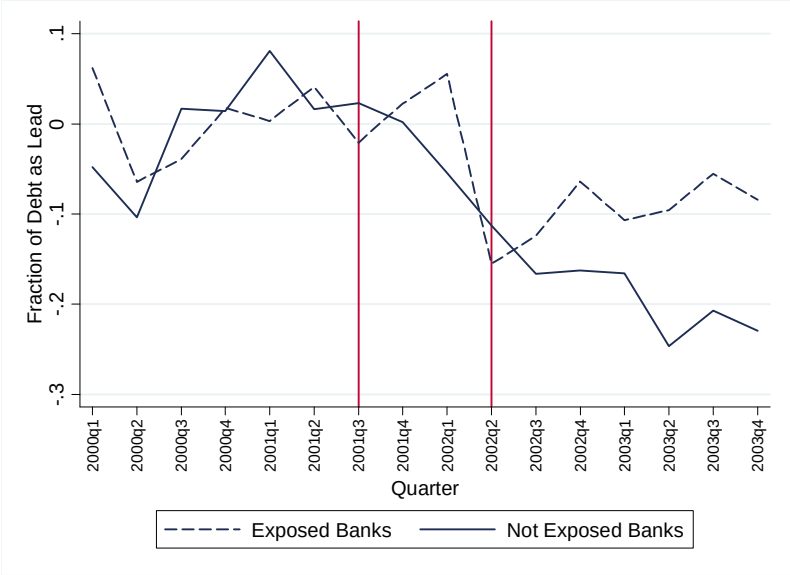


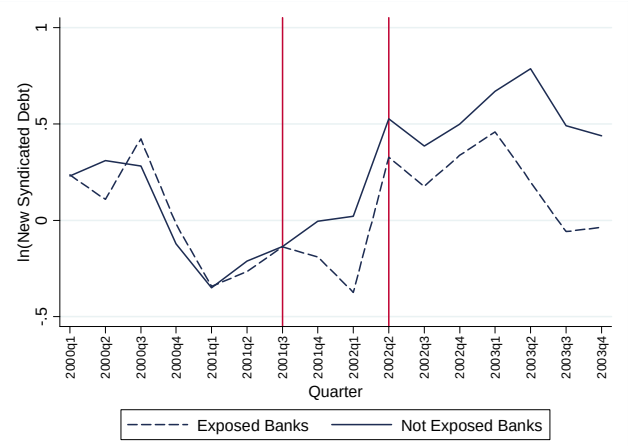
Figure 2
Conditional on Participation as a Lead Arranger, Fraction of Lead Debt to Total Facility, by Bank Role in the Enron/WorldCom Lending*



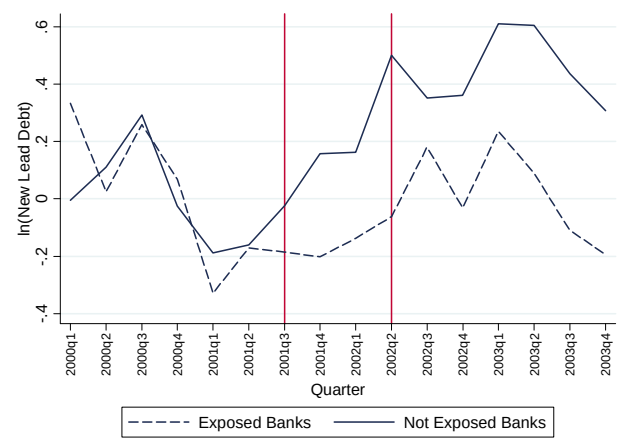
* Normalized to zero mean in the pre-Enron period. The vertical lines mark the beginning of the Enron (2001q3) and WorldCom (2002q2) events.

