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Hidden Information?

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# Relationship Lending: Is it Incentives or Hidden Information?\*

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## Abstract

Relationships are a valuable technology to produce loans. (Berger and Udell [1995], Petersen and Rajan [1994], Aoki and Dinç [2002]). While there are convincing theories in which relationships solve hidden action or hidden information problems, there is very little empirical corroboration of either theory. In this paper, we assess the empirical validity of these theories in the small firm credit market. While results suggest that relationships are more valuable for firms with worse incentive misalignment problems, more informationally opaque firms do not seem to extract more value from relationships. Contrary to what most empirical research on the value of relationships has assumed (but not tested), this indicates that relationships are, at very least, as important for aligning incentives as they are for solving hidden information problems.

## I. Introduction

Repeated interaction between lenders and borrowers, often shorthanded as Relational Lending, is viewed as a major technology for producing loans. Indeed, there is convincing evidence that relationships are valuable for borrowers such as small firms, in the sense that they increase access to credit, and better terms of credit (Berger and Udell [1995] and Petersen and Rajan [1994]). Close bank-firm ties are pervasive in several financial systems, the Japanese Main Bank and the German Universal Bank systems being but the two most prominent examples. Despite this consensus, and the supporting evidence, there is less understanding of the mechanism through which relationships facilitate the production of loans. In this paper, we investigate the circumstances in which

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relationships are valuable to borrowers. More specifically, we are interested in evaluating empirically whether relationships help alleviate hidden action, hidden information problems, both, or none.

Theory provides conceivable explanations for hidden action and hidden information as the reason for relationships. On the one hand, in Rajan [1992], Petersen and Rajan [1995], Boot and Thakor [2000], just to name a few, relationships are viewed *as informed* lending, to use Rajan's [1992] terminology. By interaction repeatedly, lenders can learn borrowers types, and overcome credit rationing due to non-observability of types. On the other hand, in Bolton and Scharfstein [1990], Boot and Thakor [1994] and Carrasco and De Mello [2006], the dynamic nature of relationships help alleviating incentive misalignment between lenders and borrowers in a world of contractual incompleteness. In all these papers, the continuation value of relationships is used to induce borrowers to take actions preferred by lenders. In this sense, it is the dynamic nature of relationships that create value.

In this paper, we confront both theories with data from small business credit market. The empirical choice is driven by both data and the economics of the small business lending. For small business, there is information available, for a large number of firms, on the firm-lender relational characteristics, which is a necessary condition for any empirical study of relationship lending. As for the economics, relative to large, public-owned corporations, small firms are considered informationally opaque. So it is an application in which hidden information has more chance of being relevant. As for the disciplining story, small firm lending is also a good application. Relationship lending for large corporations tend to involve a large amount of "hands on" *interim* monitoring. In the Japanese Main Bank case, for example, banks have board representation, and are able to monitor, to a certain degree, decision-making in the process (Aoki, Patrick and Sheard [1995]). The disciplinary role played by a relationship in the literature involves using continuation values as a substitute for direct *interim* monitoring. Therefore, one should expect the use of continuation value as a substitute for monitoring when the size of the lender-borrower operation is relatively small, since then it does not justify applying a monitoring mechanism that may involve substantial fixed costs.<sup>1</sup> It seems then that small firm lending is better than large corporation's for testing disciplining stories based on "indirect monitoring", i.e., monitoring through the continuation value of the borrower-lender relationship.

Despite the focus on small firm lending, these findings may be of broader interest. Close ties between agents is a pervasive economic phenomenon. Mediating transactions through relationships are a substitute for market-mediated transactions; therefore, one should observe the former in instances in which the latter are imperfect. In this sense, the interest in identifying the exact market failure that cause relationships to be valuable goes much beyond small firm lending.

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<sup>1</sup>These costs include, for instance, allocating a bank official to operate inside the firm, and opportunity costs of allocating high-level manager to participate in board activities.

As a preview of results, relationships are more valuable for firms facing more serious incentive problems, and for firms that are more informationally problematic. While this implies that both explanations seem operative in small firm lending, the evidence supporting the disciplining story is stronger. This result is somehow surprising given the implicit assumption of the banking literature that the first-order reason for relationship lending for small firms is hidden information.

Our findings have also policy implications. Over the last twenty years, the banking industry has, both in the United States and worldwide, experienced uninterrupted consolidation. In the US, this process has engendered, among scholars, practitioners and policy makers, considerable concern about small firm lending.<sup>2</sup> Consolidation has produced larger, more organizationally complex banks, and there are theoretical reasons, and supporting empirical evidence, that large banks refrain from lending based on soft, private information (Stein [2002], Berger, Miller, Petersen, Rajan, and Stein [2005], Berger, Rosen and Udell [2005], Berger and Udell [2002]). Therefore, larger banks would avoid using relationship lending, which is perceived to be crucial for small firm lending.

