

The Ties That Bind: Bank Relationships and Small Business Lending

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Abstract

Banks are a primary source of capital for small, private firms, yet the inner workings of small firms' bank relationships remain obscure. This paper uses hand-collected, proprietary data from a mid-sized regional bank in the United States to empirically identify the channels that strengthen the relationship between a small business and its bank. In contrast to earlier work that focuses on the role of relationships in alleviating information and incentive problems in lending, I find that the source of value in relationship banking is not limited to enhanced monitoring. I introduce two novel channels of relationship strength that embody an entrepreneur's non-lending profit appeal for a bank: (1) the depth of *cross-selling* of non-loan products to the entrepreneur, and (2) the breadth of additional bank business referred through the entrepreneur's social and professional *connections*. I show that a borrower's intensive margin of profit (the depth and profitability of cross-selling) and extensive margin of profit (the quantity and profitability of referrals) lower the cost of borrowing and generate access to more credit. These effects are additive. A one-standard deviation increase in both cross-selling and referral profits is associated with a 35 basis point reduction in the loan interest rate and a 26 percent increase in the amount of credit available to a firm.

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1. Introduction

A large theoretical literature argues that bank relationships mitigate information and incentive problems in the supply of credit.¹ These relationships are particularly important for small firms, since their informational opacity can preclude access to public capital markets. Yet the inner workings of small businesses' bank relationships remain obscure. Empirical evidence is sparse in large part because micro data on contracting between private firms and banks is rarely available.

Surveys of small business owners suggest that longer and more concentrated bank relationships ease access to credit and, to some extent, lower interest rates and collateral requirements (Petersen and Rajan (1994), Berger and Udell (1995)). However, the underlying mechanism that drives these benefits is not clear. As Boot (2000) points out in a review of the literature, "existing empirical work is virtually silent on identifying the precise sources of value in relationship banking."

In this paper, I demonstrate that in order to dissect the foundations of relationship benefits, it is critical to view lending within the larger set of fee-generating services that banks provide. While standard theories model banks as delegated monitors with the twin roles of credit and liquidity provision (Diamond (1984, 1991), Rajan (1992), Kashyap, Rajan and Stein (2002)), technology and deregulation have significantly expanded banks' production set beyond financial intermediation. Banks offer an array of non-credit financial services and products, including portfolio management, firm cash management, transaction services, pension plans, trust services, and other types of asset management. At banks across the United States, income from non-credit services has more than doubled in the last 30 years, from 18% of total net operating revenue in 1979 to a share of 41% at the end of 2007 (see Figure 1).

This paradigm shift has changed the composition of bank income sources and placed credit policy in a broader context of profit maximization (Rajan (1996)). Several authors have examined the implications of large banks' provision of non-intermediation services;² however, micro evidence on how non-credit income incentives shape lending relationships at small banks has lagged behind.

¹ See Leland and Pyle (1977), Stiglitz and Weiss (1981), Campbell and Kracaw (1980), Diamond (1984, 1991), Ramakrishnan and Thakor (1984), Fama (1985), and Haubrich (1989). Bhattacharya and Thakor (1993) provide an excellent review.

² See, for example, Rajan (1991), John et al (1994), Puri (1996), Boyd et al (1998), Boyd et al (1980), Kwan (1998), De Young and Roland (2001), Stiroh (2004), Drucker and Puri (2005), and Stiroh and Rumble (2006).

In this paper, I employ a unique empirical strategy that explores small business bank relationships from the perspective of aggregate profitability. I argue that information exchange is only part of the mechanism that creates benefits for firms with strong ties to their bank. Information production is costly and, thus, wasteful if the overall profits from the borrower are not high enough to justify the opportunity cost of monitoring. To assess the determinants of relationship strength, I assemble proprietary data from the commercial lending portfolio of a mid-sized regional bank in the United States. I construct a novel dataset that combines detailed information on every loan, including direct measures of ex ante risk and ex post performance, with thorough observation of the borrower's overall relationship with the bank. The empirical view of the relationship includes the borrower's purchases of non-lending services, as well as the borrower's referrals of additional clients to the bank. By focusing on the complete commercial loan portfolio of an individual bank, I exploit variation in borrower characteristics within the same institution to directly quantify the influence of relationships on the price and availability of credit.

To identify the drivers of relationship strength, I examine the features that make a borrower attractive enough as a trading partner to merit more favorable loan terms than a less attractive borrower with a comparable risk profile. I introduce two novel channels of relationship strength that capture an entrepreneur's non-lending profit appeal for a bank: namely, (1) the depth of *cross-selling* to the entrepreneur, and (2) the breadth of additional bank business referred through the entrepreneur's social and professional *connections*. These measures represent a borrower's intensive and extensive margins of profit, respectively: Cross-selling captures the supplemental profit the bank extracts from within an individual borrower, while the revenue stream from referred connections embodies the additional profit acquired from just outside the borrower's limit.

I postulate that, for a given level of borrower credit quality, the strength of a bank relationship is increasing in the borrower's overall profitability to the bank. To the extent that banks use price as an instrument to reward their most valued customers, the risk-adjusted discount should be greater for borrowers who yield higher overall profits to the bank, either through the cross-purchase of non-loan products or through the referral of additional clients. Moreover, if banks adjust benefits on the quantity margin, the risk- and demand-adjusted amount of capital committed to a firm should be larger for borrowers who generate more profits through higher cross-selling intensity and referral breadth. I call the interplay between non-credit income

incentives and the terms of credit the “profit channel” of relationship benefits. The profit channel weighs the borrower’s value as a non-credit customer, and adds another dimension of relationship strength to the “information channel” that dominates within the credit domain.³

Identifying the profit channel of relationship benefits hinges on separating a borrower’s non-lending profit appeal from his credit quality. Profit channel benefits are price discounts and/or quantity increases *in excess* of the benefits for lower credit risk and reduced monitoring cost that derive from the information channel of the relationship. The key to distinguishing the profit effect is to account accurately for the bank’s expectation of credit quality and monitoring cost at the time it sets the terms of the loan. I use the proprietary risk rating that the bank assigns to the borrower as a measure of the borrower’s risk at loan origination.⁴ The ability to control directly for the firm’s risk level ameliorates any potential concern that measures of relationship strength are contaminated with credit quality. In addition, to account for possible differences in intra-rating quality, I strengthen the risk control with two measures of ex post loan performance that are costly for a bank, and whose probability should be priced into the initial interest rate.

I directly evaluate the borrower’s non-lending profit appeal to the bank in the following ways: First, I measure the intensity of cross-selling by computing the number of non-credit products the borrower purchases from the bank, both in aggregate terms and differentiated across deposit/savings accounts, cash management services, and other financial services. In addition to the raw number of products, I calculate the actual dollar profits the bank earns on each borrower from these non-credit services. Second, I capture the supplementary profit opportunities the bank secures from the borrower’s connections by constructing variables that measure the number of bank clients the borrower refers, as well as the total dollar profits the borrower’s referrals yield the bank.

I use these measures to quantify the impact of non-lending income incentives on the price and availability of credit for small businesses. I find evidence for the profit channel of relationship strength in the form of risk-adjusted price discounts and quantity rewards for borrowers who have strong non-credit profit appeal. Conditional on risk profile, a one-standard

³ Institutional details give credence to the aggregate profitability framework for relationship strength. In practice, the unit of classification the bank uses to denominate each customer is the profit tier corresponding to the customer’s total credit and non-credit income. These tier demarcations are linear in dollar profits, and proceed down the hierarchy from “*Crystal*” clients to “*Gold*”, “*Silver*”, “*Bronze*”, and “*Key*” customers.

⁴ Earlier papers that use self-reported survey data measure risk indirectly with traditional proxies such as firm size and leverage. A notable exception is Agarwal and Hauswald (2008), who incorporate the internal bank risk rating in their study of a firm’s decision to seek a relationship-based loan in-person or a transaction-based loan via the same bank’s e-loan option.

deviation increase in both cross-selling and referral profits is associated with a 35 basis point reduction in the loan interest rate and a 26 percent increase in the amount of credit available to a firm. In dollar magnitude, the risk-adjusted price discount corresponds to an average annual rebate of 13 cents in reduced interest payments for every one dollar of non-credit profit a borrower yields the bank.

These results on the profit channel of relationship strength offer new insights on the dynamics and potential costs of bank-borrower relationships. For example, in models of banks as pure financial intermediaries, the relative bargaining position of each party is determined in the credit domain alone. The findings of this paper show that income incentives on the non-lending side can carve out a component of relationship capital that is transferrable, and present the borrower with a credible source of bargaining power over a bank. This in turn can have implications for firms' exposure to hold-up, as well as banks' vulnerability to soft budget constraints.

The rest of the paper is organized as follows. Section 2 reviews related work. Section 3 describes the data. Section 4 outlines the empirical strategy and the key relationship and risk variables. Sections 5 and 6 present empirical results for the price and quantity of credit, respectively. Section 7 concludes.

2. Related Findings from Survey Data

In contrast to an extensive literature on large scale firm-bank relationships⁵, there is little empirical evidence about the bank relationships of small firms. Previous studies rely on survey data from the Federal Reserve Board's National Survey of Small Business Finances (NSSBF) to infer the influence of bank relationships on self-reported terms of credit.⁶ Beginning with the seminal work of Petersen and Rajan (1994, 1995, 2002), these papers hypothesize that the

⁵ See, for example, early work by James (1987), Lummer and McConnell (1989), James and Wier (1990), Hoshi, Kashyap and Scharfstein (1990, 1991), Slovin, Sushka and Polonchek (1993), Shockley and Thakor (1997), and more recent work by Ongena and Smith (2001), Dahiya, Saunders and Srinivasan (2003), Hellman, Lindsey and Puri (2008), Ivashina and Kovner (2008), and Bharath, Dahiya, Saunders and Srinivasan (2007, 2010). Ongena and Smith (1998), Boot (2000), and Gorton and Winton (2003) provide excellent reviews. See, also, recent work on relationship banking in the context of consumer credit markets (Agarwal, Chomsisengphet, Liu and Souleles (2010), Puri, Rocholl and Steffen (2010)); retail deposit markets (Puri and Rocholl (2008), Iyer and Puri (2008)); and alternative credit markets (Iyer, Khwaja, Luttmer and Shue (2009), Ravina (2008)).

⁶ See, also, empirical evidence from Belgium (Degryse and Van Cayseele (2000), Degryse and Ongena (2005)) and Bolivia (Ioannidou and Ongena (2010)). For related empirical work that uses internal bank data to study organizational structure and informational flow within a bank, see Hertzberg, Liberti and Paravisini (2008) and Liberti and Mian (2009).

strength of a bank relationship lies in the bank's familiarity with the borrower, and highlight characteristics that could signal reduced information asymmetry and monitoring cost. In particular, they conjecture that (1) the length of the relationship summarizes a bank's opportunities to accumulate information about a firm; (2) the scope of the bank's information set widens if, in addition to a loan, the firm purchases a checking account or any other bank service that provides a window on its cash flow; and (3) the bank's control over the costly information it has produced strengthens if the firm concentrates all of its borrowing needs in that bank. With regard to non-lending services, note that the binary measures of the non-lending relationship in these studies focus only on the potential information value in these products.

With these measures of relationship strength, Petersen and Rajan (1994) analyze the 1987 NSSBF sample and find that a firm's interest rate increases with the number of banks from which it borrows, but does not respond significantly to the length and scope of the relationship. Access to credit, however, is greater for firms that have longer and fewer bank relationships, and who buy additional financial services from their bank. Using a subset of the same sample, Berger and Udell (1995) contend that some of the loan types in the full NSSBF sample are inherently transaction-driven loans and, hence, dilute the relationship effect in Petersen and Rajan's price results. Using length of relationship as their singular measure of relationship strength, they find that firms with longer banking relationships pay lower interest rates and are less likely to pledge collateral. Cole (1998) uses the subsequent 1993 NSSBF survey and the Petersen-Rajan relationship strength measures to examine the role of relationships in a potential lender's decision of whether or not to extend credit to a firm. He finds that a firm is more likely to get a loan from a bank if it has a pre-existing savings account and buys at least one other financial service from the same bank, but less likely if it purchases financial services from multiple institutions.

3. The Bank

One of the primary limitations of using survey data to assess the determinants of relationship strength is the inability to observe a borrower's overall value to the bank that grants the loan. To circumvent this issue, I collect data from the commercial loan portfolio of a mid-sized bank in the United States, and assemble comprehensive information on the non-lending dimension of each borrower's relationship. The bank, which is ranked nationally as a top-performer by *Bank Director Magazine*, has a regional focus and holds in excess of \$5 billion in loans, \$5 billion in

deposits and \$10 billion in assets throughout a branch network upwards of 40 offices.⁷ It offers a full suite of commercial and personal loan products, residential mortgages, deposit services, cash management, advisory services, portfolio management, and personal and business trusts. None of the loans originated by the bank are securitized or passed through its balance sheet. Thus, the loan portfolio in this dataset is representative of a traditional lending technology where banks internalize losses and have high-powered incentives to screen and monitor borrowers carefully.

The sample represents the portfolio of commercial loans and commitments that were issued or renewed between January 1, 2005 and June 4, 2008. Each borrower can have multiple commitments with the bank, and each commitment can spawn multiple loans (see Figure 2). The sample consists of 3,257 loans and 1,572 credit lines drawn by 1,814 unique borrowers. The mean number of credit lines per borrower is 1.5 (median=1), and the mean number of loans is 1.8 (median=1). For each loan, I collect supplemental data from the bank on the date and name of each non-credit product the borrower purchases, the dollar profits the bank earns on the borrower during the sample period, and the borrower's links to other bank clients. I use this information to construct variables that capture the length of the relationship, as well as each borrower's cross-selling and referral profitability. Section 4 details each of these measures of relationship strength. In addition to these borrower characteristics, I collect data from Dun and Bradstreet on firm age, number of employees, and annual sales, successfully matching 49% of the firms in the sample.