Figure 3
New Syndicated Debt (logs), by Bank Role in Enron/WorldCom Lending*

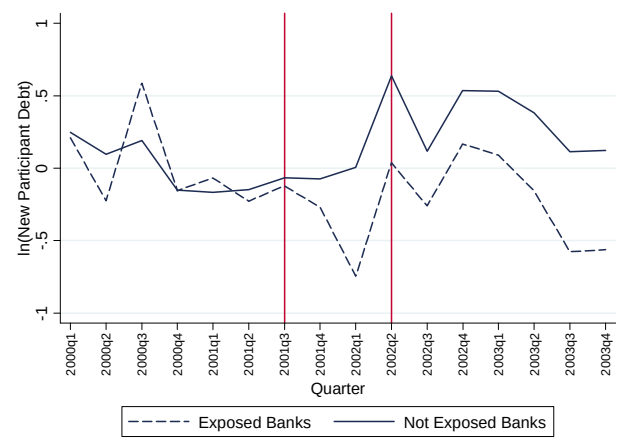
Panel A. Total Funding



Panel B: Funding Provided as Lead

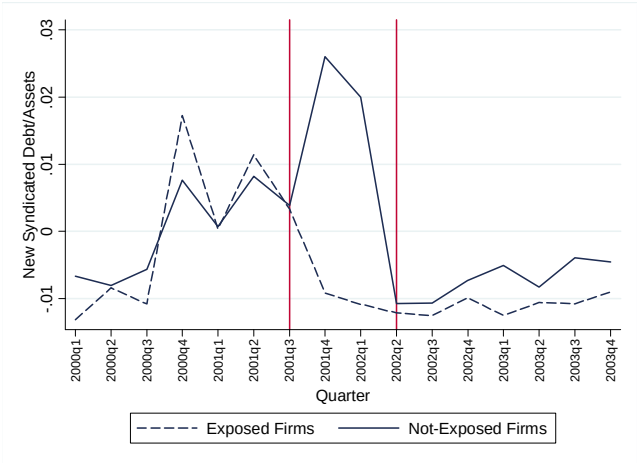


Panel C: Funding Provided as Participant

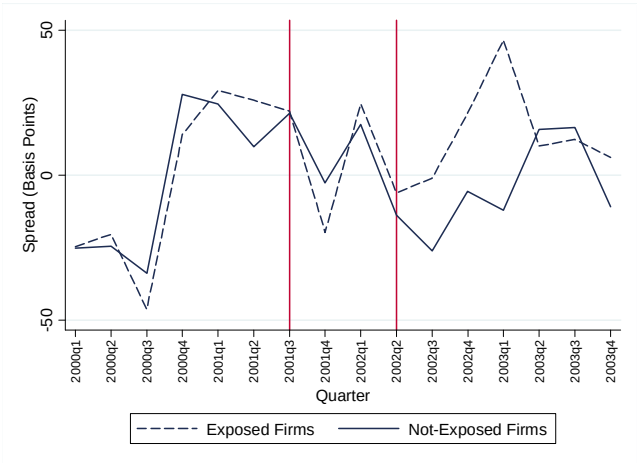


* Normalized to zero mean in the pre-Enron period. The vertical lines mark the beginning of the Enron (2001q3) and WorldCom (2002q2) events.

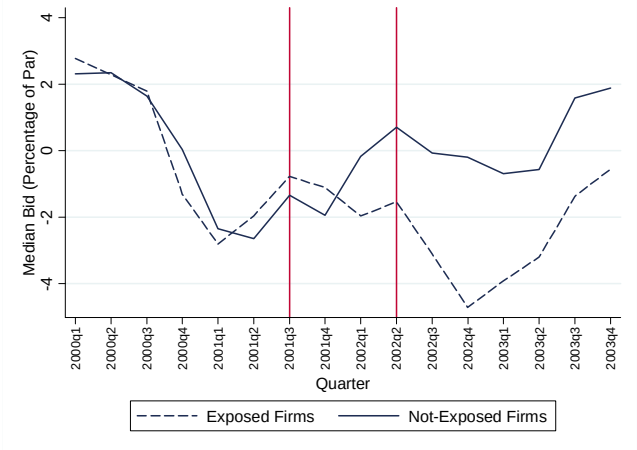
Figure 4
New Syndicated Loan Amounts and Spreads, By Firm Exposure
Panel A: Syndicated Loan Amount to Firm Assets*



Panel B: Spread*



Panel C: Secondary Market Price (Median Bid)*



* Normalized to zero mean in the pre-period. The vertical lines mark the beginning of the Enron (2001q3) and WorldCom (2002q2) events.