While it is reasonable to assume that large banks have a disadvantage in acquiring and using private information, it does not seem to be the case that the same handicap prevails in the use of continuation values of relationships as disciplining mechanism. Indeed, the empirical evidence concerning the overall ability of large banks to lend to small firms is ambiguous, contrary to one would expect if hidden information problems were the only working force behind relationship lending.<sup>3</sup>

Beyond changes in structure, increased bank competition could be viewed as a challenge to relationships lending, since competition decreases the returns to private information acquisition (Petersen and Rajan [1995], Boot and Thakor [2005], Aoki and Dinç [2000]). These concerns, however, are only relevant if hidden information problems are the only reason behind the value of relationships, i.e., if relationships are mainly a technology to produce private information. If the disciplining reason - as in Bolton and Scharfstein [1990], Boot and Thakor [1994], and Carrasco and De Mello [2006], is also relevant, then these concerns are less relevant. In fact, Carrasco and De Mello [2006], for example, show that relationship lending equilibria arise even under the assumption that banks compete away their profits.

The paper is organized as follows. Section II describes the data, and the borrowers (small firms) that are our object of study. Section III explains the empirical strategy. Results are in section IV. Section V concludes.

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<sup>2</sup>For studies on the effects of bank mergers on small firm finance in the United States, see Berger, Kashyap and Scalise [1995], Rhoades [2000], Berger, Saunders, Scalise and Udell [1998], Peek and Rosengreen [1996] and Strahan and Weston [1996].

<sup>3</sup>See Berger, Demirgüç-Kunt, Levine and Haubrich [2004], Berger, Kashyap and Scalise [1995], Berger, Demsetz and Strahan [1999], Rhoades [2000], and IMF [2001].

## II. Data

The data source is the National Survey of Small Business Finances 1987 (NSSBF 1987), and the Surveys of Small Business Finances 1993 and 1998 (SSBF 1993, SSBF 1998), performed by the Federal Reserve Board. An observation is a firm. Each survey is composed of a cross section of small firms (less than 500 employees). Although some questions differ among survey, the data is, in general, comparable between surveys.

To test the theoretical ideas in section II, one needs, at the very minimum, data on the characteristics of the firm-lender relationship, and of usage of credit. The SSBFs contain this data. To the best of author's knowledge, there is no other source with such data. First, there is a rich set of information on the firm's use of financial products, including substitutes to formal bank credit, such as trade credit. There is also information on the characteristics of the firms' relationship with their suppliers of financial products. Of particular interest is the information on the number of financial institutions the firm does business with, and the length of relationship with financial institutions. To the best of the authors' knowledge, there is no other data set with such rich set of information.

The data has, however, some drawbacks. One is the poor information on interest rates. Interest rates on bank loans are available only for the most recent approved loan. At the 1998, for example, there are interest rate observations for no more than one quarter of the firms, which severely restricts the sample size if one would explain interest rates. As for interest rates on trade credit, only information from the most important supplier of trade credit is available.

Table I describes the variables, and provides some summary statistics. A typical firm in the data set is an eleven-year-old proprietorship managed by its owner. In 1998, for example, only a tiny fraction (0.39%) of the firms in our data set were public held, and 88.71% of them had three owners or less.<sup>4</sup> This is the first interesting feature about this dataset: these borrowers seem informationally opaque. The typical firm is quite small: the median number of employees is 5, with U\$127,000 in assets. Therefore, it seems reasonable to conjecture that economies of scale are such that lender would not perform *interim*, direct monitoring on these firms.

As for banking relationships, the typical firm does business with 2 financial institutions for 6 years, which is slightly less than half the age of the firm. Therefore, relationships seem important for an average firm. There is, however, significant variation in the relationship variable: while most firms do concentrate their banking business, roughly 36% do business with 3 or more financial institutions. See Figure 5. Length of relationships vary wildly, with a standard deviation slightly larger than the mean.

Table I also shows summary statistics for a particular sub-sample of firms, those that were offered Early Discount Payments (EPDs) offers from trade credit

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<sup>4</sup>Numbers for 1987 and 1993 are very similar.

suppliers. This sub-set will be crucial in our estimation strategy, and it is important that these firms are not systematically different from firms that did not receive EPDs offers. Next section contains a more detailed discussion on this issue.

	Definition	Whole Sample		EPD only	
		Mean (Std Dev)	Median	Mean (Std Dev)	Median
<i>EPDs</i>	1, if took advantage of no Early Payment Discounts; 2, if less than half; 3 if half; 4 if more than half; 5 if all	3.46 (1.61)	4		
<i>Length</i>	Length of Relation with Main Bank, in years	9.76 (10.08)	6	10.47 (10.68)	7
<i>Number Institutions</i>	Number of financial institutions firm does business with	2.28 (1.49)	2	2.56 (1.61)	2
<i>Length/Age</i>	Length of Relation with Main Bank/Age of firm	0.74 (0.85)	0.75	0.72 (0.77)	0.71
<i>MSA</i>	1 if firm located at a Metropolitan Statistical Area, 0 otherwise	0.71 (0.45)		0.67 (0.47)	
<i>Assets</i>	Assets in thd of dollars	1442 (5609)	127	2210 (7265)	273
<i>Employee</i>	Number of employee	27.98 (57.85)	5	39.99 (69.35)	9
<i>Age of Firm</i>	Age of firm, in years	17.10 (16.07)	13	18.87 (17.24)	14
<i>HHI</i>	Herfindahl-Hirschman Index in the banking market firm is located. 1, if HHI>1800; 0, otherwise	0.52 (0.49)		0.54 (0.49)	
<i>Limited</i>	1 if firm if a limited liability, 0 otherwise	0.51 (0.49)		0.68 (0.47)	
<i>Credit Score**</i>	1, if low risk; 2, if moderate risk; 3 if average risk; 4 if significant risk; 5 if high risk	2.70 (1.04)	3	2.83 (1.14)	3
<i>Cash/Assets</i>	Cash-in-hand/Assets	0.18 (0.24)	0.09	0.15 (0.20)	0.08
<i>Firm Delinquent***</i>	1, if firm was more than 30 days delinquent in the previous 3 years; 0, otherwise	0.17 (0.38)		0.22 (0.42)	
<i>Owner Delinquent***</i>	1, if main owner firm was more than 30 days delinquent in the previous 3 years; 0, otherwise	0.12 (0.33)		0.11 (0.31)	