4. Empirical Strategy

The identification strategy in this paper relies on separating the influence of non-credit profit incentives from the effect of having better and cheaper information about a borrower. To make this distinction, it is essential to measure both the bank's perception of the borrower's overall non-credit profit appeal and its assessment of credit risk and monitoring cost at the time it sets loan price and quantity. In this section, I describe the key relationship variables and risk controls I employ to distinguish profit channel rewards from those that flow through the information channel of the relationship.

4.1. Measuring Relationship Strength: Cross-Selling

The first dimension of relationship strength I measure embodies the depth of cross-selling of non-loan products. Consistent with industry norms, the bank markets a wide-ranging menu of

⁷ Asset values are stated ambiguously to protect the anonymity of the bank.

banking services that are distinct from the credit domain. These non-credit products are naturally partitioned into (1) traditional deposit and savings accounts, (2) cash management products, and (3) financial service products, each described in more detail below:

Deposit and savings accounts include both commercial and personal demand deposit accounts, money market and interest checking accounts, as well as certificates of deposits and other savings accounts. These accounts represent an inexpensive source of funds for the bank to loan out. They also allow the bank to observe a firm's cash flow and, potentially, the owner's personal liquidity. The average commercial borrower holds one deposit or savings account, while some firms hold as many as six such accounts (see Table 1).

Cash management products are banking services designed to help businesses better manage their cash flow by increasing control and efficient use of incoming and outgoing funds. These products expedite deposits, manage payments and payroll, consolidate and move funds to maximize interest-earning capacity, and protect against fraud. Some examples include sweep accounts, electronic deposits, and check processing. Bank clients purchase each service for an additional fee. The consumption of cash management services per commercial borrower in the sample ranges from zero to 25 products, with an average of 7 and a median of 5 (see Table 1). While cash management products generate significant non-credit fee income for banks, they also theoretically make it easier for a bank to monitor a firm's short-term cash flow. In practice, this function is by and large not exploited. Anecdotal evidence suggests that loan officers do not typically rely on the information embedded in a firm's use of cash management services. Instead, the primary channel to keep a pulse on a firm's financial health is the regular reporting of financial statements, as mandated by the loan contract. However, to avoid overlooking the potential information in this channel, I assume that the bank actively learns from the information set generated from a borrower's consumption of cash management services.

Financial service products encompass various types of asset management services for both businesses and individuals. They include IRA and employer-sponsored retirement plans, investments managed through the bank's proprietary family of mutual funds, client-directed investments, brokerage, trust and custodial services. Eleven percent of the loans in the sample are drawn by borrowers who also purchase at least one financial service product. The consumption of this product category ranges from zero to 5 products, with an average of 0.18 (see Table 1). In contrast to cash management services, these financial services do not reveal information about firm cash flow. Over long horizons, these products have the potential to be

partially informative about a firm's assets or its owner's net worth. However, detailed information on both firm assets and the owner's personal net worth is required of all borrowers as part of the risk rating process at loan initiation, regardless of whether or not the borrower entrusts the bank with the management of these assets. Furthermore, loan covenants are often tied to the value of these assets, which means that their value is routinely reassessed throughout the maturity of the loan. Even though the net worth of a firm and its owner are critical determinants of a firm's risk rating, *delegating* the management of these assets to the bank does not give the bank incremental information in excess of what is already required as part of the loan underwriting and monitoring process.

I measure the intensity of cross-selling per borrower in two complementary ways. First, I use the raw number of non-credit products a borrower purchases from the bank, both in aggregate terms and differentiated across deposit/savings accounts, cash management services and financial services. In addition, I measure the actual dollar profits the bank earns on each borrower from these non-credit products. The ability to directly measure each borrower's annual profitability to the bank is a unique feature of this dataset. The dollar profits per borrower are computed by the bank, and are used internally for such purposes as profitability analysis and loan officer compensation contracts. Using the bank's own accounting metric to measure borrower profitability ensures both consistency across borrowers and practical relevance to the decision-maker. The dollar profits per borrower correspond to the cumulative amount of profit accrued throughout the sample period. As such, this measure represents both the realized profits the bank has netted just prior to granting each loan, as well as a proxy for the near future profits the bank expects to earn from its cross-selling effort.

4.2. Measuring Relationship Strength: Connections

The second dimension of relationship strength captures the additional profit opportunities the bank secures through the borrower's connections. Connections are ties between clients, usually through referrals, where the bank perceives its relationship with a client as being correlated with its relationship with the client's ties. These connections are traced through a parent-child hierarchy. The levels of seniority are based on whom the bank perceives to be the pivotal party in that particular group of connected clients. Figure 3 illustrates a few examples of possible ways in which clients are connected to each other within the bank. In the first example, Client A is a stand-alone client who is not connected to any other bank customer. In the second example,

Client *B* is the head of a group of size four, in which he is responsible for referring Clients *x*, *y* and *z* to the bank. *B* is regarded as “senior” to his three “children” *x*, *y* and *z*, while they are each considered his “junior”. In the third example, Client *C* is the “ultimate head” of a group of size six, where he is “senior” to his five children *x*, *y*, *z*, *w*, and *D*. However, *D* also gets credit for referring *z* and *w*, who are therefore regarded as *D*’s children as well. Another way to understand this type of group is to think of *C* as the ultimate head with children *x*, *y* and *D* and grandchildren *z* and *w* courtesy of his child *D*. In this case, *D* is both junior to one client (*C*) and senior to two others (*z* and *w*). In practice, these groups commonly represent ties between firms, suppliers, customers and a firm owner’s personal relationships.

One might wonder why these connections are important enough for the bank to invest in their documentation. In practice, connected clients tend to have correlated longevity with the bank: if a pivotal member of the group leaves the bank, others might follow, possibly with some lag. In other words, just as the cross-selling measures capture both realized and expected profits, these networks of referrals capture both the potential for new sources of profit and, importantly, the loss of existing sources of profit. Table 1 gives summary statistics for the various connection measures I employ. Sixty-four percent of the loans in the sample are drawn by borrowers who are connected to at least one other bank client. The average client is connected to six other bank clients. The median number of connections to other clients is two and the 90th percentile is 13. Approximately 35 percent of the loans are drawn by borrowers who are “senior” to other bank clients. Conditional on having referred another client, the average number of referrals is 3 and the median number is 2.

4.3. Measuring Relationship Strength: Length

In addition to these novel channels of relationship strength, I measure the length of the borrower’s overall relationship with the bank. Approximately 37% of the borrowers in the sample purchased non-lending services from the bank before initiating their first commercial loan. The length of relationship is on average 6.5 years, and ranges from brand-new relationships of a few weeks to long-standing relationships of 32 years (Table 1). In order to allow for non-linearity in the effect of relationship length, throughout the paper, I use dummy variables that partition the duration space into five ranges: one to two years, three to five years, six to ten years, eleven to fifteen years, and greater than fifteen years. The coefficients on these ranges

measure the impact of relationship length relative to brand-new relationships of less than one year.

4.4. Measuring Risk: Ex Ante Credit Quality

Earlier papers that use self-reported survey data measure risk indirectly with traditional proxies such as firm size, leverage and profitability. Measuring small firms' risk with hard information alone neglects the distinguishing attribute that compels these inherently obscure firms to seek credit from smaller regional banks instead of large banks. In addition to gleaning information from firms' financial statements, small banks evaluate intangible risk factors such as the borrower's character, the quality of management, geographic risk, industry risk, extraordinary risks, and competitive position (Stein (2002), Petersen (2004), Berger, Miller, Petersen, Rajan and Stein (2005), Berger and Udell (2002)). Thus, an accurate measure of credit risk must embed both the quantifiable information about the firm and the soft, private information the bank has accumulated through costly monitoring.

In accordance with the United States Office of the Comptroller of the Currency (OCC) recommendation, the bank assesses two risk ratings for each loan: (1) the *Borrower Rating*, which measures the borrower's fundamental creditworthiness on the basis of historical, present and prospective financial and non-financial characteristics, and (2) the *Facility Rating*, which adjusts the *Borrower Rating* based on an analysis of positive and negative factors that can affect the potential for recovery in the event of default. To determine the *Borrower Rating*, the bank evaluates the borrower's character, the quality of management, the firm's leverage, capitalization, liquidity, profit margins, earnings, adequacy of financial records, alternative funding sources, geographic risk, industry risk, cash flow adequacy, accounting practices, asset protection, payment performance, extraordinary risks, and competitive position. To assess the intangible components of risk, in particular the borrower's character, loan officers make phone calls to the borrower's suppliers and customers, as well as to fellow lenders in the area. According to the bank, financial communities in regional lending markets are small and "reputation follows a borrower". Special attention is paid to how the borrower has dealt with financial commitments in the past, especially during previous business cycles or other periods of distress.

The *Facility Rating* modifies the *Borrower Rating* on the basis of collateral, guarantees or third-party undertakings, ownership, loan structure, terms, and policy exceptions. Put

differently, the *Borrower Rating* reflects the probability of default while the *Facility Rating* reflects the probability that the bank will incur a loss in the event of default. Each borrower has only one *Borrower Rating*, but can have multiple *Facility Ratings*. For each loan, the *Facility Rating* encapsulates what is known in the industry as the “5 C’s of Credit”: the borrower’s character (repayment integrity), capacity (cash flow), capital (net worth), collateral to secure the loan, and the conditions of the overall economy.

Both scores are rated on an integer scale between 1 and 10 that is decreasing in credit quality: a 1-rated facility represents the highest quality class of loan, while a rating of 10 signifies loss to the bank. In all of the regressions in the paper, I control for the level of the risk rating non-parametrically with dummy variables that span the *Facility Rating*'s integer scale. This approach imposes the least a priori structure on how the risk rating maps to the cost and availability of capital.

A natural concern with subjective risk assessments is their susceptibility to favoritism or other contaminating biases. Loan officers could potentially assign better risk ratings to borrowers who generate more profits (both realized and potential) through either the cross-selling or referral channel. This possibility is especially worrisome in light of the growing evidence of rampant manipulation of risk ratings for securitized products during the sample period of this study (Benmelech and Dlugosz (2009)). However, any “preferential measurement error” that could result from attempts to game the rating process would likely exert an opposite bias on the estimated coefficients after controlling for the level of the risk rating. Absent the subjectivity confound, the results would only get stronger.

4.5. Measuring Risk: Ex Post Loan Performance

To capture any variation in risk within a rating band, in supplementary regressions, I use two measures of ex post loan performance that impose real costs on the bank. I track the performance of each loan in the sample through the end of June, 2009. While 65% of the loans reach maturity by the end of the observation period, I address concerns about right-censoring by controlling for both the maturity and the month-year of loan issue.

The first measure of loan performance is the non-accrual status of the loan. A non-accrual is a non-performing loan on which interest is overdue and full collection of principal is uncertain. These are loans in default or close to being in default. A loan that declines to this state of objective default is then transferred to the bank’s Special Assets Division, where a subjective

decision is made whether to work out the loan, charge off the principal, or exit the relationship entirely.

In case default is too severe an outcome to capture small differences in intra-rating quality, the second measure of loan performance I use corresponds to changes in the loan's risk rating between initiation and maturity. Risk ratings are routinely reassessed throughout the life of the loan, either on a quarterly or monthly basis. The reassessed risk rating is of consequence because it determines the amount of loan loss reserves the bank is required to hold. Loans that migrate into riskier classifications inflict ex post opportunity costs on the bank by siphoning off capital that could otherwise earn higher interest as loans to other borrowers. An ex post downgrade is, therefore, costly for the bank even if the loan does not fully deteriorate to a non-accrual or eventual charge-off. Conversely, ex post upgrades are valuable, as they free up reserve capital for new loans.

4.6. Additional Controls

In addition to the borrower's riskiness, I control directly for other important loan and firm characteristics that influence the terms of credit. For each loan in the sample, I include the maturity of the loan, measured in months; the logarithm of the total loan amount; a dummy variable indicating whether the loan is secured; a time fixed effect corresponding to the month-year of loan issue to capture the prevailing economic conditions and interest rate environment; a loan index fixed effect that indicates whether the loan is set at a fixed or variable rate, and to which index the interest rate is tied (e.g., LIBOR, Prime rate); and a loan type fixed effect that describes the specific purpose of the loan (e.g., working capital, equipment loans, accounts receivable). The loan type is an especially important control as, according to the bank, certain types of loans require more intensive follow-up and have higher maintenance costs that lead to higher prices. I control for the industry of each firm at the 2-digit NAICS level. I also include a branch fixed effect to capture the bank office that originated the loan. The branch fixed effect has a dual purpose. In addition to controlling for the location of the borrowing firm, it captures any unobservable branch-specific characteristics that could influence the terms on which credit is granted, including the idiosyncratic components of each branch's underwriting culture, and the underlying matching of loan officers to branches. Finally, I include supplementary data from Dun and Bradstreet on firm age, the number of employees, and annual sales.

5. Relationships and the Price of Credit

I first examine how the strength of a firm's relationship with its bank impacts its cost of borrowing. To the extent that banks use price as an instrument to reward their most valued customers, I hypothesize that the risk-adjusted discount should be greater for borrowers who yield higher overall profits to the bank, either through the cross-purchase of non-loan products or through the referral of additional clients. I test the profit channel hypothesis by estimating different variants of the following baseline specification:

$$\begin{aligned} \text{Rate}_{i,j} = & \alpha_{i,j} + \beta_{1,i} \text{Relationship Characteristics}_i + \beta_{2,ij} \text{Risk Characteristics}_{i,j} \\ & + \beta_{3,ij} \text{Loan Characteristics}_{i,j} + \beta_{4,i} \text{Firm Characteristics}_i + \varepsilon_{i,j} \end{aligned}$$

where *Rate* is the all-in cost for firm (*i*) of loan (*j*), computed as the sum of the interest rate and the amortized loan fees in basis points. Across the 3,257 loans in the sample, the all-in rate averages 6.94 percent with a standard deviation of 2.25 percent. The vector of *Relationship Characteristics* includes the length of the relationship and various measures of cross-selling intensity and referral breadth, each described in detail with the corresponding regression results. *Risk Characteristics* include dummy variables for the initial risk rating in every regression, as well as ex post non-accrual status and changes in risk rating in supplementary regressions. The set of *Loan Characteristics* consists of the maturity, amount, collateral, loan type, loan index, month-year and originating branch. The *Firm Characteristics* include industry fixed effects in every specification. Supplementary regressions that control for firm age, number of employees and the dollar volume of annual sales are reported in the Appendix, due to loss of observations when matching with Dun and Bradstreet. Tables throughout the paper report standard errors that are clustered at the borrower level.