Table I
Top 40 Lenders' Syndicated Lending between Q4-2000 and Q3-2001, Fraction to Enron and WorldCom, and Exposure to Post-Bankruptcy Litigation

Sources: *Dealscan*, *LexisNexis*, *Enron Creditors Recovery Corp.* Enron and WorldCom received two syndicated facilities each between Q3 of 2000 and Q3 of 2001. Enron's facilities were a $1.75 billion 364-day loan and a $400 million standby letter of credit (identical 49 lenders and 2 lead arrangers each). WorldCom's facilities were a $2.65 billion 364-day loan and a $1.6 billion 5-year line of credit (identical 28 lenders and 2 lead arrangers each). % lending by lead arrangers to Enron and WorldCom highlighted with bold typeface. *% to Other* is calculated based on $6.09 billion in four new facilities to other firms also involved in fraud scandals between Q3 of 2001 and Q2 of 2002 (Adelphia Communications, Arthur Anderson, KMART, and Qwest Communications International).

#	Top 40 Syndicated Lenders (2000Q4 to 2001Q3)	Total # of Facilities		Total Facilities (million $)		% to Enron	% to WorldCom	% to Other	Post-Bankruptcy Litigations	
		Any	As Lead	Any Role	As Lead				Enron	WorldCom
1	Bank of America Corporation	1,700	1009	99,400	73,800	0.03%	**0.59%**	0.98%		Yes
2	J.P. Morgan Chase & Co.	1,223	740	124,200	109,000	**0.13%**	**0.47%**	0.31%	Yes	Yes
3	FleetBoston Financial Corp.	1,115	225	33,200	10,800	0.09%	0.36%	0.66%		
4	Wachovia Corporation	1,110	201	33,540	7,540	0.18%		0.90%		
5	Bank One Corporation	993	296	44,500	19,900	0.07%	0.27%	0.41%	Yes	
6	Citigroup Inc.	859	397	71,500	48,600	**0.22%**	0.17%	1.38%	Yes	Yes
7	Bank of New York Company	727	83	24,150	5,550	0.13%		0.75%	Yes	
8	U.S. Bancorp	663	97	9,970	1,040			1.33%		
9	Bank of Nova Scotia	591	47	20,160	3,660	0.15%	0.59%			
10	Suntrust Banks, Inc.	577	94	15,150	3,750	0.20%				
11	Wells Fargo & Co.	554	126	14,070	4,220		0.84%	1.29%		
12	BNP Paribas	503	47	19,470	1,670	0.16%	0.61%			Yes
13	Credit Suisse First Boston	488	121	30,000	15,100	0.10%			Yes	Yes
14	ABN AMRO Bank NV	475	54	20,440	3,340	0.15%	0.58%			Yes
15	Credit Lyonnais	443	36	13,410	1,310	0.23%	0.88%			
16	National City Corporation	412	89	5,630	1,970					
17	Mellon Financial Corporation	401	17	13,853	353		0.85%	1.03%		
18	Comerica Inc.	379	45	6,604	474			0.33%		
19	Bank of Tokyo-Mitsubishi Ltd	371	4	15,840	1,040	0.19%	0.74%			Yes
20	PNC Financial Services Group	370	101	7,610	1,150					
21	Keycorp	334	66	5,710	1,180			1.69%		
22	Barclays Bank Plc	291	15	14,920	1,220	0.20%			Yes	
23	Northern Trust Corporation	283	0	8,180	0	0.37%				
24	Union Bank of Canada	269	38	5,064	774					
25	Commerzbank AG	263	17	14,160	1,160					
26	Deutsche Bank Alex Brown	252	71	14,830	5,680	0.21%			Yes	Yes
27	Industrial Bank of Japan Ltd	251	1	8,100	30		1.46%			
28	Societe Generale	247	25	8,692	902	0.35%				
29	General Electric Capital Corp	244	77	4,020	2,180					
30	Fuji Bank Ltd	239	1	6,040	0		1.95%			
31	LaSalle Bank NA	210	17	2,004	254					
32	Heller Financial Inc	207	51	2,029	639					
33	Royal Bank of Canada	197	6	8,922	542	0.34%			Yes	
34	Toronto Dominion Bank	193	24	8,670	1,850				Yes	
35	Bank of Montreal	175	26	5,628	808	0.54%				
36	Royal Bank of Scotland Plc	174	5	6,752	72	0.45%	1.75%		Yes	
37	Dresdner Bank AG	172	6	6,448	868	0.47%				
38	Westdeutsche Landesbank GZ	172	1	7,440	0	0.41%	1.59%			
39	KBC Group	153	5	4,376	246	0.70%				
40	Harris Bankcorp, Inc	152	13	1,661	251					
	All others	10,625	1,108	297,313	62,429	0.25%	0.48%	0.01%	9 others	8 others