Table I Source: FED NSSBF 1987, SSBF 1993, 1998. \* Firms with no banking relationships excluded. \*\* Only 1998. \*\*\* Only 1998 and 1993

### III. Empirical Strategy

The data provides enough information to distinguish firm according to the theoretically relevant dimension. The identification strategy depends crucially

on variation among firms in three dimensions: the characteristics of their banking relationships; the organization structure of firms; and on how informationally challenged they are.

### A. The Performance Measure and the Specification<sup>5</sup>

Our interest is assessing the determinants of the value of the lender-borrower relationship. Value could be evaluated through prices or quantities, also called availability of credit in the banking literature parlance. The choice of quantity as a measure of value is both theory and data driven. First, as noted above, interest rate information is poor, not allowing enough variation to recover anything meaningful. Furthermore, the empirical literature has been much more successful when credit availability is used (Petersen and Rajan [1995], and De Mello [2006]). Second, it is not exactly clear what the theoretical predictions are for interest rates. If relationships mainly solve hidden information problems, then interest rates could well be higher for relational firm. If relationships are a disciplining device, interest rate in relational transactions are lower than in the arm's length market (Boot and Arnaud [1994], Carrasco and De Mello [2006]). As for quantities, predictions are clear: relationships, whether producing private information or disciplining borrowers, should be associated with a higher availability of credit.

The economic object of interest is the firm level supply of credit. If the econometrician observed quantities supplied and demanded, her task would be simple: endogeneity stems from only observing *equilibrium* quantities. Trade credit information available SSBF allows for the identification strategy of arguing that firm level *supply* of credit is observed, albeit imperfectly.<sup>6</sup> Following Petersen and Rajan [1995] and De Mello [2006], information on trade credit is used to *proxy* the firm level *supply* of credit.

Trade credit is finance provided by the firms' suppliers of inputs (other than capital) by allowing firms to pay for goods after the delivery date. Conversely, trade credit suppliers also offer Early Payment Discounts (henceforth, EPD), which are discounts for payment before the contracted payment date.

An important piece of information arise, which was successfully used by Petersen and Rajan [1995] and De Mello, is the percentage of EPD offers the firm took advantage of. Forgoing EDPs carries an implicit interest rate, which is very high. For example, in 1998, while 80.4% of the firms which received EPD offers from their most important suppliers carried an implicit annual interest rate of more than 40%, the average interest rate on the most recent bank loan is 9.04%. Given this difference, if a firm is not taking advantage of 100% of EPDs it must be that it is either cash or bank credit constrained. After controlling for cash-in-hand, the percentage of EPDs offers the firm took advantage of

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<sup>5</sup>This section draws heavily on De Mello [2006].

<sup>6</sup>An alternative strategy is to use financial ratios, such as  $\frac{\text{Bank Loans}}{\text{Assets}}$ . These measures, however, are endogenous: they contain both supply and demand on them.

effectively measures the firm level supply of credit. Below, it is shown that the measure is reasonable empirically. For example, as one would expect, firms with more cash-in-hand take more advantage of EPDs.

Let  $EPD_i$  (%EPDs, for example) be the *proxy* for credit supply.  $RL_i$  is a measure of whether the transaction between firm  $i$  and banks is relationship-based. Let  $Z_i$  be a variable that affects how market power shifts the supply of credit for relational firms. It is either a measure of how costly it is to acquire and use private information, or a measure of how informationally problematic the firm is. Finally, let  $(IR_i - BR_i)$  be the measure of how advantageous it is to take advantage of the EPD. The ideal specification is:

$$EPD_i = \gamma_0 + \gamma_1 RL_i + \gamma_2 (IR_i - BR_i) + \Lambda Controls_i + \varepsilon_i \quad (1)$$

Parameters in (1) are estimated for different subsamples of firms, according to two criteria. First, organizational structure provides variation to split the sample according to how serious the incentive misalignment between the firm and lenders is. As it is argued in subsection, the identification hypothesis is that limited liability firms should face more serious incentive problems than unlimited liability firms. Second, according to how pervasive the problem of hidden information, which is measured by *Credit Score*

The following hypothesis are tested. For the whole sample, we expect, as the literature has already established, that relationships are valuable, i.e.,  $\gamma_1 > 0$ . If relationships are solve hidden action problems, the relationships should be more valuable for firms for which hidden action problems are more severe, i.e., limited liability firms. More specifically, we expect  $\gamma_1^{\text{limited}} > \gamma_1^{\text{unlimited}}$ . Similarly for firms which are more informationally problematic:  $\gamma_1^{\text{bad score}} > \gamma_1^{\text{good score}}$ .