The analysis of price proceeds as follows: I first look at the influence of a borrower's direct profitability from non-credit income. Then I consider separately the price impact of the borrower's indirect profitability from referrals of new clients. Finally, I combine the analysis to test for an additive impact of these two effects.

5.1. Cross-Selling and Price

As an initial step in the cross-selling analysis, Columns 3 through 7 of Table 3 report the coefficients from estimating a version of the baseline regression that measures relationship strength through the raw number of non-credit products the borrower purchases. Column 3 shows that each non-credit product reduces the interest rate by 3.5 bps. This translates to a 35.7

basis point reduction for the mean number of non-credit products purchased by commercial borrowers. A one-standard deviation increase in the intensity of cross-selling (roughly 9 non-credit products) lowers the rate by 29.5 bps.

In interpreting this result, we must be careful not to attribute the credit discount associated with the number of non-credit purchases exclusively to the profit channel of relationship benefits. While all non-credit products generate attractive fee income for the bank, not all product categories are equal in their information content. As previously discussed, deposit/savings accounts and some cash management products inherently embed information about firm cash flow. Borrowers who consume more of these products provide the bank with additional opportunities to monitor them at lower cost. For these two product categories, a price reduction associated with the depth of purchases is entirely consistent with the information channel of relationship benefits highlighted in previous empirical work. Products in the “financial services” category, on the other hand, do not facilitate monitoring. These asset management services do not reveal information about firm cash flow, nor do they provide incremental information about the firm’s assets or the owner’s net worth in excess of the standard reports required by the loan underwriting and monitoring process. The bank’s incentive to sell these products is entirely fee-driven.

If the value of cross-selling were limited to information content and the attendant ease of monitoring, price rewards for purchasing non-credit products would only exist for informative product categories. In Columns 4 through 7 of Table 3, I examine the impact of cross-selling for each product category separately. Each deposit/savings account is associated with a reduction of 4.8 bps (t-statistic=0.92), each cash management product with a reduction of 3.1 bps (t-statistic=3.99), and each financial service product with a reduction of 8.7 bps (t-statistic=1.35) from the loan rate. The magnitude of the sensitivity is highest for non-informative financial service products, but these services have low utilization rates in the sample, so the mean effect in this category is only 1.6 bps, compared to 6.4 bps for the mean number of deposit/savings accounts (roughly 1 account), and 23.3 bps for the mean number of cash management products (roughly 7 products). In Column 7, I use binary measures of product category consumption instead. Buying at least one cash management service has a statistically insignificant inverse effect of 33.1 bps on the loan rate; however, simply delegating the management of assets to the bank (a non-informative service) lowers a borrower’s interest rate significantly by 40.4 bps (t-statistic=2.70). This effect does not stem from borrower risk type, as it holds controlling for the

Facility Risk Rating, which accounts for both the borrower's net worth and the likelihood of recovery in the event of default.

One concern with the interpretation of these results is that the number of non-credit products a borrower purchases is in fact a proxy for firm size and, therefore, correlated with credit risk. Panel B of Table A1 addresses this concern by repeating the same analysis while adding controls for the number of employees, annual sales, and the age of the firm (all expressed in logs). Adding these controls truncates the sample to 1,598 observations and slightly lowers the magnitude of the coefficients on the relationship variables, but the pattern of results is identical. Furthermore, even though larger firms might have intrinsic demand for a larger set of non-credit products, the competing hypothesis that the price reward is driven instead by underlying borrower risk type is again ruled out by the direct control of the *Facility Risk Rating*.

The sheer number of non-credit products a borrower purchases loosely approximates the profitability of the non-lending component of the relationship, but a more direct way to test the profit channel is to look at the actual dollar profits the bank earns on each borrower from these products. Table 4 examines the impact of the borrower's intensive margin of profit by directly measuring the dollar profits the bank accrues from fees charged on the non-lending relationship. The key explanatory variable is *Non-credit profits to bank (\$)*, which represents the total dollar profits the bank earns on the client during the sample period, denominated in units of \$100,000. Column 1 shows that the dollar volume of profits is associated with a statistically significant 17.1 basis point reduction in the interest rate. A one-standard deviation increase in profitability lowers the interest rate 34.6 bps; the mean reduction is 19.2 bps.

However, once again, we have to consider the information potentially embedded in these profit figures, since some of the fee generation comes from informative products, like cash management services. In order to separate the profit channel from the information effect, Columns 2 through 5 of Table 4 refine the analysis by conditioning the non-credit dollar profits on the number of products purchased. The rationale is as follows: If each product specializes in an individual type of information, then the total number of products used by the borrower roughly captures the amount of product-driven information made available through cross-selling. Thus, controlling for the amount of information reveals the excess return of a borrower's cross-selling profitability, above and beyond the value of information exchange. As can be seen across the various specifications in Table 4, the profit effect strongly survives controls for the borrower's consumption of each product category. As a conservative inference, I focus on the

result in Column 2, which separates the collective information embedded in the aggregate number of non-credit products purchased by the borrower. The coefficient on the profit variable indicates a statistically significant 14.4 basis point reduction per loan for every \$100,000 of non-credit profits a borrower yields the bank during the sample period. Another way to conceptualize the magnitude of this value transfer is a dollar-for-dollar comparison of price discount and profit yield. That is, for every dollar of non-credit profits a borrower yields the bank, what is the dollar magnitude of the rebate he gets in the form of reduced interest payments? Per loan, the average annual rebate is 7 cents for every \$1 of non-credit profit. Per borrower, the average annual rebate corresponds to 13 cents (in interest payments across all loans) for every \$1 of non-credit profit.

The results above demonstrate that the strength of a bank relationship, and the corresponding benefits in price, are increasing in the depth and profitability of the non-lending business a borrower generates. An alternative explanation for these cross-selling results is that the intensity of non-credit purchases is actually a proxy for the concentration of the banking relationship. Recall that concentration is the only measure of relationship strength that has a statistically significant (inverse) effect on the interest rate in Petersen and Rajan (1994). If we assume that a borrower's demand for non-credit products is exogenously determined and insensitive to sales efforts, the amount of cross-selling within a given bank uncovers the concentration of the borrower's relationship with that bank. Therefore, high utilization rates of non-credit products would imply a high relationship concentration, and the associated reduction in borrowing costs could be consistent with an exclusively information-based channel of relationship benefits. However, this competing hypothesis is only justified when cross-selling is measured by the raw number of products, as in Table 3. The fact that the magnitude of dollar profits from cross-selling significantly lowers the loan rate – even after controlling for the number of non-credit products (Table 4, Column 2) – calls into question whether the unique feature of relationship concentration is the information monopoly. These results suggest that concentration is an important source of relationship benefits, but the density of the borrower's relationship with the bank concentrates both the information *and* the profits from the borrower.

As an aside, consider the length of the relationship as a determinant of its strength. Looking first at the effect of length without conditioning on cross-selling, I find that the duration of the relationship does not significantly explain the interest rate. Even though a basic linear specification of length suggests that the cost of borrowing falls over time by 1.3 bps per year (Column 1 of Table 3), this effect disappears when the logarithm of the firm's age is included as

a control (Table A1, Column 1). An equivalent result holds with a nonlinear specification of length: Column 2 of Table 3 hints at an initial drop of 21.8 bps after the first year of the relationship, but this effect also disappears after controlling for firm age (Table A1, Column 3). This result is consistent with Petersen and Rajan (1994), and the prevailing interpretation of relationship length as a summary of the bank's knowledge. If the measurement error of a bank's risk assessment decreases with the amount of time it observes the borrower, the length of the relationship should not have incremental explanatory power for price after controlling for the risk rating at loan initiation.

However, the predicted explanatory power of length changes when the determinants of relationship strength also include profit motives from the non-lending side. As time passes in a relationship and further cross-selling becomes unlikely, we would expect a bank to place less value on clients who have purchased fewer products during the course of the relationship. Therefore, conditional on the number of non-credit products, the risk-adjusted price should increase over time. This is exactly the pattern we see in Column 3 of Table 3. After the first two years, the annual loan rate rises by 31.5 bps and remains higher over time (26.7 bps in the 6-10 year range, 24.3 bps in the 11-15 year range, and 44.3 bps for relationships longer than 15 years). Each non-credit product the borrower purchases from the bank counteracts this 24.3 to 44.3 basis point increase by 3.4 bps. Similar results hold when we control for cross-selling intensity and cross-selling profitability together (Table 4, Column 2), with only some loss in magnitude (and statistical significance in one segment of the length distribution). This pattern highlights the endogenous determination of relationship length. While we generally worry that the length of a firm's bank relationship is biased by the firm's survival, this pattern suggests that the length measure is also biased by the survival of the bank relationship itself. In particular, since producing information on borrowers is costly, a bank would only choose to foster a lending relationship if the overall profits from the borrower are high enough to justify the opportunity cost of monitoring. The length of a bank relationship could, thus, be yet another proxy for its profitability.

5.2. Connections and Price

The analysis in Tables 3 and 4 shows that borrowers who generate high non-lending profits for a bank are compensated with risk-adjusted price discounts on commercial credit. In this section, I shift attention to the borrower's extensive margin of profit and test whether borrowers who

supply a bank with supplementary profit avenues through referrals also receive similar price rewards. As a preliminary step, Table 5 explores the price impact of various modes of connectedness. Being connected to at least one other client marginally lowers the annual loan rate by 1.0 bps, but this effect is both economically small and statistically insignificant (Table 5, Column 2). It is not surprising that this effect is negligible, as the majority of the borrowers in the sample (64%) are connected to another bank client. The overall size of a borrower's connection group also exerts trivial, albeit statistically significant, downward pressure on the loan rate. Each client a borrower is connected to lowers the rate by 0.4 bps (Table 5, Column 3), corresponding to a 2.3 basis point reduction for the mean number of connections.

Connectedness begins to exhibit benefits when we look at borrowers who are linked to other clients from a senior perspective. Columns 4 and 5 of Table 5 show that being the pivotal party in a group, either as a senior (35% of the borrowers in the sample) or as the ultimate head (33% of the borrowers in the sample) lowers the annual cost of borrowing by 13.6 bps (t -statistic=1.38). These results on binary seniority measures indicate that being a referral source carries rewards for commercial borrowers. If a bank values referrals from its existing customers, then the associated price benefits should increase with the quantity of referrals a borrower makes. In Column 6 of Table 5, we see that, indeed, each additional client a borrower refers lowers his annual loan rate by a statistically significant 4.2 bps. This effect corresponds to a reduction of 5.0 bps for the mean number of referrals. Referring four new bank clients (a one-standard deviation change) lowers the rate by 16.2 bps.

Taking the analysis one step further, if the strength of a bank relationship is determined in part by the borrower's overall profit appeal, his value to the bank should increase not just with the number of additional clients he recruits, but also with how profitable those additional clients are. To test whether referral price rewards are increasing in the referrals' profitability, I sum the aggregate dollar profits the bank earns on the borrower's children during the sample period (from both credit and non-credit income, in this case) and measure the dollar volume in units of \$100,000. The key explanatory variable is *Children's total profits to bank (\$)*, which, of course, takes a value of zero for borrowers who are not credited with any referrals. Column 7 of Table 5 shows that a borrower's commercial loan rate is indeed decreasing in the dollar volume of profits his referrals generate. Every \$100,000 of bank profits yielded by a borrower's referrals during the sample period lowers his annual loan rate by a statistically significant 7.5 bps. A one-

standard deviation increase in children's profitability lowers the rate 15.8 bps; the mean reduction is 5.3 bps.

Returning to the aside on the length of the relationship, it is interesting to note that, in contrast to cross-selling intensity, referrals do not affect the explanatory power of relationship length. Neither the number of referrals (Table 5, Column 6), nor the profitability of referrals (Table 5, Column 7) significantly changes the coefficients of relationship length from those estimated in the baseline specification that examines the effect of length on the loan rate (Table 5, Column 1). It appears that, in order for a borrower to boost his value to a bank, the bank expects him to initiate a non-borrowing relationship, and to increase its breadth over time, but does not insist that he recruit other clients as well. Additional referrals are simply (a highly valued) added bonus. This result is consistent with both anecdotal conversations with loan administrators, as well as the portrait that emerges from perusing the "Relationship Strategy" section of credit folders.

5.3. Cross-Selling, Connections and Price

The analysis so far considers each dimension of profit appeal independently, and measures the risk-adjusted price rewards associated with generating profits through cross-selling and spawning additional profit opportunities through referrals. In this section, I juxtapose the borrower's direct and indirect streams of profit, and estimate the additive effect of his overall non-lending profitability. Table 6 tests various combinations of the direct and indirect effects. In Columns 1 and 2 we see that, when evaluated together, cross-selling profits and referral breadth both exert statistically significant downward pressure on the price of credit, with magnitudes similar to their independent effects. I focus on the specification in Column 2, which separates the excess return of cross-selling profitability by controlling for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. Every \$100,000 of non-credit profit a borrower yields the bank lowers the loan rate by 13.1 bps, while each additional client the borrower refers concurrently lowers the rate by another 2.5 bps. Column 3 shows a composite effect for cross-selling profits ($\beta=15.6$ bps) and referral profits ($\beta=3.0$ bps). Column 4 gives further evidence of the combined influence: each additional non-credit product lowers the rate by 3.0 bps, while every \$100,000 of children's profits simultaneously reduces the price by another 5.8 bps. These effects are statistically significant (with the exception of the effect of referral profits in Column 3, where the t-statistic equals 1.17). A one-standard deviation change

in both own-profits and referrals' bank profits reduces the annual loan rate by 35.1 bps. Similarly, a one-standard deviation change in both the number of non-credit products and referrals' bank profits reduces the loan rate by 31.4 bps.