Table II
Descriptive Statistics of Syndicated Loan Structure

Sample: new syndicated loans issued between the fourth quarter of 2000 and the first quarter of 2002. A bank is classified as Exposed if it participated in loan facilities to WorldCom or Enron during the four quarters prior to Enron's bankruptcy. Excludes loans to firms in the financial, utility, telecommunications, and energy sectors.

	mean	sd	5th %-ile	median	95th %-ile	N
Panel 1. Aggregate Statistics, by quarter						
New Facilities (million $)	50,800	5,410	45,500	50,800	56,300	4
Fraction by Lead Banks	0.297	0.056	0.253	0.282	0.370	4
Fraction by Exposed Banks	0.640	0.022	0.610	0.643	0.663	4
Fraction Lead among Exposed	0.301	0.073	0.227	0.294	0.391	4
Panel 2. Firm-Quarter Statistics						
New Facilities (million $)	199	533	2	40	942	1,020
Fraction by Lead Banks	0.706	0.367	0.113	1.000	1.000	1,020
Fraction by Exposed Banks	0.377	0.411	0.000	0.157	1.000	1,020
Fraction Lead among Exposed	0.552	0.401	0.000	0.459	1.000	530

Table III
Sample Descriptive Statistics of Public Firms

Sample: results from hand-matching the firm names in DealScan with the firm names in COMPUSTAT - North America. Restricted to firms that had at least one loan facility between the fourth quarter of 2000 and the first quarter of 2002. Excludes firms in the financial, utility, telecommunications, energy, electrical equipment, or software industries.

	All Firms (n= 1,193)			Exposed Firms (n= 587)			Not-Exposed Firms (n= 606)		
	mean	median	sd	mean	median	sd	mean	median	sd
Market Capitalization ($ millions)	4,206	474	17,124	6,493	977	22,141	1,429	211	6,333
Spread on Syndicated Debt	160.8	150.0	114.3	144.7	125.0	112.9	206.8	210.0	105.6
Syndicated Origination/Assets	0.025	0.000	0.083	0.027	0.000	0.086	0.021	0.000	0.079
Syndicated Origination (Conditional)/Assets*	0.20	0.16	0.14	0.20	0.17	0.14	0.21	0.16	0.15
Total Debt/Assets	0.29	0.28	0.20	0.31	0.30	0.20	0.27	0.25	0.21
Cash/Assets	0.081	0.028	0.138	0.062	0.027	0.099	0.103	0.031	0.170
Dividends and Repurchases/Assets	0.006	0.000	0.027	0.007	0.001	0.032	0.005	0.000	0.020
Investment in Fixed Assets/Assets	0.018	0.010	0.034	0.019	0.011	0.039	0.017	0.010	0.026

*Conditional on receiving a syndicated loan

Table IV
Effect of Enron/WorldCom Frauds on the Composition of Syndicates

Estimation results of within-firm specification (2):

$$\bar{y}_{ijl}^{\,post} - \bar{y}_{ijl}^{\,pre} = \alpha_i + \beta_0 \cdot ExposedBank_j + \beta_1 \cdot LeadDebt_l + \beta_2 \cdot ExposedBank_j \cdot LeadDebt_l + \varepsilon_{ijl}$$

The dependent variable represents the change in average debt of type *l* (lead or participant) of firm *i* with with bank type *j* (exposed or not-exposed), before and after the shock. Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the firm industry level. *, ** and *** statistical significance at the 10, 5, and 1 percent levels respectively.