Of course, not all firms receive trade credit from suppliers (and consequently are not offered EPDs). Thus, sample selection may bias results. Table I, however, suggests sample selection is not important empirically: firms in the regression sub-sample do not seem different from firms in the whole sample. By inspection, the two groups of firms have very similar means and median for all relevant variables, except for size and organizational structure: these firms are larger, and there are more limited liability firms among them. There is, however, significant variation in size and organizational structure among them, which allows us to recover the parameters of interest in (1). More importantly, however, is that firms in general and firms that received EPD offer are not very different in two dimensions. First, their credit score in 1998 are quite alike, which indicates risk does not vary systematically between with receiving trade credit. Second, although firms that received EPD offers seem slightly more relational than the general population, the relationship measures are quite similar.

$IR_i$  and  $BR_i$  are not observed.<sup>7</sup> Evidently,  $IR_i - BR_i$  is in error term, and could affect both, and be affected, by  $RL_i$ . In this case, identification is

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<sup>7</sup>Although very imprecisely measured, one could use the interest rate on the most recent loan for  $BR$ , and implicit interest rates on EPDs by the most important trade credit supplier for  $IR$ . This strategy is, however, too costly. Only a small subset of firms applied for loans in recent periods, and received cash discount offers from the most important trade credit supplier. Thus, including these variables severely decreases the sample size.

by exclusion: omitting them is not a serious problem. All that matters to the demand for EPDs, for example, is the difference between bank credit interest rate and the implicit interest rate in forgoing EPDs,  $IR_i - BR_i$ . Trade credit tends to be very highly priced, relative to bank loans, and thus variations of this variable, at the relevant range, are not likely to influence the decision to take advantage of EPDs: one should take advantage of as much EPDS as possible.<sup>8</sup>

*Controls<sub>i</sub>* include variables that might affect both  $X_i$  and  $RL_i$ . First and foremost, measures of quality of the firm are included. The first is *Credit Score*. The second is *Owner Delinquency*, which is a categorical variable for whether the owner of firm was 60 days or more delinquent on personal obligations in the previous 3 years. They capture how informationally problematic firms are. This control is crucial to our purposes since the measure of incentive misalignment, limited liability, could also capture different degrees of informational opaqueness. Other controls are the amount of cash-in-hand, which determines EPDs and tardiness and could vary systematically with relational strength, size of firm, measured both by assets and number of employees, and age of firm, which measures both how established the firm is, and degree of relational strength. Finally, characteristics of the location of firms are included, such as bank market concentration and whether the firm is located at an MSA.

## B. Measuring the Degree of Relational Strength

The empirical banking literature has used two measures of relational strength: length of firm-bank relationship and number of banks the firm does business with (see Berger and Udell [1995], Petersen and Rajan [1994], Cole [1998], De Mello [2006], among others). The former is self-evident: longer interaction both produce private information, and indicate repeated interaction that is essential to disciplining in the spirit of Boot and Thakor [1994] and Carrasco and De Mello [2006]. As for the latter, if relationships are valuable, one would expect concentration of operations, just as one would expect dispersed operations in arm's length mediated transactions.

In this paper, we innovate by presenting a slightly different measure. First, we create an index of relational strength based on *both* measures used by the literature. More specifically. We use factor analysis to project variation from both measures into a single dimension. The inverse of the number of banking institutions the firm does business with, and the log of the ratio  $\frac{\text{Length with main bank}}{\text{Age of firm}}$  enter the factor analysis. We call this measure **relational**.

The second innovation is how length is measured.<sup>9</sup> The rationale behind the measure is that a three year old relationship for a ten year old firm means less, in terms of use of relationship lending, than the same three years of relationship

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<sup>8</sup>Using only data on the most important trade credit supplier, the median implied interest rate on forgoing EPDS was 43% a.a. in 1993.

<sup>9</sup>Only length, not the length/age, has been used so far. See Berger and Udell [1995] and Petersen and Rajan [1994].

for a six year old firm. Additionally, by measuring length in this way, years of relationship in equation (1) becomes a cleaner measure of the effect of age on credit availability.<sup>10</sup> However, a twenty year old firm with 10 years of banking relationship is different than a two year old firm with one year of banking relationship. This suggests that  $\frac{\text{Length with main bank}}{\text{Age of firm}}$  is more informative for older firms. We incorporate this fact by weighting our factor loads estimation by the age of firm, i.e., by allowing older firms to have more weight in the estimation procedure of the measure **relational**.