5.4. Robustness: Differentiating Connections from Cross-Selling

We see strong evidence that cross-selling and connections, both independently and in combination, produce value transfers from the bank to the borrower in the form of price rewards for commercial credit. One issue of concern is the boundary between the referral of a new, distinct client and what is effectively more lending or cross-selling to a different version of the same client. Consider, for example, a connection group where the parent client is a small firm, and the child client represents the personal banking relationship of the firm's owner. In such a case, the distinction between the parent and the child is vague, and the child is not so much a referral as an extension of the same relationship. This possibility is of minor concern in light of the fact that connections are denominated at the client level, and each client can have multiple accounts (e.g., commercial, personal, residential), where an account spawns its own set of commitments that engender specific loans (see Figure 2). However, as a robustness check, I repeat the analysis under the conservative assumption that connection groups with just two clients represent a single relationship. In other words, I take away referral attribution from "senior" borrowers who have only one child. Table 7 shows that this specification yields equivalent, if not marginally stronger, results in terms of both magnitude and statistical significance. Being a referral source lowers the rate by 28.7 bps, as compared to 13.6 bps in the unconditional sample (Table 7, Panel A, Columns 1 and 2). Each additional client a borrower refers continues to lower his annual loan rate by approximately 4.3 bps (Table 7, Panel A, Column 3), and every \$100,000 of bank profits yielded by a borrower's referrals generates a price discount in the 7 basis point range (Table 7, Panel A, Column 4). When cross-selling is juxtaposed with connections, as in Panel B of Table 7, the coefficients of interest are virtually unchanged from their estimates in the unconditional analysis presented in Table 6.

5.5. Robustness: Controlling for Ex Post Performance

To identify the profit channel of relationship benefits, it is critical to distinguish between lower prices that correspond to less risk and *even* lower prices that stem from the borrower's non-credit profit appeal to the bank. The key to separating the profit and information effects is to account accurately for the bank's expectation of credit quality at the time it sets the price of the loan.

Every regression in the preceding price analysis controls non-parametrically for the bank's ex ante risk assessment with dummy variables spanning the *Facility Rating's* integer scale. However, within each risk rating level, there could still be variation in risk premium that the integer scale lacks the granularity to capture. In this section, I add another degree of power to the credit quality control to account for possible differences in intra-rating quality. I use two measures of ex post loan performance that are costly for a bank, and whose probability should be priced into the loan rate at initiation.

5.5.1. Non-Accrual

The first measure of ex post performance I use is the non-accrual status of the loan. Table 8 repeats the analysis from Table 6, while adding a dummy variable, *Become non-accrual*, that is equal to one if the loan defaulted (or came close to default) as of June 2009. Importantly, the non-accrual control does not replace, but rather supplements, the existing *Facility Rating* control.

If profit channel relationship benefits exist in price (and small differences in intra-rating quality are also priced), we would expect two patterns: (1) the loan's ex post performance should be incorporated in the initial risk premium as a (noisy) measure of ex ante credit quality expectation, but (2) any distinctions in credit quality within a rating band should be orthogonal to the borrower's cross-selling and referral characteristics. As can be seen in Table 8, within a rating category, riskier loans have higher initial prices, but the difference in risk is unrelated to cross-selling intensity and referral breadth. The coefficient on *Become non-accrual* indicates an increase of 84.1 to 90.3 bps in the initial price of loans that end up near default. This effect is statistically significant at the 1% level across every specification. Yet, at the same time, the magnitude and statistical significance of the profit channel characteristics are almost identical to their estimates in Table 6.

5.5.2. Risk Rating Change

In case default is too severe an outcome to capture small differences in intra-rating quality, as a second robustness check, I measure ex post performance through changes in the loan's risk rating between initiation and maturity. Table 9 repeats the analysis from Table 6, while controlling for upgrades or downgrades to the risk rating. *Ex post change in risk rating* measures the integer magnitude of change from the initial risk rating level.⁸ This variable takes a negative

⁸ In particular *Ex post change in risk rating* = risk rating at loan initiation – risk rating at maturity (or the end of the observation period). Recall that the risk rating is measured on an integer scale between 1 and 10 that is decreasing

value for downgrades, a positive value for upgrades, and equals zero if there is no change.⁹ Once again, we see that, within a rating category, riskier loans have higher initial prices, but the difference in risk is unrelated to cross-selling intensity and referral breadth. The coefficient of *Ex post change in risk rating* indicates an average initial price increase of 23 bps for each level the loan is downgraded. This result is also statistically significant at the 1% level across every specification. Yet, once again, the magnitude and statistical significance of the profit channel characteristics are virtually unchanged from their estimates in Table 6. This confirms that cross-selling intensity and referral breadth are not veiled indicators of credit quality, and that their resultant benefits are indeed risk-adjusted price discounts.

6. Relationships and the Amount of Credit

The previous section establishes that the profit channel of relationship strength generates price rewards for commercial credit. I now shift attention away from price and examine how relationships influence the amount of credit a firm is able to secure from a bank. A quantity effect stemming from a borrower's non-credit profit appeal would, to some extent, be more telling than the results on price. It is conceivable for a bank to balance price discounts on commercial loans by charging higher prices elsewhere in the relationship. However, there does not exist a compensating margin to offset quantity rewards. A bank's stock of capital is scarce, and its commitment has high opportunity costs. As a result, banks might be even more selective with whom they allocate quantity benefits to. If banks do use quantity as an instrument to reward their most valued customers, I hypothesize that the risk- and demand-adjusted amount of capital committed to a firm should be greater for borrowers who yield higher overall profits to the bank, either through the cross-purchase of non-loan products or through the referral of additional clients.

Any attempt to analyze the quantity of issued credit is impeded by the fundamental empirical challenge that a funded loan amount confounds the supply and demand for credit. A drawdown of X dollars from a credit line simultaneously implies the bank's willingness to supply X dollars to the firm, and a lower bound of X dollars on the firm's demand for credit. The size of the credit line itself circumvents this simultaneity bias only to some degree, as

in credit quality: a 1-rated facility represents the highest quality class of loan, while a rating of 10 signifies loss to the bank.

⁹ As an example, consider a loan with an initial rating of 4 that was later downgraded to a (more risky) rating of 5. In this case, the variable *Ex post change in risk rating* would equal -1.

demand still partially determines the commitment amount. Previous studies based on the NSSBF survey measure credit availability by outlining a pecking order of external debt for firms. Following Petersen and Rajan (1994, 1997), they argue that firms that are constrained in their ability to get capital from banks must appeal to alternate (more expensive) sources of financing, like trade credit; therefore, the percentage of trade credit a firm pays late would signal the degree of its credit constraint.

In this study, I do not observe the borrower's other sources of financing outside its borrowing relationship with the bank. In order to address the supply of credit, I measure the size of the credit line, while controlling for firm characteristics that are important determinants of credit demand. In particular, I account for the size of the firm, measured in both annual sales and the number of employees; the age of the firm; the industry; and the prevailing economic conditions. Instead of gauging the likelihood of overall credit constraints, this approach compares the differential credit availability for borrowers who rate comparably in risk and firm profiles, but who vary in their overall value to the bank. However, I want to emphasize that there could be unobservable differences in firm demand that are not fully captured by the industry, age, size and time controls. Firms that are similar on observable characteristics could still face different investment opportunities, liquidity needs, or levels of financial distress. While potential omitted demand determinants are unlikely to be highly correlated with the borrower's cross-selling intensity and referral breadth, I interpret the magnitude of these coefficients with some reservation.

I test the profit channel hypothesis for quantity by estimating different variants of the following baseline specification:

$$\begin{aligned} \text{Log Amount}_{i,j} = & \alpha_{i,j} + \beta_{1,i} \text{Relationship Characteristics}_i + \beta_{2,ij} \text{Risk Characteristics}_{i,j} \\ & + \beta_{3,ij} \text{Commitment Characteristics}_{i,j} + \beta_{4,i} \text{Firm Characteristics}_i + \varepsilon_{i,j} \end{aligned}$$

The dependent variable, *Log Amount*, is the logarithm of the size of credit line (*j*) committed to firm (*i*). Thus, the marginal effects of the explanatory variables correspond to percentage changes in the amount of credit available. Across the 1,572 commitments in the sample that are successfully matched to firm characteristics from Dun and Bradstreet, the commitment amount averages \$3,002,549 with a standard deviation of \$6,192,300. The vector of *Relationship Characteristics* includes the length of the relationship and the same measures of cross-selling intensity and referral breadth employed in the previous price analysis. *Risk Characteristics* specify dummy variables for the level of the commitment risk rating at origination. The set of

Commitment Characteristics consists of maturity, collateral, commitment type, month-year and originating branch. *Firm Characteristics* include industry fixed effects, and the logarithms of one plus firm age, number of employees and annual sales in every regression. As with the previous price analysis, all tables report standard errors that are clustered at the borrower level.

The analysis of quantity proceeds in the same fashion as price, looking first at cross-selling and connections separately, and then combining the analysis to measure the additive impact of the two effects.

6.1. Cross-Selling and Quantity

Tables 10 and 11 measure the influence of the non-lending relationship and provide evidence that the depth of cross-selling business not only decreases the price, but also increases the amount of capital a firm is able to secure from a bank. Columns 2 through 6 of Table 10 report the coefficients from estimating a version of the baseline regression that measures relationship strength through the raw number of non-credit products the borrower purchases. As can be seen in Column 2, each non-credit product a borrower purchases increases the size of the credit line by 3.5 percent. This translates to a 40.9 percent increase for the mean number of non-credit products. A one-standard deviation increase in the intensity of cross-selling increases the credit line by 27.1 percent. Columns 3 through 5 show that the percentage increase in quantity ranges from 3.5 to 10.8 percent per product across the deposit/savings account, cash management and financial service categories. Column 6, which estimates binary measures of product category consumption, reveals a notable result: just as in the price analysis, simply delegating the management of assets to the bank (a non-informative service rooted purely in profit appeal) augments the size of the borrower's credit line by a statistically significant 23.2 percent. Once again, this effect does not stem from borrower risk type, as it holds controlling for the commitment risk rating, which accounts for both the borrower's net worth and the likelihood of recovery in the event of default.

Table 11 looks directly at the dollar profits the bank accrues from fees charged on the non-lending relationship. As can be seen in the coefficient of *Non-credit profits to bank (\$)* across every specification in the table, the dollar volume of profits is associated with a statistically significant 5 to 6 percent increase in the size of the credit line. I focus on the result in Column 2 ($\beta=5.0\%$), which controls for the collective information embedded in the aggregate

number of non-credit products purchased by the borrower. A one-standard deviation increase in profitability increases the amount of credit by 16.5 percent; the mean increase is 4.6 percent.

Returning to the aside on the length of the relationship, I refrain from drawing definitive conclusions on the lifecycle of credit availability since this empirical specification cannot fully alleviate the demand confound. Tables 10 and 11 suggest that the size of the credit line decreases after the first year of the relationship, but this result might stem from unobservable demand factors that are absent in the model. I focus on the profit channel variables as the parameters of interest, while maintaining a flexible specification of relationship length as a control.

6.2. Connections and Quantity

The results in Tables 10 and 11, in conjunction with the preceding analysis of price, illustrate that borrowers who generate high non-lending profits for a bank are compensated with both more credit and cheaper credit. In this section, I test whether borrowers who supply a bank with supplementary profit avenues through referrals benefit along the quantity dimension as well. As Table 12 reveals, a borrower's extensive margin of profit has a strong influence on his access to credit. Being a referral source for a bank is rewarding in quantity: "Senior" borrowers get access to 39.6 percent more credit than non-referring borrowers of equivalent risk, age, firm size, and tenure with the bank (Table 12, Column 2). The quantity benefits are even stronger for referral sources who spawn additional referral sources. Borrowers who are the "ultimate head" of a connection group have access to 43.9 percent more credit than otherwise comparable borrowers (Table 12, Column 3). Both of these effects are statistically significant at the 1% level. Indeed, Column 4 of Table 12 shows that each additional client a borrower refers increases his access to credit by a statistically significant 1.4 percent, which corresponds to an increase of 2.2 percent for the mean number of referrals. Referring 6 new bank clients (a one-standard deviation change) increases the amount of credit by 9.0 percent. Furthermore, Column 5 of Table 12 demonstrates that quantity rewards increase not only in the number of referrals but in the referrals' profitability as well. As before, I sum the aggregate dollar profits the bank earns on the borrower's children during the sample period (from both credit and non-credit income) and measure the dollar volume in units of \$100,000. The coefficient of *Children's total profits to bank (\$)* shows that a borrower's access to credit increases by 5.8 percent for every \$100,000 of bank profits his referrals generate during the sample period. A one-standard deviation increase in children's profitability increases the amount by 15.1 percent; the mean increase is 4.1 percent.

6.3. Cross-Selling, Connections and Quantity

Table 13 demonstrates that the intensive and extensive dimensions of a borrower's overall profitability have additive effects in quantity as well. In Column 2 of Table 13, we see that cross-selling profitability (controlling for the collective information embedded in the aggregate number of non-credit products) increases quantity by 5.2 percent, while being a referral source (*Connected as senior* = 1) concurrently adds another 27.1 percent increase to the supply of credit. Column 3 displays a strong composite effect for cross-selling profits ($\beta=6.1\%$) and referral profits ($\beta=5.2\%$). Column 4 gives further evidence of the combined influence, showing that each additional non-credit product increases the credit line by 3.2 percent, while every \$100,000 of children's profits simultaneously increases the amount by 4.5 percent. All of these effects are statistically significant at the 1% level. A one-standard deviation change in both own-profits and referrals' bank profits increases access to credit by 26.0 percent. Similarly, a one-standard deviation change in both the number of non-credit products and referrals' bank profits increases the amount of credit by 29.3 percent. As a robustness check on the boundary between cross-selling and referrals, once again, I repeat the analysis assuming that connection groups with just two clients represent a single relationship. Table 14 shows that, when referral attribution is stripped from "senior" borrowers who have only one child, the results are equivalent.