	$\ln(\text{New Debt}_{ijl})_{post} - \ln(\text{New Debt}_{ijl})_{pre}$	
Post-Enron Estimation Period:	1 Year	2 Years
	(1)	(2)
Panel 1. Full Sample		
ExposedBank	-0.3497**	-0.4824***
	(0.1494)	(0.1012)
LeadDebt	-0.0741	-0.0492
	(0.1538)	(0.1348)
ExposedBank x LeadDebt	0.311	0.3168**
	(0.2254)	(0.1514)
Observations	436	673
R-squared	0.734	0.726
Panel 2. Excluding Energy, Electrical Equipment, and Software		
ExposedBank	-0.3345**	-0.4621***
	(0.1570)	(0.1024)
LeadDebt	-0.1349	-0.0817
	(0.1384)	(0.1371)
ExposedBank x LeadDebt	0.3933*	0.3325**
	(0.2263)	(0.1645)
Observations	394	607
R-squared	0.703	0.713

Table V
Effect of Enron/WorldCom Frauds on the Composition of Syndicates, by Role of the Exposed Lender in the Syndicate

Estimation results of within-firm specification (2) augmented to include a separate indicator for banks that were exposed as lead arrangers and as participants in syndicated loans before Enron events:

$$\bar{y}_{ijl}^{\,post} - \bar{y}_{ijl}^{\,pre} = \alpha_i + \beta_0 \cdot ExposedBank_j + \beta_1 \cdot LeadDebt_l + \beta_2 \cdot ExposedBank_j \cdot LeadDebt_l + \varepsilon_{ijl}$$

The dependent variable represents the change in average debt of type *l* (lead or participant) of firm *i* with with bank type *j* (exposed or not-exposed), before and after the shock. Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the firm industry level. *, ** and *** statistical significance at the 10, 5, and 1 percent levels respectively.

	$\ln(\text{New Debt}_{ijl})_{post} - \ln(\text{New Debt}_{ijl})_{pre}$	
Post-Enron Estimation Period:	1 Year	2 Years
	(1)	(2)
Panel 1. Full Sample		
ExposedBank_asLead	-0.2522*	-0.4102***
	(0.1322)	(0.0954)
ExposedBank_asPart	-0.2769*	-0.3663**
	(0.1435)	(0.1389)
LeadDebt	-0.0793	-0.063
	(0.1459)	(0.1336)
ExposedBank_asLead x LeadDebt	0.3627	0.3551*
	(0.3453)	(0.2099)
ExposedBank_asPart x LeadDebt	0.1522	0.165
	(0.2604)	(0.2079)
Observations	463	707
R-squared	0.735	0.715
Panel 2. Excluding Energy, Electrical Equipment, and Software		
ExposedBank_asLead	-0.2295	-0.3843***
	(0.1380)	(0.0941)
ExposedBank_asPart	-0.2785*	-0.3899**
	(0.1511)	(0.1466)
LeadDebt	-0.1384	-0.0977
	(0.1351)	(0.1358)
ExposedBank_asLead x LeadDebt	0.4726	0.4137*
	(0.4097)	(0.2435)
ExposedBank_asPart x LeadDebt	0.252	0.2063
	(0.2420)	(0.2145)
Observations	419	637
R-squared	0.705	0.701

Table VI
Effect of Enron/WorldCom Shock on the Supply of Credit

Estimation results of within-firm specification (1):

$$\bar{y}_{ij}^{\ post} - \bar{y}_{ij}^{\ pre} = \alpha_i + \beta \cdot ExposedBank_j + \varepsilon_{ij}$$

The dependent variable is the average flow of new syndicated credit to firm *i* from bank type *j* (exposed, not-exposed) after the Enron bankruptcy (4th quarter of 2000 and afterwards), minus the average flow of new syndicated credit to firm *i* from bank type *j* before the Enron bankruptcy. Columns 3 and 4 (5 and 6) use new syndicated debt by lead arrangers (participants) of the syndicate. Standard errors (in parenthesis) are heteroskedasticity-robust and clustered at the firm industry level. *, ** and *** statistical significance at the 10, 5, and 1 percent levels respectively.