### C. Limited Liability as a Measure of Incentive Misalignment

By sheltering personal assets, limited liability protects entrepreneurs from excessive exposure in case of bankruptcy. Two well known implications of limited liability for an entrepreneur’s incentives are the following. First, because it prevents entrepreneurs from facing the whole distribution of returns, it puts incentives to excessive risk-taking from the lenders, with consequent credit rationing (Stiglitz and Weiss [1982]). Second, by impeding the design of an incentive contract that makes the entrepreneur the full residual claimant of the benefits of his effort, limited liability leads to shirking. However, limited liability also worsens hidden information problems. Indeed, Stiglitz and Weiss’s theory of an upward sloping credit supply schedule is compatible with both firms taking excessive risks and intrinsically riskier firms being more willing to borrow at higher interest rates. Additionally, limited liability firms could be perceived as riskier.

Our empirical strategy rests on the identification hypothesis that limited liability worsens incentive problems. For that to be true, one needs, at the very minimum, that limited liability to be associated with “bad behavior” in some sense. Even if that holds empirically, there is the competing hypothesis is that limited liability firms are intrinsically worse types, which also rationalizes bad outcomes. While one cannot decide in favor of either hypothesis unequivocally, one can perform some tests on the implications of each story. Table II is informative with this respect. The dependent variable is whether the firm has at least once been delinquent in the three years previous to the survey (1998).<sup>11</sup> In column (1), one can see that, even after controlling for availability for cash-in-hand, equity, size (as measured by assets and employment), and age of firm, limited liability is associated with a higher probability of being delinquent, 3.31% more ( $p$ -value 3.2%). Limited liability seems indeed associated with bad outcomes.

If limited liability did indeed capture bad type, one would respect that including a measure of type would wipe out the results in column (1). In column

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<sup>10</sup>If length alone, no the ratio is included, age becomes a control for fact that longer relationships often occur for older firms. When the ratio is included, this fact is already controlled for in the measure, and the model allows more flexibility for age to capture whatever effect it should have.

<sup>11</sup>We only use 1998 data because is the only one that contains data on credit score.

(3), credit score, which proxy for type, is added to the specification described above. Results are, if anything, stronger than in column (1). Since firm delinquency might determine credit score, the equation is also estimated with only owner delinquency, and results are similar if not stronger. Finally, delinquency in over the previous three years, so we also estimate the model excluding firms younger than 4 years, and results still hold.<sup>12</sup>

<b>Firm Delinquent previous 3 years?</b>				
	(1)	(2)	(3)	†(4)
<i>Limited Liability</i>	3.31 (1.44)**	3.83 (1.40)***	3.71 (1.33)***	3.39 (1.57)**
<i>Log(Relational)</i>	-12.05 (2.01)***	-10.16 (1.85)***	-9.52 (1.84)***	-10.53 (1.98)***
<i>Credit Score</i>			0.0514 (0.0055)***	
<i>Owner Delinquent?</i>		11.62 (0.66)***	10.25 (0.66)***	12.57 (0.75)***
<i>Log(Cash/Assets)</i>	-2.87 (0.37)***	-1.80 (0.35)***	-1.43 (0.34)***	-1.78 (0.38)***
<i>Equity‡</i>	-5.04 (2.21)**	-4.97 (2.05)**	-4.28 (1.83)**	-4.89 (2.05)**
<i>Log(Employee)</i>	2.07 (0.60)***	2.06 (0.58)***	1.67 (0.56)***	2.13 (0.64)***
<i>Log(Age of Firm)</i>	-1.63 (0.70)**	-1.31 (0.69)*	-0.18 (0.68)	-3.70 (1.00)***
<i>Log(Assets)</i>	-1.98 (0.0041)***	-0.81 (0.40)**	-0.51 (0.38)	-0.79 (0.45)*
<i>Observations</i>	3395	3395	3395	2918

Table II Source FED, SSBF 1998. Dependent variable is 1, if firm was ever delinquent more than 60 days in the previous 3 years. Robust standard errors in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Marginal probit estimates, in % points. †: only firms older than 3 years included. ‡: coefficients are multiplied by  $10^7$ . Sector and regional dummies included.

Firms might choose limited liability precisely because they know they are bad types, and the causality would run the reverse way. Although there is no source of exogenous variation to estimate the effect of limited liability on delinquency free of this reverse causality, there is exogenous variation to determine whether firms choose limited liability anticipating delinquency.

<sup>12</sup>Indeed, age of firm has the strongest (expected) negative effect on delinquency.

### Limited Liability?

	(1)	†(2)	†(3)	†(4)	†(5)/IV Probit	(6)/IV Probit
<i>Firm Delinquent?</i>	7.59 (3.15)**	6.02 (3.36)*	3.49 (2.96)	4.13 (2.92)	-4.95 (7.98)	-3.83 (6.86)
<i>Log(Relational)</i>	-6.44 (3.59)*	-7.56 (3.77)**	-7.53 (3.77)**			-0.0712 (0.0353)**
<i>Credit Score</i>	-1.81 (1.00)*	-1.93 (1.06)*				-1.23 (1.10)
<i>Owner Delinquent?</i>	-1.44 (1.30)	-1.22 (1.40)				
<i>Log(Cash/Assets)</i>	1.16 (0.69)*	1.14 (0.70)	1.31 (0.71)*			
<i>Equity‡</i>	-7.36 (3.67)**	-6.82 (3.63)*	-6.86 (3.57)*			-7.59 (3.78)**
<i>Log(Employee)</i>	15.14 (0.10)***	15.29 (0.11)***	15.23 (1.10)***	16.62 (1.07)**	15.88 (1.02)***	15.60 (0.97)**
<i>Log(Age of Firm)</i>	-3.45 (1.19)***	-3.82 (1.62)***	-3.38 (1.60)***	-2.77 (1.55)*	-3.26 (1.62)***	-3.39 (1.18)***
<i>Log(Assets)</i>	4.48 (0.69)***	4.14 (0.75)***	4.32 (0.74)***	3.27 (0.55)***	4.22 (0.63)***	4.20 (0.61)***
<i>Observations</i>	3395	2918	2918	3036	2982	3395