These results are evidence that the profit channel is a determinant of relationship benefits in quantity as well as in price. The aggregate non-lending profits a borrower yields a bank, both through the purchase of other products and the referral of new clients, increase his access to the bank's capital. While the possibility of unobservable demand characteristics tempers the interpreted magnitude of the quantity results, the joint decrease in price and increase in quantity arising from the profit channel nonetheless suggest that the dominating effect is an outward shift in the supply curve.

7. Conclusion

This paper examines firm-bank relationships by investigating credit provision as part of a broader set of fee-generating services that banks offer. The results offer new insights on the channels that lead to repeated interaction between a small firm and a bank. In contrast to earlier work that focuses on the role of relationships in alleviating information and incentive problems

in lending, I find that the source of value in relationship banking is not limited to enhanced monitoring. Relationships enable banks to sell borrowers a variety of other profitable financial services, as well as gain access to additional borrowers to whom they can sell these services. This paper shows that non-lending income incentives interact with the terms of credit to create a profit channel of relationship strength that gives weight to the borrower's aggregate profitability as a non-credit customer. Conditional on risk profile, borrowers who buy more financial services and who refer more clients to a bank get access to more credit at a lower price.

These findings shed a new light on the sources of bargaining power between a firm and a bank. In models of banks as pure financial intermediaries, the relative bargaining position of each party is determined in the credit domain alone. The results in this paper suggest that the component of relationship capital that derives from the borrower's cross-selling profitability is transferrable, since it is not locked up in private information about the borrower's credit quality.

A potential implication of the profit channel in bank relationships is stronger protection in credit negotiations for borrowers who generate non-lending profits than for comparably risky borrowers who only buy loans. For example, in credit markets with limited competition, empirical evidence suggests that firms that concentrate their bank debt are susceptible to exploitation in the supply of credit. Banks that have acquired a monopoly on the firm's private information can use the threat of hold-up to extract rents from the firm in the form of higher interest rates (Petersen and Rajan (1995)). In such cases, the borrower's stock of non-lending relationship capital from cross-selling profitability could be a useful source of bargaining power to mitigate this risk. On the other hand, relationship capital from non-credit channels also exacerbates concerns about allocative efficiency and the soft-budget constraint problem in the provision of credit. Firms in economic distress could potentially use their non-lending bargaining power to extract more credit to forestall default in a way that would not be possible on the basis of their credit quality alone.

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Figure 1

Non-Interest Income Growth in U.S. Commercial Banks

The graph plots non-interest income as a share of net operating revenue, in aggregate dollars, across all Federal Deposit Insurance Company-insured commercial banks in the United States. Source: FDIC Historical Statistics on Banking.

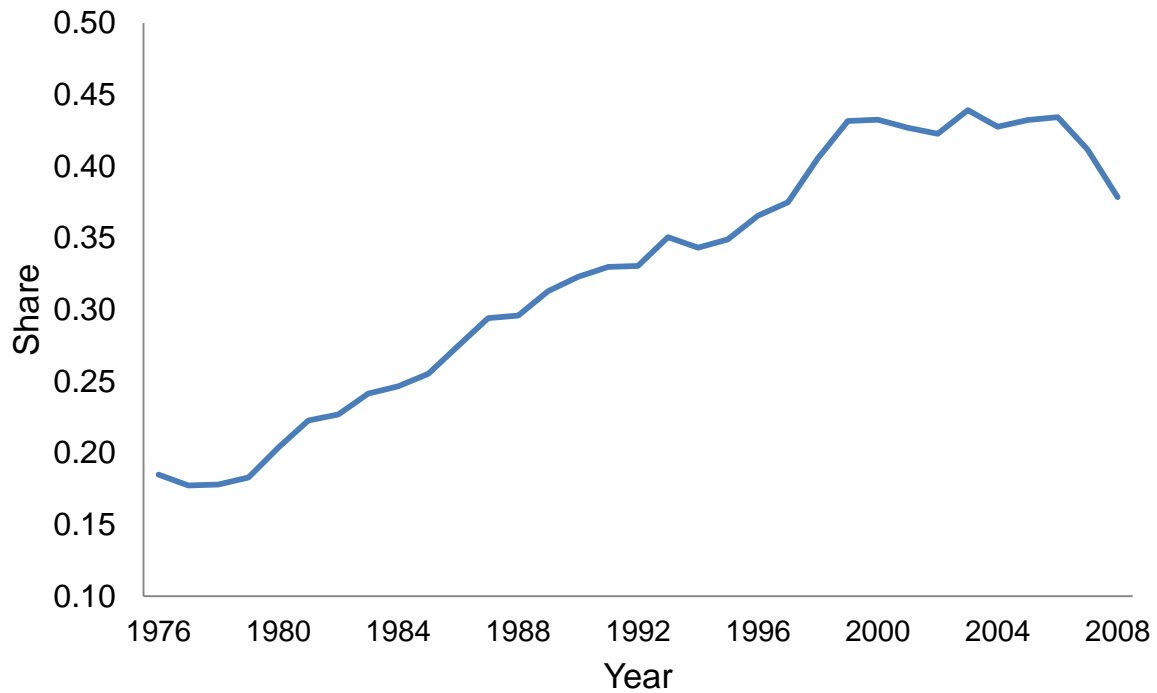


Figure 2
Credit Structure Example

The figure shows the tree structure that generates a loan. Each borrower can have multiple credit accounts (e.g., commercial, personal, residential). Each account spawns its own set of commitments from which the borrower draws down specific loans. In practice, a commitment can remain untapped or only partially utilized. The sample in this study consists of 3,257 loans and 1,572 credit lines drawn by 1,814 unique borrowers. The mean number of credit lines per borrower is 1.5 (median=1), and the mean number of loans is 1.8 (median=1).

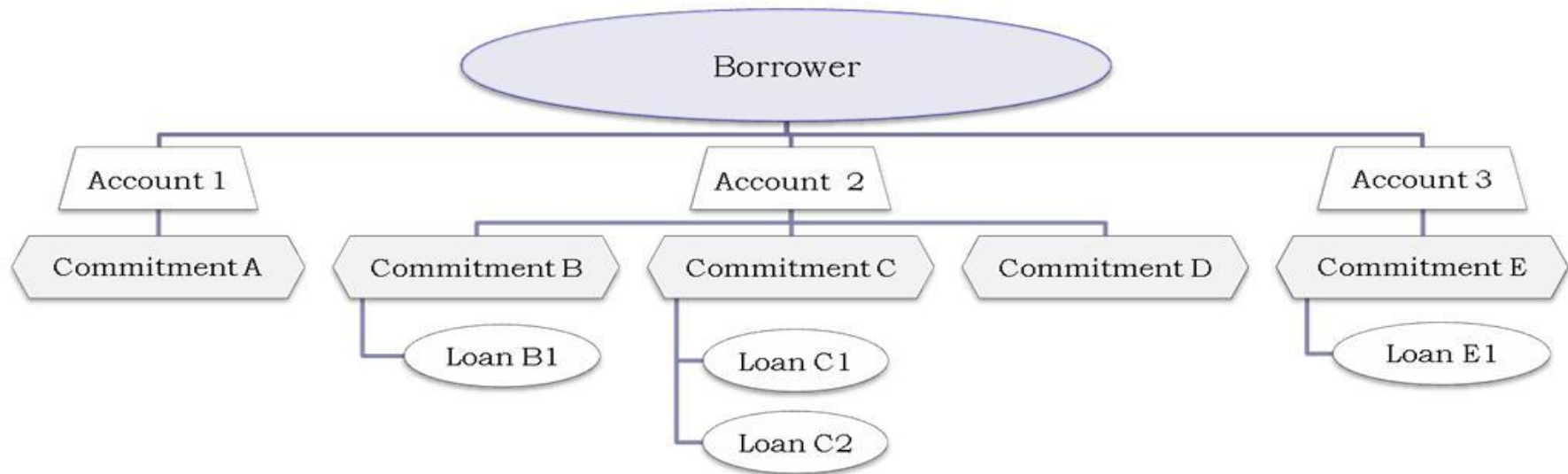


Figure 3
Connection Hierarchy Examples

The figure illustrates examples of connection networks among bank clients. In the first example, Client A is a stand-alone client who is not connected to any other bank customer. In the second example, Client B is the head of a group of size four, in which he is responsible for referring Clients x, y and z to the bank. B is regarded as “senior” to his three “children” x, y and z, while they are each considered his “junior”. In the third example, Client C is the “ultimate head” of a group of size six, where he is “senior” to his five children x, y, z, w, and D. However, D also gets credit for referring z and w, who are therefore regarded as D’s children as well. Another way to understand this type of group is to think of C as the ultimate head with children x, y and D and grandchildren z and w courtesy of his child D. In this case, D is both junior to one client (C) and senior to two others (z and w). In practice, these groups commonly represent ties between firms, suppliers, customers and a firm owner’s personal relationships.

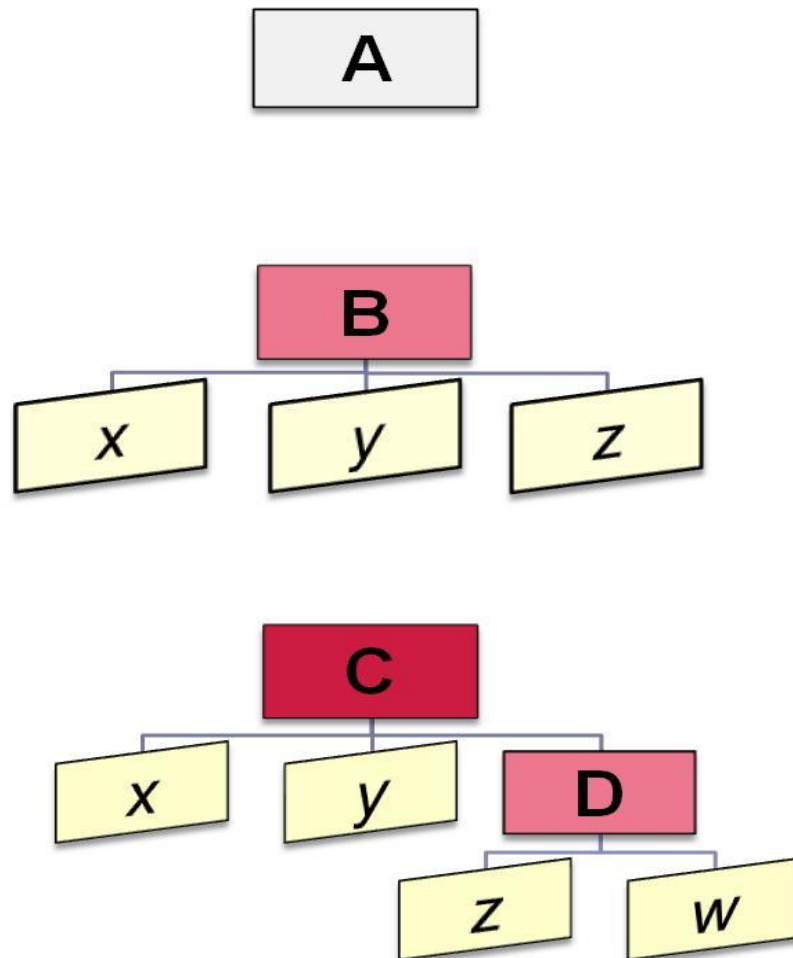


Table 1
Sample Summary Statistics

The table displays summary statistics for the sample at the loan level. Note that some statistics have been omitted to protect client confidentiality. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Number of non-credit products* is the total number of non-loan products the borrower has purchased, and is partitioned into the *Number of deposit/savings accounts*, the *Number of cash management products*, and the *Number of financial service products*. *Non-credit profits to bank* is the total dollar profit the bank earns on the client from non-credit products during the sample period. *Connected* is a dummy variable equal to one if the borrower is connected to at least one other bank client. *Number of clients connected to* measures the size of the borrower's intra-bank network. *Connected as senior* is a dummy variable equal to one if the borrower has referred at least one additional client to the bank. *Connected as ultimate head* is a dummy variable equal to one if the borrower holds the highest rank in the hierarchy of referrals within the borrower's network. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank (\$)* is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. Loan characteristics include the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees; the amount of the loan; the maturity, in months; and a dummy variable indicating whether the loan is secured with collateral. Firm characteristics are collected by matching each borrower to data from Dun and Bradstreet on firm age, annual sales and number of employees.

Panel A. Relationship Characteristics

	N	Min	Max	Mean	Median	St. Dev.	10th %	25th %	75th %	90th %
Length (years)	3,257	0.00	32.00	6.52	6.00	5.23	0.00	2.08	10.67	13.58
<i>Cross-selling</i>										
Number of non-credit products	3,257	0.00	33.00	10.34	8.00	8.55	0.00	3.00	18.00	23.00
Number of deposit/savings accounts	3,257	0.00	6.00	1.33	1.00	0.96	0.00	1.00	2.00	3.00
Number of cash management products	3,257	0.00	25.00	7.40	5.00	6.35	0.00	2.00	14.00	16.00
Number of financial service products	3,257	0.00	5.00	0.18	0.00	0.59	0.00	0.00	0.00	1.00
Non-credit profits to bank (\$100,000)	3,257	-	-	1.12	-	2.02	-	-	-	-
<i>Connections</i>										
Connected (0,1)	3,257	0.00	1.00	0.64	1.00	0.48	0.00	0.00	1.00	1.00
Number of clients connected to	3,257	0.00	386.00	6.64	2.00	17.45	1.00	1.00	5.00	13.00
Connected as senior (0,1)	3,257	0.00	1.00	0.35	0.00	0.48	0.00	0.00	1.00	1.00
Connected as ultimate head (0,1)	3,257	0.00	1.00	0.33	0.00	0.47	0.00	0.00	1.00	1.00
Number of clients connected to as senior	3,257	0.00	126.00	1.18	0.00	3.84	0.00	0.00	1.00	4.00
Number of clients connected to as senior, if senior=1	1,128	1.00	126.00	3.41	2.00	5.92	1.00	1.00	4.00	6.00
Children's total profits to bank (\$100,000)	3,257	-	-	0.71	-	2.11	-	-	-	-

Panel B. Loan Characteristics

	N	Min	Max	Mean	Median	St. Dev.	10th %	25th %	75th %	90th %
Interest rate with fees (in basis points)	3,257	-	-	693.86	-	224.59	-	-	-	-
Loan amount (\$100,000)	3,257	0.00	400.00	11.14	3.77	23.58	0.29	1.00	11.20	28.69
Maturity (in months)	3,257	0.00	368.70	38.81	12.17	54.61	1.13	3.00	60.47	121.73
Collateral (0,1)	3,257	0.00	1.00	0.75	1.00	0.43	0.00	1.00	1.00	1.00

Panel C. Firm Characteristics

	N	Min	Max	Mean	Median	St. Dev.	10th %	25th %	75th %	90th %
Age of firm	1,598	2.00	159.00	25.12	25.00	17.68	7.00	12.00	33.00	46.00
Number of employees	2,119	0.00	900.00	37.63	15.00	68.32	0.00	2.00	50.00	90.00
Annual sales (in millions)	2,119	0.00	4,880.66	23.94	2.30	198.56	0.04	0.11	14.00	46.00

Table 2
Sample Correlations

The table reports the correlations between the loan, relationship and firm characteristics defined in Table 1. Panel A represents the full sample of loans. Panel B restricts the sample to the loans that are successfully matched to firm characteristics from Dun and Bradstreet.