Dependent Variable	$\ln(\text{New Debt}_{ij})_{post} - \ln(\text{New Debt}_{ij})_{pre}$		$\ln(\text{New Lead Debt}_{ij})_{post} - \ln(\text{New Lead Debt}_{ij})_{pre}$		$\ln(\text{New Participant Debt}_{ij})_{post} - \ln(\text{New Participant Debt}_{ij})_{pre}$	
Post Period	1 Year	2 Years	1 Year	2 Years	1 Year	2 Years
	(1)	(2)	(3)	(4)	(5)	(6)
Panel 1. Full Sample						
ExposedBank	-0.4239**	-0.5352***	-0.5958	-0.305	-0.3503**	-0.4846***
	(0.2072)	(0.1672)	(3.0194)	(1.2303)	(0.1508)	(0.1151)
Observations	377	560	196	311	240	362
R-squared	0.767	0.779	0.998	0.98	0.76	0.77
Panel 2. Excluding Energy, Electrical Equipment, and Software						
ExposedBank	-0.3700*	-0.4887***		-0.3316		-0.4669***
	(0.2155)	(0.1677)		(1.6734)		-0.1207
Observations	337	499		275		332
R-squared	0.737	0.765		0.977		0.773

Table VII
Effect of Enron/WorldCom Shock on Flow of New Syndicated Credit, Firm Level Estimation

Estimation results of firm fixed-effects panel specification (3):

$$y_{it} = \gamma \cdot ExposedFirm_i.Post_t + + \alpha_i + \delta^{SIC2}{}_i.Post_t + \delta^{State}{}_i.Post_t + \delta^{SizeQuartile}{}_i.Post_t + \varepsilon_{it}$$

The dependent variable is an outcome for firm *i* at quarter *t*. The right-hand side variable of interest is the interaction between a dummy equal to one if it is classified as exposed to the shock, and a dummy equal to one for the post-shock period (after the third quarter of 2000).

Originating Bank	New Syndicated Debt$_t$/Assets$_{t-1}$					
	All Banks		Exposed Banks		Non-Exposed Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel 1. Full Sample						
FirmExposed x PostEnron	-0.0083***	-0.0123***	-0.0070***	-0.0090***	-0.0004	-0.002
	(0.0023)	(0.0025)	(0.0010)	(0.0011)	(0.0013)	(0.0016)
FirmExposed x PostEnron_plus1year		0.0076***		0.0039***		0.0030**
		(0.0017)		(0.0008)		(0.0012)
Industry, location, size quintile x PostEnron	Yes	Yes	Yes	Yes	Yes	Yes
Industry, location, size quintile x PostWC	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,110	17,110	17,110	17,110	17,110	17,110
R-squared	0.095	0.096	0.104	0.104	0.093	0.093
Panel 2. Excluding Energy, Electrical Equipment, and Software						
FirmExposed x PostEnron	-0.0095***	-0.0138***	-0.0072***	-0.0093***	-0.0013	-0.0022
	(0.0024)	(0.0026)	(0.0011)	(0.0013)	(0.0014)	(0.0016)
FirmExposed x PostEnron_plus1year		0.0083***		0.0040***		0.0037***
		(0.0018)		(0.0009)		(0.0014)
Industry, location, size quintile x PostEnron	Yes	Yes	Yes	Yes	Yes	Yes
Industry, location, size quintile x PostWC	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,924	14,924	14,924	14,924	14,924	14,924
R-squared	0.097	0.097	0.106	0.107	0.095	0.096