Table III Source FED, SSBF 1998. Dependent variable is 1, if firm was ever delinquent more than 60 days in the previous 3 years. Robust t-statistics in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Marginal probit estimates, in % points. †: only firms older than 3 years included. ‡: coefficients are multiplied by 10<sup>7</sup>. Sector and regional dummies included. IV Probit procedure: instruments are owner delinquent and Log(Cash/Assets).

As hinted by the results in table II, when OLS is estimated it seems that firms choose limited liability anticipating delinquency (column (1)). When the sample is restricted to firms older than three years, (column (2)), results start to vanish (column (2)). Interestingly, results only arise when type is controlled for with credit score and owner delinquency (column (3)). In column (4), not only the sample is restricted to firms older than three years, but all regressors that are not reasonably established characteristics of the firm, and therefore most likely did not influence the organizational structure choice, are omitted. In this case, future firm delinquency does not appear to affect limited liability. It is noteworthy that, if anything, worse firms, as measured by credit and owner liability, seem to choose more *unlimited* liability forms (columns (1) and (2)). This could be because unlimited liabilities are worse types, which would only reinforce the result that limited liability induces bad behavior.

Columns (1) to (3) in table III, and results in table II, suggest an identification strategy for controlling for reverse causality. It appears that, while anticipation of *owner* delinquency does not affect organizational choice, it does affect *firm* delinquency. This is expected since limited liability concerns *firm* bankruptcy, and owner delinquency might affect her ability to fund the firm. Same seems true about cash-in-hand, which is does not seem to consistently determine limited liability, and does determine delinquency (as it would be ex-

pected). In columns (5) and (6) the model is estimated using Log(Cash) and owner delinquency as instruments.<sup>13</sup> When the reverse causality is accounted for, results not only disappear but become *negative*, both when the whole sample is used (column (6)) and when it is restricted to firms older than three years (column (5)).<sup>14</sup>

Results in tables II and III makes us comfortable with the assumption that limited liability induces “bad behavior”. Limited liability is associated with more delinquency, and this result is rather robust to including measures of firm type. Furthermore, reverse causality does not seem to drive results: estimates indicate bad type firms do not choose limited liability anticipating high probability of defaulting.

## IV. Results

### A. The value of relationships according to limited liability

In table IV, shows the estimates of the parameters in (1) for limited and unlimited liability firms, in terms of EPDs offer taken advantage of. Starting at column (6), one can see that relationships have value. The ordered probit 0.22 estimate means, economically, that a firm 10% more relational than the average firm has 8.3% more chance of taking advantage of all EPDs offered. Other estimates are either expected by theory, or consistent with what has been documented in the literature. Older firms with more cash-in-hand take more advantage of EPDs. Larger firms as measured by assets take more advantage of EPDs, but firms with more employees take advantage of less EPDs. Urban firms and firms in more concentrated bank markets take less advantage of EPDs.<sup>15</sup>

<sup>13</sup>Credit score would another candidate. There is however, slightly more evidence that it determine limited liability choice. Results are very similar if credit score is used as an additional instrument.

<sup>14</sup>For consistency, when the whole sample is used current variables such as equity and credit score are included. When the sample is restricted, only “fundamental characteristics” variables, such as size and age are included. Results are very similar if they were always included or excluded.

<sup>15</sup>The result that take urban firms take more advantage of EPDs was already in Petersen and Rajan [1995]. Bank market concentration implies less bank credit for 1998 is in De Mello [2006]. This result, however, was the opposite in 1987 (Petersen and Rajan [1995]).

### Early Payment Discounts

	†(1)	‡(2)	† (3)	‡ (4)	§(5)	(6)
<i>Log(Relational)</i>	0.33 (0.11)***	0.04 (0.19)	0.26 (0.11)**	0.05 (0.20)	0.25 (0.12)**	0.22 (0.10)**
<i>Credit Score</i>			-0.21 (0.03)***	-0.23 (0.06)***	-0.25 (0.04)***	-0.22 (0.03)***
<i>Owner Delinquent?</i>			-0.09 (0.05)**	-0.15 (0.08)*	-0.08 (0.05)	-0.10 (0.04)**
<i>Log(Cash/Assets)</i>	0.08 (0.02)***	0.06 (0.04)	0.05 (0.02)***	0.04 (0.04)	0.05 (0.02)**	0.05 (0.02)***
<i>Log(Employee)</i>	-0.08 (0.04)**	-0.09 (0.06)	-0.07 (0.04)*	-0.06 (0.06)	-0.08 (0.04)*	-0.06 (0.03)**
<i>Log(Age of Firm)</i>	0.15 (0.05)***	0.20 (0.07)***	0.09 (0.05)*	0.14 (0.07)*	0.10 (0.05)*	0.11 (0.04)***
<i>Log(Assets)</i>	0.08 (0.03)***	-0.00 (0.05)	0.05 (0.03)	-0.03 (0.05)	0.05 (0.03)	0.02 (0.02)
<i>MSA</i>	-0.26 (0.09)***	-0.19 (0.14)	-0.23 (0.09)**	-0.17 (0.13)	-0.19 (0.10)*	-0.20 (0.08)***
<i>HHI</i>	-0.10 (0.07)	-0.07 (0.11)	-0.12 (0.07)*	-0.09 (0.11)	-0.13 (0.07)*	-0.11 (0.06)**
<i>Observations</i>	1022	431	1022	431	860	1453