Panel A. Full Sample (N=3,257)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Interest rate with fees	1.00								
(2) Length of relationship	-0.13	1.00							
(3) Number of non-credit products	-0.20	0.65	1.00						
(4) Non-credit profits to bank	-0.34	0.32	0.59	1.00					
(5) Connected (0,1)	-0.04	0.16	0.16	0.15	1.00				
(6) Number of clients connected to	0.04	-0.02	-0.10	-0.04	0.24	1.00			
(7) Connected as senior (0,1)	-0.14	0.37	0.54	0.39	0.54	-0.06	1.00		
(8) Number of clients connected to as senior	-0.11	0.15	0.28	0.30	0.23	0.15	0.42	1.00	
(9) Children's total profits to bank	-0.18	0.11	0.27	0.50	0.25	0.07	0.46	0.67	1.00

Panel B. Dun and Bradstreet Matches Only (N=1,598)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Interest rate with fees	1.00											
(2) Length of relationship	-0.10	1.00										
(3) Number of non-credit products	-0.27	0.56	1.00									
(4) Non-credit profits to bank	-0.40	0.26	0.62	1.00								
(5) Connected (0,1)	-0.16	0.31	0.27	0.27	1.00							
(6) Number of clients connected to	-0.02	0.04	-0.03	0.06	0.26	1.00						
(7) Connected as senior (0,1)	-0.20	0.42	0.57	0.42	0.62	0.04	1.00					
(8) Number of clients connected to as senior	-0.16	0.16	0.29	0.30	0.23	0.42	0.38	1.00				
(9) Children's total profits to bank	-0.28	0.18	0.39	0.61	0.29	0.29	0.46	0.76	1.00			
(10) Firm age	-0.18	0.14	0.11	0.02	0.00	-0.06	0.10	0.06	0.07	1.00		
(11) Number of employees	-0.15	0.07	0.16	0.10	0.07	0.02	0.19	0.11	0.14	0.16	1.00	
(12) Annual sales	-0.08	-0.07	-0.05	0.04	-0.05	-0.01	0.00	0.02	0.03	-0.01	0.18	1.00

Table 3
Price: Cross-Selling by Number of Products

The table captures cross-selling intensity with the raw number of non-loan products the borrower purchases from the bank. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. The total *Number of non-credit products* is partitioned into the *Number of deposit/savings accounts* (4), the *Number of cash management products* (5), and the *Number of financial service products* (6). Column (7) measures the consumption of each product category with dummy variables equal to one if the borrower purchases at least one product within that category. *Collateral* is a dummy variable equal to one if the loan is secured. The *Maturity* of the loan is measured in months. The loan's risk rating at initiation is specified non-parametrically with dummy variables spanning the *Facility Rating's* integer scale. Each regression also includes an intercept, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Relationship Characteristics</u>							
<i>Length of relationship</i>							
# of years	-1.336*						
	[0.727]						
1-2 years		-21.803*	-4.713	-16.058	-10.983	-21.658*	-20.786
		[11.593]	[11.961]	[13.175]	[11.909]	[11.585]	[27.654]
3-5 years		9.505	31.467***	15.304	24.425***	9.596	9.903
		[8.613]	[9.568]	[11.078]	[9.377]	[8.593]	[28.143]
6-10 years		-3.128	26.726**	4.006	16.134	-1.765	0.533
		[9.526]	[10.419]	[11.029]	[10.195]	[9.505]	[27.474]
11-15 years		-15.832	24.259*	-8.071	10.354	-13.421	-11.169
		[11.672]	[13.569]	[15.536]	[13.256]	[11.975]	[27.930]
16+ years		2.440	44.285**	11.896	29.227	3.609	4.631
		[17.043]	[18.483]	[19.354]	[18.294]	[16.793]	[29.957]
<i>Cross-selling</i>							
# of non-credit products			-3.449***				
			[0.644]				
# of deposit/savings accounts; (0,1)				-4.843			32.228
				[5.262]			[37.124]
# of cash management products; (0,1)					-3.147***		-33.079
					[0.788]		[27.167]
# of financial service products; (0,1)						-8.701	-40.393***
						[6.432]	[14.943]
<u>Loan Characteristics</u>							
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-27.196***	-29.122***	-15.552	-29.488***	-18.723*	-28.135***	-27.079***
	[9.357]	[9.371]	[9.826]	[9.363]	[9.839]	[9.506]	[9.552]
Maturity (months)	0.211***	0.232***	0.170**	0.231***	0.194**	0.228***	0.209***
	[0.079]	[0.079]	[0.077]	[0.079]	[0.078]	[0.079]	[0.079]
Observations	3,257	3,257	3,257	3,257	3,257	3,257	3,257
R ²	0.61	0.62	0.62	0.62	0.62	0.62	0.62

Table 4
Price: Cross-Selling by Dollar Profits

The table captures cross-selling profitability with the dollar profits the bank accrues from fees charged on the non-lending relationship, while controlling for the information content in each non-credit product purchased. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Non-credit profits to bank (\$)* is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. The total *Number of non-credit products* is partitioned into the *Number of deposit/savings accounts* (3), the *Number of cash management products* (4), and the *Number of financial service products* (5). *Collateral* is a dummy variable equal to one if the loan is secured. The *Maturity* of the loan is measured in months. The loan's risk rating at initiation is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
<u>Relationship Characteristics</u>					
<i>Length of relationship</i>					
1-2 years	-22.261*	-14.057	-29.516**	-18.603	-22.359**
	[11.352]	[12.167]	[13.284]	[11.889]	[11.350]
3-5 years	11.280	21.440**	4.062	16.156*	11.288
	[8.389]	[9.785]	[11.128]	[9.348]	[8.389]
6-10 years	9.437	21.603**	1.048	15.010	9.090
	[9.940]	[10.384]	[10.923]	[10.206]	[9.913]
11-15 years	3.283	19.258	-5.585	10.717	2.565
	[11.626]	[12.988]	[14.539]	[12.614]	[11.633]
16+ years	18.972	36.200**	7.847	26.789	18.869
	[16.524]	[18.043]	[18.163]	[17.535]	[16.546]
<i>Cross-selling</i>					
Non-credit profits to bank (\$100,000)	-17.130***	-14.356***	-17.939***	-15.928***	-17.708***
	[4.521]	[4.858]	[4.856]	[4.825]	[4.925]
# of non-credit products		-1.641**			
		[0.791]			
# of deposit/savings accounts			6.097		
			[5.437]		
# of cash management products				-1.055	
				[0.901]	
# of financial service products					4.921
					[7.196]
<u>Loan Characteristics</u>					
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-24.127***	-18.481*	-23.430**	-20.992**	-24.517***
	[9.338]	[9.723]	[9.376]	[9.724]	[9.389]
Maturity (months)	0.149*	0.133*	0.147*	0.142*	0.149*
	[0.079]	[0.078]	[0.080]	[0.078]	[0.079]
Observations	3,257	3,257	3,257	3,257	3,257
R^2	0.63	0.63	0.63	0.63	0.63

Table 5
Price: Connections

The table focuses on the borrower's network of connections to other bank clients. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Connected* is a dummy variable equal to one if the borrower is connected to at least one other bank client. *Number of clients borrower connected to* measures the size of the borrower's intra-bank network. *Connected as senior* is a dummy variable equal to one if the borrower has referred at least one additional client to the bank. *Connected as ultimate head* is a dummy variable equal to one if the borrower holds the highest rank in the hierarchy of referrals within the borrower's network. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank (\$)* is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the loan is secured. The *Maturity* of the loan is measured in months. The loan's risk rating at initiation is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Relationship Characteristics							
<i>Length of relationship</i>							
1-2 years	-21.803*	-21.911*	-21.081*	-22.133*	-22.033*	-21.618*	-22.143*
	[11.593]	[11.589]	[11.623]	[11.534]	[11.525]	[11.695]	[11.621]
3-5 years	9.505	9.519	8.890	9.888	9.917	10.014	9.432
	[8.613]	[8.602]	[8.654]	[8.538]	[8.533]	[8.529]	[8.409]
6-10 years	-3.128	-2.972	-3.258	-1.251	-1.432	0.053	-0.726
	[9.526]	[9.831]	[9.518]	[9.678]	[9.676]	[9.688]	[9.362]
11-15 years	-15.832	-15.758	-15.533	-12.041	-12.430	-10.226	-12.511
	[11.672]	[11.784]	[11.722]	[12.903]	[12.755]	[12.051]	[11.821]
16+ years	2.440	2.695	1.802	8.513	8.005	5.770	4.488
	[17.043]	[17.029]	[17.016]	[16.754]	[16.676]	[16.992]	[17.073]
<i>Connections</i>							
Connected (0,1)		-1.035		5.778	5.381	4.405	
		[8.920]		[10.180]	[10.088]	[9.028]	
# of clients borrower connected to			-0.352*				
			[0.181]				
Connected as senior (0,1)				-13.607			
				[9.834]			
Connected as ultimate head (0,1)					-13.397		
					[9.780]		
# of clients connected to as senior						-4.225***	
						[1.162]	
Children's total profits to bank (\$100,000)							-7.494***
							[2.746]
Loan Characteristics							
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-29.122***	-29.173***	-29.494***	-28.033***	-28.006***	-28.250***	-30.886***
	[9.371]	[9.333]	[9.325]	[9.384]	[9.401]	[9.144]	[9.195]
Maturity (months)	0.232***	0.233***	0.239***	0.227***	0.228***	0.223***	0.219***
	[0.079]	[0.080]	[0.080]	[0.079]	[0.079]	[0.078]	[0.077]
Observations	3,257	3,257	3,257	3,257	3,257	3,257	3,257
R ²	0.62	0.62	0.62	0.62	0.62	0.62	0.62

Table 6
Price: Cross-Selling and Connections

The table tests the additive effect of borrowers' direct and indirect streams of non-credit profit. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Non-credit profits to bank (\$)* is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. *Number of non-credit products* controls for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank (\$)* is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the loan is secured. The *Maturity* of the loan is measured in months. The loan's risk rating at initiation is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
<u>Relationship Characteristics</u>					
<i>Length of relationship</i>					
1-2 years	-22.390*	-15.485	-22.358**	-7.099	-14.330
	[11.425]	[12.238]	[11.365]	[11.986]	[12.153]
3-5 years	11.464	19.988**	11.091	28.684***	21.036**
	[8.358]	[9.762]	[8.323]	[9.357]	[9.702]
6-10 years	10.603	20.731**	9.280	24.881**	21.186**
	[9.838]	[10.328]	[9.910]	[10.336]	[10.341]
11-15 years	5.106	18.381	2.910	21.854*	18.550
	[11.728]	[12.867]	[11.543]	[13.168]	[12.845]
16+ years	20.091	34.477*	18.316	40.676**	35.195*
	[16.474]	[18.008]	[16.533]	[18.256]	[17.989]
<i>Cross-selling</i>					
Non-credit profits to bank (\$100,000)	-15.326***	-13.145***	-15.591***		-12.948***
	[4.374]	[4.723]	[4.561]		[4.902]
# of non-credit products		-1.379*		-3.021***	-1.605**
		[0.791]		[0.621]	[0.786]
<i>Connections</i>					
# of clients connected to as senior	-2.737**	-2.509**			
	[1.186]	[1.241]			
Children's total profits to bank (\$100,000)			-3.034	-5.808**	-2.894
			[2.584]	[2.674]	[2.581]
<u>Loan Characteristics</u>					
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-24.229***	-19.476**	-25.290***	-18.604*	-19.714**
	[9.197]	[9.538]	[9.249]	[9.640]	[9.608]
Maturity (months)	0.153*	0.139*	0.151*	0.168**	0.135*
	[0.079]	[0.077]	[0.079]	[0.076]	[0.077]
Observations	3,257	3,257	3,257	3,257	3,257
R^2	0.63	0.63	0.63	0.62	0.63