Table VIII
Effect of Enron/WorldCom Shock on Loan Prices, Firm Level Estimation

Estimation results of firm fixed-effects panel specification (3):

$$y_{it} = \gamma \cdot ExposedFirm_i.Post_t + +\alpha_i + \delta^{SIC2}{}_i.Post_t + \delta^{State}{}_i.Post_t + \delta^{SizeQuartile}{}_i.Post_t + \varepsilon_{it}$$

The dependent variable is the interest rate spread relative to LIBOR in basis points (and median secondary market bid in percentage points of par) for firm *i* at quarter *t*. The right-hand side variable of interest is the interaction between a dummy equal to one if it is classified as exposed to the shock, and a dummy equal to one for the post-shock period (after the third quarter of 2000).

	Interest Spread		Median Secondary Market Bid	
	(1)	(2)	(3)	(4)
Panel 1. Full Sample				
FirmExposed x PostEnron	33.211**	23.635	-3.635	-3.404
	(13.715)	(15.703)	(2.751)	(2.820)
FirmExposed x PostEnron_plus1year		17.0114		-0.664
		(15.874)		(1.172)
Industry, location, size quintile x PostEnron	Yes	Yes	Yes	Yes
Industry, location, size quintile x PostWC	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	2,510	2,510	1,058	1,058
R-squared	0.865	0.866	0.755	0.755
Panel 2. Excluding Energy, Electrical Equipment, and Software				
FirmExposed x PostEnron	27.969*	17.576	-3.626	-3.469
	(14.723)	(16.502)	(2.822)	(2.897)
FirmExposed x PostEnron_plus1year		19.5411*		-0.485
		(11.379)		(1.263)
Industry, location, size quintile x PostEnron	Yes	Yes	Yes	Yes
Industry, location, size quintile x PostWC	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	2,212	2,212	980	980
R-squared	0.881	0.881	0.754	0.754

Table IX
Effect of Enron/WorldCom Shock on Financial Policy and Investment

Estimation results of firm fixed-effects panel specification (3):

$$y_{it} = \gamma \cdot ExposedFirm_i.Post_t + +\alpha_i + \delta^{SIC2}{}_i.Post_t + \delta^{State}{}_i.Post_t + \delta^{SizeQuartile}{}_i.Post_t + \varepsilon_{it}$$

The dependent variable is debt, cash balance, and capital expenditures (scaled by assets) for firm *i* at quarter *t*. The right-hand side variable of interest is the interaction between a dummy equal to one if it is classified as exposed to the shock, and a dummy equal to one for the post-shock period (after the third quarter of 2000).

Dependent Variable (/Assets)	Debt		Cash		CAPEX	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel 1. Full Sample						
FirmExposed x PostEnron	0.007	0.0119	0.0021	-0.0018	-0.0007	-0.0015**
	(0.0111)	(0.0100)	(0.0066)	(0.0057)	(0.0007)	(0.0006)
FirmExposed x PostEnron_plus1year		-0.0091		0.0073*		0.0015*
		(0.0060)		(0.0041)		(0.0008)
Industry, location, size quintile x PostEnron	Yes	Yes	Yes	Yes	Yes	Yes
Industry, location, size quintile x PostWC	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,667	16,667	17,187	17,187	16,720	16,720
R-squared	0.829	0.829	0.858	0.858	0.486	0.486
Panel 2. Excluding Energy, Electrical Equipment, and Software						
FirmExposed x PostEnron	-0.0048	0.0017	0.0052	0.0014	-0.0008	-0.0021
	(0.0097)	(0.0089)	(0.0069)	(0.0057)	(0.0010)	(0.0016)
FirmExposed x PostEnron_plus1year		-0.0122*		0.0074*		0.0029*
		(0.0067)		(0.0046)		(0.0016)
Industry, location, size quintile x PostEnron	Yes	Yes	Yes	Yes	Yes	Yes
Industry, location, size quintile x PostWC	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,488	14,488	14,988	14,988	13,683	13,683
R-squared	0.845	0.845	0.860	0.860	0.465	0.465