Table IV Source FED, SSBF 1998. Dependent variable is 5, if firm took advantage of all EPDs, 4 if most of the time, 3 if around half the time, 2 if few times, 1 if never. Ordered Probit estimates. Robust standard errors in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. †: limited liability firms. ‡: unlimited liability firms. §: limited liability firms managed by their owners. Sector and Region dummies included.

In column (1) only limited liability firms are in the sample, and the *proxies* for type of firm (credit score and owner delinquent) are omitted. In column (2) shows the same for unlimited liability firms. One can see a marked difference: while relationships are valuable for limited liability firms, they seem not valuable for unlimited liability ones. Economically, the ordered probit coefficients mean that, a limited liability firm 10% more relational than an average limited liability firm has 12.7% more chance of taking advantage of 100% of EPDs ( $p$ -value = 0.3%). For an unlimited liability firm, this effect is 1.5%, but it is not precisely estimated ( $p$ -value = 84.2%). Columns (3) and (4) show this difference is not produced by omitting credit worthiness. When credit score and owner delinquency are included, the difference still arises.

As a last robustness check, we estimate the value of relationship only for limited liability firms managed by their owners. Since unlimited liability implies the owners' and unlimited partners' assets are in the line, it seems reasonable that the results should arise when only owner-managed firms are included. The result still arises, despite the smaller sample size. This also indicates the difference between unlimited and limited liability firms is not due to smaller sample size on unlimited liability firms.

In table V, the other survey years are added. The estimated model is less satisfactory, for the lack of information on credit score for 1993 and 1987. For

1993, one still observes whether the owner of the firm was delinquent at some point in the previous three years.

### Early Payment Discounts

	(1)	‡(2)	‡(3)	(4)	‡(5)	‡(6)
<i>Log(Relational)</i>	0.47 (0.06)***	0.52 (0.07)***	0.36 (0.12)***	0.36 (0.07)***	0.42 (0.08)***	0.16 (0.15)
<i>Owner Delinquent?</i>				-0.47 (0.06)***	-0.43 (0.08)***	-0.57 (0.09)***
<i>Log(Cash/Assets)</i>	0.06 (0.01)***	0.06 (0.01)***	0.06 (0.01)***	0.05 (0.01)***	0.05 (0.01)***	0.05 (0.01)***
<i>Log(Employee)</i>	-0.04 (0.02)**	-0.03 (0.02)	-0.07 (0.03)**	-0.04 (0.02)**	-0.03 (0.02)	-0.07 (0.04)*
<i>Log(Age of Firm)</i>	0.21 (0.02)***	0.22 (0.02)***	0.18 (0.03)***	0.18 (0.02)***	0.19 (0.03)***	0.14 (0.05)***
<i>Log(Assets)</i>	0.02 (0.01)	0.04 (0.02)**	-0.03 (0.02)	0.02 (0.01)	0.04 (0.02)**	-0.02 (0.03)
<i>MSA</i>	-0.20 (0.04)***	-0.23 (0.05)***	-0.11 (0.07)*	-0.23 (0.05)***	-0.28 (0.06)***	-0.12 (0.09)
<i>HHI</i>	0.02 (0.02)	0.02 (0.02)	0.02 (0.03)	-0.02 (0.03)	-0.01 (0.03)	-0.08 (0.05)
<i>Observations</i>	5462	3728	1734	3599	2571	1028

Table V Source FED, SSBF 1998 and 1993, NSSBF 1987. Dependent variable is 5, if firm took advantage of all EPDs, 4 if most of the time, 3 if around half the time, 2 if few times, 1 if never. Ordered Probit estimates. Robust standard errors in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. †: limited liability firms. ‡: unlimited liability firms. §: limited liability firms managed by their owners. Sector, region and year dummies included. For columns (4)-(6), only 1993 and 1998.

Results including all three years confirm that the 1998 results in table IV were not a peculiarity. Relationships continue to have value, which is what columns (1) and (4) show: strength of relationships are associated with more advantage of EPDs. The model estimated for all years does not include any measure of firm credit worthiness.<sup>16</sup> Still, the same result as in table IV arises. For limited liability firms (column (2)), the ordered probit estimate implies that a firm 10% more relational than an average limited liability firm has 20.6% more chance of taking advantage of 100% of EPDs ( $p$ -value = 0.0%). For unlimited liability, this effect is 14.16% ( $p$ -value = 0.2%).