Table 7

Robustness: Boundary Between Connections and Cross-Selling

The table shows the robustness of the results to taking away referral attribution from “senior” borrowers who have only one “child”. This specification repeats the analysis in Tables 5 and 6 under the conservative assumption that connection groups with just two clients represent a single relationship. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm’s overall relationship with the bank. *Non-credit profits to bank (\$)* is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. *Number of non-credit products* controls for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children’s total profits to bank (\$)* is the total sum of credit income and non-credit income from the borrower’s referrals, denominated in units of \$100,000. Each regression also includes an intercept, dummy variables spanning the *Facility Rating*’s integer scale, the maturity of the loan, a dummy variable equal to one if the loan is secured, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	Panel A. Connections				Panel B. Connections & Cross-Selling				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Relationship Characteristics									
<i>Length of relationship</i>									
1-2 years	-21.851*	-21.688*	-21.537*	-21.710*	-22.263*	-15.227	-22.178*	-6.824	-14.119
	[11.541]	[11.535]	[11.705]	[11.620]	[11.436]	[12.233]	[11.369]	[11.975]	[12.154]
3-5 years	10.368	10.552	10.029	9.781	11.460	20.162**	11.222	28.877***	21.207**
	[8.512]	[8.515]	[8.533]	[8.401]	[8.364]	[9.750]	[8.318]	[9.325]	[9.690]
6-10 years	0.868	0.718	0.106	-0.563	10.508	20.867**	9.281	24.930**	21.241**
	[9.649]	[9.654]	[9.705]	[9.362]	[9.845]	[10.327]	[9.909]	[10.326]	[10.333]
11-15 years	-9.875	-10.054	-10.476	-12.596	4.858	18.448	2.768	21.683*	18.481
	[12.249]	[12.231]	[11.994]	[11.765]	[11.675]	[12.871]	[11.522]	[13.145]	[12.837]
16+ years	6.034	5.859	4.468	3.817	19.028	33.800*	17.932	40.022**	34.894*
	[17.233]	[17.228]	[17.065]	[17.083]	[16.541]	[18.049]	[16.543]	[18.249]	[17.985]
<i>Cross-selling</i>									
Non-credit profits to bank (\$100,000)					-15.256***	-13.010***	-15.455***		-12.782***
					[4.366]	[4.712]	[4.564]		[4.908]
# of non-credit products						-1.407*		-3.008***	-1.612**
						[0.786]		[0.618]	[0.785]
<i>Connections</i>									
Connected (0,1)	5.712	5.531	3.314						
	[9.320]	[9.311]	[8.974]						
Connected as senior (0,1)	-28.718***								
	[10.292]								
Connected as ultimate head (0,1)		-28.331***							
		[10.411]							
# of clients connected to as senior			-4.256***		-2.790**	-2.591**			
			[1.143]		[1.165]	[1.208]			
Children’s total profits to bank (\$100,000)				-7.734***			-3.235	-6.091**	-3.132
				[2.765]			[2.606]	[2.691]	[2.606]
Observations	3,257	3,257	3,257	3,257	3,257	3,257	3,257	3,257	3,257
R^2	0.62	0.62	0.62	0.62	0.63	0.63	0.63	0.62	0.63

Table 8
Robustness: Ex Post Loan Performance — Non-Accrual Status

I supplement the credit quality control to account for possible differences in intra-rating quality. The table shows the robustness of the results to variation in risk premium within a rating band. It repeats the analysis in Table 6 while adding a dummy variable, *Become non-accrual*, that is equal to one if the loan defaulted (or came close to default) as of June 2009. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Non-credit profits to bank* (\$) is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. *Number of non-credit products* controls for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank* (\$) is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the loan is secured. The *Maturity* of the loan is measured in months. The loan's risk rating at initiation is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	Panel A		Panel B			
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Relationship Characteristics</u>						
<i>Length of relationship</i>						
1-2 years	-20.896*	-14.053	-20.744*	-20.861*	-5.560	-12.902
	[11.424]	[12.219]	[11.625]	[11.363]	[11.995]	[12.133]
3-5 years	12.252	20.702**	10.141	11.886	29.553***	21.749**
	[8.254]	[9.644]	[8.315]	[8.217]	[9.261]	[9.582]
6-10 years	11.731	21.771**	0.146	10.422	25.965**	22.230**
	[9.772]	[10.224]	[9.285]	[9.843]	[10.266]	[10.234]
11-15 years	6.746	19.905	-11.257	4.573	23.395*	20.084
	[11.473]	[12.698]	[11.561]	[11.290]	[13.036]	[12.676]
16+ years	21.723	35.984**	5.766	19.972	42.256**	36.712**
	[16.523]	[17.982]	[17.138]	[16.582]	[18.280]	[17.961]
<i>Cross-selling</i>						
Non-credit profits to bank (\$100,000)	-15.627***	-13.463***		-15.913***		-13.290***
	[4.398]	[4.758]		[4.584]		[4.937]
		-1.367*			-3.044***	-1.592**
# of non-credit products		[0.786]			[0.614]	[0.782]
<i>Connections</i>						
# of clients connected to as senior	-2.716**	-2.491**				
	[1.191]	[1.246]				
Children's total profits to bank (\$100,000)			-7.518***	-2.967	-5.819**	-2.829
			[2.752]	[2.586]	[2.680]	[2.582]
<u>Loan Performance</u>						
Become non-accrual? (0,1)	90.179***	89.947***	84.147***	90.274***	85.504***	89.974***
	[26.594]	[26.231]	[28.117]	[26.650]	[26.661]	[26.230]
<u>Loan Characteristics</u>						
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-24.298***	-19.584**	-31.034***	-25.334***	-18.660*	-19.802**
	[9.087]	[9.435]	[9.135]	[9.141]	[9.548]	[9.506]
Maturity (months)	0.155**	0.141*	0.222***	0.153*	0.170**	0.137*
	[0.079]	[0.077]	[0.077]	[0.079]	[0.076]	[0.077]
Observations	3,257	3,257	3,257	3,257	3,257	3,257
R^2	0.63	0.63	0.62	0.63	0.62	0.63

Table 9
Robustness: Ex Post Loan Performance — Risk Rating Change

In case default is too severe an outcome to capture small differences in intra-rating quality, as a second robustness check, I measure ex post performance through changes in the loan's risk rating between initiation and maturity. The table repeats the analysis in Table 6 while controlling for upgrades or downgrades to the risk rating. *Ex post change in risk rating* measures the integer magnitude of change from the initial risk rating level. This variable takes a negative value for downgrades, a positive value for upgrades, and equals zero if there is no change. Below are results of OLS regressions where the dependent variable is the all-in cost of the loan, computed in basis points as the sum of the interest rate and the amortized loan fees. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Non-credit profits to bank* (\$) is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. *Number of non-credit products controls* for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank* (\$) is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the loan is secured. The *Maturity* of the loan is measured in months. The loan's risk rating at initiation is specified non-parametrically with dummy variables spanning the Facility Rating's integer scale. Each regression also includes an intercept, the logarithm of the loan amount, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of loan issue, the type of loan (e.g., working capital, equipment loans, accounts receivable), the index to which the interest rate is tied (e.g., LIBOR, Prime Rate, Fixed Rate), and the bank branch that originated the loan. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	Panel A		Panel B			
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Relationship Characteristics</u>						
<i>Length of relationship</i>						
1-2 years	-19.288*	-11.740	-18.971	-19.230*	-3.462	-10.598
	[11.406]	[12.206]	[11.602]	[11.351]	[11.949]	[12.126]
3-5 years	11.981	21.246**	9.989	11.626	29.748***	22.264**
	[8.261]	[9.634]	[8.286]	[8.227]	[9.222]	[9.575]
6-10 years	12.639	23.669**	1.487	11.374	27.804***	24.134**
	[9.845]	[10.351]	[9.360]	[9.913]	[10.350]	[10.358]
11-15 years	4.514	18.921	-12.910	2.384	22.326*	19.092
	[11.684]	[12.829]	[11.779]	[11.489]	[13.096]	[12.805]
16+ years	25.675	41.386**	10.383	24.006	47.645***	42.141**
	[16.236]	[17.818]	[16.800]	[16.286]	[18.044]	[17.796]
<i>Cross-selling</i>						
Non-credit profits to bank (\$100,000)	-15.186***	-12.814***		-15.458***		-12.631***
	[4.327]	[4.649]		[4.510]		[4.825]
# of non-credit products		-1.497*			-3.098***	-1.715**
		[0.783]			[0.613]	[0.778]
<i>Connections</i>						
# of clients connected to as senior	-2.653**	-2.404*				
	[1.212]	[1.273]				
Children's total profits to bank (\$100,000)			-7.327***	-2.907	-5.594**	-2.756
			[2.737]	[2.577]	[2.663]	[2.573]
<u>Loan Performance</u>						
Ex post change in risk rating	-22.539***	-22.892***	-23.057***	-22.719***	-23.629***	-23.097***
	[5.731]	[5.723]	[5.785]	[5.733]	[5.727]	[5.725]
<u>Loan Characteristics</u>						
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-28.637***	-23.544**	-35.300***	-29.687***	-22.814**	-23.802**
	[9.098]	[9.421]	[9.122]	[9.149]	[9.526]	[9.490]
Maturity (months)	0.150*	0.135*	0.216***	0.148*	0.163**	0.131*
	[0.078]	[0.077]	[0.077]	[0.079]	[0.076]	[0.077]
Observations	3,257	3,257	3,257	3,257	3,257	3,257
R ²	0.63	0.63	0.62	0.63	0.63	0.63

Table 10
Quantity: Cross-Selling by Number of Products

The table captures cross-selling intensity with the raw number of non-loan products the borrower purchases from the bank. Below are results of OLS regressions where the dependent variable is the logarithm of the size of credit line (j) committed to firm (i). The marginal effects of the explanatory variables correspond to percentage changes in the amount of credit available. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. The total *Number of non-credit products* is partitioned into the *Number of deposit/savings accounts* (3), the *Number of cash management products* (4), and the *Number of financial service products* (5). Column (6) measures the consumption of each product category with dummy variables equal to one if the borrower purchases at least one product within that category. *Collateral* is a dummy variable equal to one if the commitment is secured. The *Maturity* of the commitment is measured in months. The commitment risk rating is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of one plus the age of the firm, the logarithm of one plus the annual sales of the firm, the logarithm of one plus the number of employees, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of commitment issue, the type of commitment, and the bank branch that originated the commitment. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
<u>Relationship Characteristics</u>						
<i>Length of relationship</i>						
1-2 years	-0.508*** [0.140]	-0.728*** [0.143]	-0.581*** [0.144]	-0.679*** [0.143]	-0.512*** [0.141]	-0.287* [0.169]
3-5 years	-0.443*** [0.140]	-0.704*** [0.139]	-0.536*** [0.145]	-0.639*** [0.138]	-0.451*** [0.140]	-0.225 [0.167]
6-10 years	-0.329** [0.132]	-0.627*** [0.134]	-0.433*** [0.136]	-0.552*** [0.134]	-0.340** [0.133]	-0.121 [0.159]
11-15 years	-0.217 [0.144]	-0.532*** [0.146]	-0.347** [0.151]	-0.444*** [0.144]	-0.245* [0.145]	-0.020 [0.172]
16+ years	-0.346 [0.221]	-0.657*** [0.216]	-0.469** [0.225]	-0.572*** [0.218]	-0.368 [0.224]	-0.159 [0.241]
<i>Cross-selling</i>						
# of non-credit products		0.035*** [0.006]				
# of deposit/savings accounts; (0,1)			0.108*** [0.040]			-0.470 [0.304]
# of cash management products; (0,1)				0.035*** [0.007]		0.084 [0.300]
# of financial service products; (0,1)					0.086 [0.061]	0.232* [0.133]
<u>Commitment Characteristics</u>						
Risk Rating	Yes	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	0.202** [0.088]	0.111 [0.087]	0.205** [0.088]	0.122 [0.087]	0.202** [0.088]	0.202** [0.088]
<u>Firm Characteristics</u>						
Log (1 + sales)	0.023** [0.012]	0.019* [0.011]	0.023* [0.012]	0.020* [0.011]	0.023** [0.012]	0.023** [0.012]
Log (1 + age)	0.038 [0.054]	0.018 [0.053]	0.033 [0.054]	0.020 [0.053]	0.039 [0.054]	0.039 [0.054]
Log (1 + employees)	0.069** [0.028]	0.055** [0.027]	0.070** [0.028]	0.056** [0.028]	0.065** [0.028]	0.062** [0.028]
Observations	1,572	1,572	1,572	1,572	1,572	1,572
R ²	0.57	0.58	0.57	0.58	0.57	0.57

Table 11
Quantity: Cross-Selling by Dollar Profits

The table captures cross-selling profitability with the dollar profits the bank accrues from fees charged on the non-lending relationship, while controlling for the information content in each non-credit product purchased. Below are results of OLS regressions where the dependent variable is the logarithm of the size of credit line (j) committed to firm (i). The marginal effects of the explanatory variables correspond to percentage changes in the amount of credit available. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Non-credit profits to bank (\$)* is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. The total *Number of non-credit products* is partitioned into the *Number of deposit/savings accounts* (3), the *Number of cash management products* (4), and the *Number of financial service products* (5). *Collateral* is a dummy variable equal to one if the commitment is secured. The *Maturity* of the commitment is measured in months. The commitment risk rating is specified non-parametrically with dummy variables spanning the *Facility Rating's* integer scale. Each regression also includes an intercept, the logarithm of one plus the age of the firm, the logarithm of one plus the annual sales of the firm, the logarithm of one plus the number of employees, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of commitment issue, the type of commitment, and the bank branch that originated the commitment. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
<u>Relationship Characteristics</u>					
<i>Length of relationship</i>					
1-2 years	-0.533*** [0.138]	-0.697*** [0.142]	-0.561*** [0.141]	-0.657*** [0.142]	-0.534*** [0.139]
3-5 years	-0.488*** [0.139]	-0.681*** [0.137]	-0.524*** [0.142]	-0.629*** [0.136]	-0.492*** [0.139]
6-10 years	-0.403*** [0.130]	-0.617*** [0.132]	-0.441*** [0.132]	-0.559*** [0.131]	-0.407*** [0.130]
11-15 years	-0.332** [0.143]	-0.550*** [0.143]	-0.379*** [0.147]	-0.485*** [0.142]	-0.344** [0.143]
16+ years	-0.419** [0.210]	-0.643*** [0.208]	-0.465** [0.213]	-0.577*** [0.209]	-0.428** [0.211]
<i>Cross-selling</i>					
Non-credit profits to bank (\$100,000)	0.064*** [0.022]	0.050*** [0.018]	0.061*** [0.023]	0.054*** [0.019]	0.063*** [0.022]
# of non-credit products		0.027*** [0.006]			
# of deposit/savings accounts			0.044 [0.042]		
# of cash management products				0.026*** [0.007]	
# of financial service products					0.041 [0.061]
<u>Commitment Characteristics</u>					
Risk Rating	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	0.197** [0.086]	0.128 [0.086]	0.199** [0.086]	0.137 [0.086]	0.197** [0.086]
<u>Firm Characteristics</u>					
Log (1 + sales)	0.021* [0.011]	0.019* [0.011]	0.021* [0.011]	0.019* [0.011]	0.021* [0.011]
Log (1 + age)	0.040 [0.053]	0.024 [0.052]	0.038 [0.053]	0.026 [0.052]	0.041 [0.053]
Log (1 + employees)	0.059** [0.027]	0.050* [0.027]	0.059** [0.027]	0.050* [0.027]	0.057** [0.027]
Observations	1,572	1,572	1,572	1,572	1,572
R ²	0.58	0.59	0.58	0.58	0.58