The omission of any measure of credit worthiness appears to bias the value of relationships upward. In columns (5) and (6), owner delinquency is included, which forces us to drop all 1987 observations. A result very similar to 1998 arises: while for limited liability firms, relationships are valuable, they do not seem to matter for unlimited liability firms. For the former, a firm 10% more relational than an average limited liability firm has 16.74% more chance of taking advantage of 100% of EPDs ( $p$ -value = 0.0%). For the later, this effect is only

<sup>16</sup>Credit score is available only for 1998. Owner delinquency only for 1993 and 1998.

6.24%, and not precisely estimated ( $p$ -value = 0.0%). Notice that the number of observations on unlimited liability firms rises to 1028, which makes us more comfortable that the result for 1998 is not driven by too few observations on unlimited liability firms..

## B. The value of relationships according to credit worthiness

Table VI shows results when the model in equation (1) is estimated according to whether firms have bad or good credit score.<sup>17</sup> In columns (1) and (3), equation (1) is estimated for firms with a bad credit score, which can be thought of as the most informationally opaque firms. Relationships are valuable for these firms: the ordered probit coefficient in column (1) means that a bad credit record firm 10% more relational than the average firm has 14.6% more chance of taking advantage of all EPDs offered. When compared with firms with a good credit record (columns (2) and (4)), one can see that relationships are more valuable for more informationally opaque firms. However, relationships are also valuable for good credit record firms: a good credit record firm 10% more relational than the average firm has 9.5% more chance of taking advantage of all EPDs offered.

### Early Payment Discounts

	‡(1)	‡(2)	‡ (3)	‡ (4)
<i>Log(Relational)</i>	0.45 (0.22)**	0.24 (0.13)*	0.50 (0.22)**	0.26 (0.12)**
<i>Credit Score</i>	-0.02 (0.12)	-0.39 (0.12)***		
<i>Owner Delinquent?</i>	-0.08 (0.06)	-0.14 (0.12)		
<i>Log(Cash/Assets)</i>	0.04 (0.04)	0.04 (0.03)	0.05 (0.03)	0.04 (0.03)
<i>Log(Employee)</i>	-0.05 (0.07)	-0.12 (0.05)**	-0.05 (0.07)	-0.12 (0.05)**
<i>Log(Age of Firm)</i>	0.13 (0.07)*	0.10 (0.06)	0.14 (0.07)*	0.13 (0.06)**
<i>Log(Assets)</i>	0.02 (0.05)	0.06 (0.04)	0.03 (0.05)	0.07 (0.04)*
<i>MSA</i>	-0.28 (0.15)*	-0.16 (0.11)	-0.28 (0.15)*	-0.21 (0.11)*
<i>HHI</i>	-0.15 (0.11)	-0.08 (0.09)	-0.16 (0.11)	-0.10 (0.09)
<i>Observations</i>	409	626	409	626

Table VI Source FED, SSBF 1998. Dependent variable is 5, if firm took advantage of all EPDs, 4 if most of the time, 3 if around half the time, 2 if few times, 1 if never. Ordered Probit estimates. Robust standard errors in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. †: Bad Credit Score (high and significant categories 3, 4 and 5). ‡: Good Credit Score (low and moderate risk). Sector and Region dummies included.

<sup>17</sup>The sample could also be split according to whether the firm's owner was delinquent or not. There are, however, too few observations for which the owner was delinquent.

This result can be alternatively interpreted as relationships being more valuable for firms under financial distress. This could be so because relationships produce private information above and beyond credit score, and therefore relational lender are willing to fund firms in difficulty. Or, it could mean that relational firms under distress get financed because this is part of the equilibrium path in a repeated moral hazard game in which the continuation value of relationships induce firm to take the action lenders want them to [see Boot and Thakor [1994] and Carrasco and De Mello [2006]]. Under the interpretation that credit score measures financial distress, relationships can be valuable both as disciplining mechanism or as a technology to produce private information.

## V Conclusion

Our first result, which is not a novelty, is that relationships matter. Just as they did in late 1980s, they continued to do so in the late 1990s. Still, it is informative to know why they matter. Our results indicate both theoretical explanations, hidden information and hidden action, are relevant to explain why relationships are valuable. However, firms hidden action seems, for this application, more robust as an explanation.

It is not warranted to conclude from these results that hidden action is first-order relative to hidden information. Our measure of incentive misalignment is stronger than our measure of informational opaqueness. Further empirical research, specially in other empirical settings, is necessary to establish degrees of importance. We can, however, be assertive that incentive reason seems at least as important as the adverse selection reason. If this is so, one should be less concerned about banking deregulation and consolidation as a harmful trend to small firm lending. Relationships will have a better shot at surviving in the new structure of the banking industry since large, more competitive banks, while being disadvantaged at acquiring and using private information, do not have an intrinsic disadvantage in using relationships as disciplining mechanism. The geographical expansion of the banking industry can still harm small business for reasons other than slashing relational ties between lender and borrowers. One such reason is that small firms now compete for funds with more alternative uses. Relationships however should survive, as the evidence that there are as important in the late 1990 as they were in the late 1980 suggests.

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