Table 12
Quantity: Connections

The table focuses on the borrower's network of connections to other bank clients. Below are results of OLS regressions where the dependent variable is the logarithm of the size of credit line (j) committed to firm (i). The marginal effects of the explanatory variables correspond to percentage changes in the amount of credit available. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Connected* is a dummy variable equal to one if the borrower is connected to at least one other bank client. *Number of clients borrower connected to* measures the size of the borrower's intra-bank network. *Connected as senior* is a dummy variable equal to one if the borrower has referred at least one additional client to the bank. *Connected as ultimate head* is a dummy variable equal to one if the borrower holds the highest rank in the hierarchy of referrals within the borrower's network. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank (\$)* is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the commitment is secured. The *Maturity* of the commitment is measured in months. The commitment risk rating is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of one plus the age of the firm, the logarithm of one plus the annual sales of the firm, the logarithm of one plus the number of employees, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of commitment issue, the type of commitment, and the bank branch that originated the commitment. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
<u>Relationship Characteristics</u>					
<i>Length of relationship</i>					
1-2 years	-0.506*** [0.139]	-0.545*** [0.138]	-0.559*** [0.138]	-0.515*** [0.139]	-0.523*** [0.140]
3-5 years	-0.437*** [0.139]	-0.477*** [0.137]	-0.489*** [0.136]	-0.442*** [0.139]	-0.447*** [0.140]
6-10 years	-0.320** [0.131]	-0.408*** [0.128]	-0.421*** [0.128]	-0.324** [0.130]	-0.352*** [0.133]
11-15 years	-0.209 [0.142]	-0.344** [0.138]	-0.343** [0.138]	-0.223 [0.142]	-0.274* [0.144]
16+ years	-0.332 [0.225]	-0.470** [0.222]	-0.461** [0.218]	-0.352 [0.222]	-0.368* [0.218]
<i>Connections</i>					
Connected (0,1)	-0.027 [0.079]	-0.247*** [0.093]	-0.258*** [0.093]	-0.053 [0.079]	
Connected as senior (0,1)		0.396*** [0.096]			
Connected as ultimate head (0,1)			0.439*** [0.098]		
# of clients connected to as senior				0.014*** [0.005]	
Children's total profits to bank (\$100,000)					0.058*** [0.014]
<u>Commitment Characteristics</u>					
Risk Rating	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	0.202** [0.088]	0.170* [0.087]	0.166* [0.087]	0.209** [0.088]	0.210** [0.087]
<u>Firm Characteristics</u>					
Log (1 + sales)	0.023** [0.012]	0.022* [0.011]	0.022* [0.011]	0.023** [0.012]	0.022* [0.012]
Log (1 + age)	0.039 [0.054]	0.025 [0.054]	0.019 [0.053]	0.035 [0.054]	0.044 [0.054]
Log (1 + employees)	0.069** [0.028]	0.061** [0.027]	0.059** [0.027]	0.068** [0.028]	0.070** [0.028]
Observations	1,572	1,572	1,572	1,572	1,572
R ²	0.57	0.57	0.58	0.57	0.57

Table 13
Quantity: Cross-Selling and Connections

The table tests the additive effect of borrowers' direct and indirect streams of non-credit profit. Below are results of OLS regressions where the dependent variable is the logarithm of the size of credit line (j) committed to firm (i). The marginal effects of the explanatory variables correspond to percentage changes in the amount of credit available. *Length of relationship* measures the duration, in years, of the firm's overall relationship with the bank. *Non-credit profits to bank* (\$) is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. *Number of non-credit products* controls for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children's total profits to bank* (\$) is the total sum of credit income and non-credit income from the borrower's referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the commitment is secured. The *Maturity* of the commitment is measured in months. The commitment risk rating is specified non-parametrically with dummy variables spanning the *Facility Rating*'s integer scale. Each regression also includes an intercept, the logarithm of one plus the age of the firm, the logarithm of one plus the annual sales of the firm, the logarithm of one plus the number of employees, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of commitment issue, the type of commitment, and the bank branch that originated the commitment. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	Panel A		Panel B		
	(1)	(2)	(3)	(4)	(5)
<u>Relationship Characteristics</u>					
<i>Length of relationship</i>					
1-2 years	-0.568*** [0.137]	-0.687*** [0.140]	-0.545*** [0.139]	-0.720*** [0.144]	-0.690*** [0.142]
3-5 years	-0.521*** [0.135]	-0.665*** [0.135]	-0.491*** [0.139]	-0.685*** [0.140]	-0.662*** [0.138]
6-10 years	-0.479*** [0.126]	-0.629*** [0.130]	-0.420*** [0.130]	-0.618*** [0.135]	-0.609*** [0.132]
11-15 years	-0.454*** [0.137]	-0.593*** [0.140]	-0.378*** [0.142]	-0.548*** [0.145]	-0.565*** [0.143]
16+ years	-0.538** [0.210]	-0.688*** [0.212]	-0.435** [0.208]	-0.646*** [0.215]	-0.633*** [0.208]
<i>Cross-selling</i>					
Non-credit profits to bank (\$100,000)	0.063*** [0.021]	0.052*** [0.018]	0.061*** [0.021]		0.049*** [0.017]
# of non-credit products		0.021*** [0.007]		0.032*** [0.006]	0.024*** [0.006]
<i>Connections</i>					
Children's total profits to bank (\$100,000)			0.052*** [0.014]	0.045*** [0.016]	0.044*** [0.015]
Connected as senior (0,1)	0.382*** [0.094]	0.271*** [0.099]			
Connected (0,1)	-0.236*** [0.091]	-0.148 [0.095]			
<u>Commitment Characteristics</u>					
Risk Rating	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	0.166* [0.086]	0.121 [0.085]	0.204** [0.086]	0.125 [0.086]	0.141 [0.086]
<u>Firm Characteristics</u>					
Log (1 + sales)	0.020* [0.011]	0.018* [0.011]	0.020* [0.011]	0.019* [0.011]	0.018* [0.011]
Log (1 + age)	0.027 [0.052]	0.018 [0.052]	0.046 [0.052]	0.025 [0.053]	0.031 [0.052]
Log (1 + employees)	0.051* [0.026]	0.047* [0.026]	0.060** [0.027]	0.056** [0.027]	0.051* [0.027]
Observations	1,572	1,572	1,572	1,572	1,572
R ²	0.59	0.59	0.58	0.58	0.59

Table 14
Robustness: Boundary Between Connections and Cross-Selling for Quantity

The table shows the robustness of the results to taking away referral attribution from “senior” borrowers who have only one “child”. This specification repeats the analysis in Tables 12 and 13 under the conservative assumption that connection groups with just two clients represent a single relationship. Below are results of OLS regressions where the dependent variable is the logarithm of the size of credit line (j) committed to firm (i). The marginal effects of the explanatory variables correspond to percentage changes in the amount of credit available. *Length of relationship* measures the duration, in years, of the firm’s overall relationship with the bank. *Non-credit profits to bank (\$)* is the total dollar profit the bank earns on the client from non-credit products during the sample period, denominated in units of \$100,000. *Number of non-credit products* controls for the collective information embedded in the aggregate number of non-credit products purchased by the borrower. *Number of clients connected to as senior* is the number of additional clients the bank attributes to the borrower. *Children’s total profits to bank (\$)* is the total sum of credit income and non-credit income from the borrower’s referrals, denominated in units of \$100,000. *Collateral* is a dummy variable equal to one if the commitment is secured. The *Maturity* of the commitment is measured in months. The commitment risk rating is specified non-parametrically with dummy variables spanning the *Facility Rating*’s integer scale. Each regression also includes an intercept, the logarithm of one plus the age of the firm, the logarithm of one plus the annual sales of the firm, the logarithm of one plus the number of employees, fixed effects for the industry of the firm at the 2-digit NAICS level, the month-year of commitment issue, the type of commitment, and the bank branch that originated the commitment. Standard errors are in brackets and clustered at the borrower level. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relationship Characteristics								
<i>Length of relationship</i>								
1-2 years	-0.532*** [0.140]	-0.536*** [0.139]	-0.515*** [0.139]	-0.687*** [0.142]	-0.523*** [0.140]	-0.720*** [0.144]	-0.544*** [0.139]	-0.691*** [0.142]
3-5 years	-0.442*** [0.139]	-0.440*** [0.138]	-0.441*** [0.139]	-0.651*** [0.137]	-0.445*** [0.140]	-0.684*** [0.140]	-0.488*** [0.139]	-0.662*** [0.138]
6-10 years	-0.374*** [0.131]	-0.375*** [0.131]	-0.322** [0.131]	-0.617*** [0.131]	-0.347*** [0.133]	-0.615*** [0.135]	-0.416*** [0.130]	-0.606*** [0.133]
11-15 years	-0.300** [0.142]	-0.301** [0.142]	-0.222 [0.142]	-0.576*** [0.140]	-0.268* [0.144]	-0.545*** [0.145]	-0.372*** [0.142]	-0.562*** [0.143]
16+ years	-0.429** [0.219]	-0.420* [0.216]	-0.350 [0.222]	-0.674*** [0.210]	-0.366* [0.218]	-0.645*** [0.215]	-0.433** [0.207]	-0.633*** [0.208]
<i>Cross-selling</i>								
Non-credit profits to bank (\$100,000)				0.051*** [0.018]			0.061*** [0.021]	0.049*** [0.017]
# of non-credit products				0.022*** [0.007]		0.032*** [0.006]		0.024*** [0.006]
<i>Connections</i>								
Children’s total profits to bank (\$100,000)					0.057*** [0.014]	0.044*** [0.016]	0.051*** [0.014]	0.042*** [0.015]
Connected as senior (0,1)	0.389*** [0.106]			0.277** [0.108]				
Connected as ultimate head (0,1)		0.419*** [0.107]						
# of clients connected to as senior			0.014*** [0.005]					
Connected (0,1)	-0.137 [0.084]	-0.140* [0.084]	-0.049 [0.079]	-0.074 [0.084]				
Observations	1,572	1,572	1,572	1,572	1,572	1,572	1,572	1,572
R ²	0.57	0.57	0.57	0.59	0.57	0.58	0.58	0.59

Appendix Table A1
Price Analysis with Firm Age, Employee and Sales Controls

The table adds controls for the logarithms of one plus firm age, number of employees and annual sales to the preceding price analysis. These firm characteristics are collected from Dun and Bradstreet, with a loss of 51% of the loan observations in the sample. Panel A refines the analysis of the length of relationship in Columns 1 and 2 of Table 3. Panel B repeats the analysis in Columns 3 through 7 of Table 3 with these additional firm characteristic controls.

	Panel A				Panel B				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>Relationship Characteristics</u>									
<i>Length of relationship</i>									
# of years	0.229 [1.056]	0.356 [1.031]							
1-2 years			6.604 [20.852]	4.982 [21.124]	24.717 [21.873]	10.867 [22.686]	19.442 [21.741]	5.599 [21.131]	-6.007 [65.791]
3-5 years			14.186 [14.757]	15.455 [14.774]	39.001** [16.576]	21.971 [17.509]	32.659** [16.364]	16.086 [14.756]	4.938 [65.534]
6-10 years			-15.613 [14.014]	-14.519 [13.753]	12.475 [15.625]	-6.567 [16.911]	4.066 [15.201]	-12.715 [13.865]	-22.759 [63.678]
11-15 years			3.393 [16.620]	7.257 [16.321]	43.096** [19.630]	15.562 [18.625]	32.837* [19.191]	10.020 [16.775]	-0.008 [63.897]
16+ years			37.946 [24.757]	37.600 [24.216]	71.545*** [26.209]	46.120* [26.483]	62.602** [26.391]	39.178 [23.982]	28.194 [66.345]
<i>Cross-selling</i>									
# of non-credit products					-2.750*** [0.848]				
# of deposit/savings accounts; (0,1)						-5.200 [6.590]			33.838 [67.880]
# of cash management products; (0,1)							-2.678** [1.054]		-21.590 [25.566]
# of financial service products; (0,1)								-6.842 [7.337]	-33.418** [16.360]
<u>Firm Characteristics</u>									
Log (1 + age)	-16.344** [6.519]	-11.271 [6.884]	-15.102** [6.638]	-10.122 [6.985]	-8.151 [6.835]	-10.019 [6.989]	-8.639 [6.869]	-9.900 [7.003]	-9.593 [7.027]
Log (1 + sales)		-0.567 [1.729]		-0.237 [1.727]	-0.150 [1.747]	-0.248 [1.745]	-0.203 [1.732]	-0.222 [1.719]	-0.277 [1.712]
Log (1 + employees)		-8.263** [3.316]		-8.587** [3.357]	-5.990* [3.277]	-8.652** [3.393]	-6.484* [3.327]	-8.419** [3.315]	-8.345** [3.281]
<u>Loan Characteristics</u>									
Facility Risk Rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collateral (0,1)	-37.025*** [13.079]	-34.858*** [12.963]	-37.819*** [12.980]	-35.581*** [12.893]	-25.319* [13.909]	-35.786*** [12.889]	-27.317* [13.945]	-34.569*** [13.217]	-33.114** [13.208]
Maturity (months)	0.516*** [0.139]	0.527*** [0.140]	0.513*** [0.138]	0.526*** [0.139]	0.476*** [0.136]	0.521*** [0.140]	0.493*** [0.137]	0.519*** [0.139]	0.496*** [0.141]
Observations	1,598	1,598	1,598	1,598	1,598	1,598	1,598	1,598	1,598
R ²	0.64	0.64	0.65	0.65	0.65	0.65	0.65	0.65	0.65