SVERIGES RIKSBANK
WORKING PAPER SERIES
384

Big Broad Banks: How Does Cross-Selling Affect Lending?

Yingjie Qi

January 2020

WORKING PAPERS ARE OBTAINABLE FROM

www.riksbank.se/en/research
Sveriges Riksbank • SE-103 37 Stockholm
Fax international: +46 8 21 05 31
Telephone international: +46 8 787 00 00

The Working Paper series presents reports on matters in
the sphere of activities of the Riksbank that are considered
to be of interest to a wider public.
The papers are to be regarded as reports on ongoing studies
and the authors will be pleased to receive comments.

Big Broad Banks:

How Does Cross-Selling Affect Lending?

Yingjie Qi*

Stockholm School of Economics

Sveriges Riksbank Working Paper Series

No. 384

January 2020

Abstract

Using unique micro-data that contain the internal information on all corporate customers of a large Nordic bank, I show that combining loan and non-loan products (cross-selling) has two benefits. First, it increases credit supply, especially in recessions. Second, it increases the likelihood of receiving lenient treatment in delinquency. I argue that non-loan relationships play an important role in determining credit supply and debt renegotiation, not only by (i) mitigating information asymmetries (as suggested in earlier literature), but also by (ii) increasing the profitability of the relationship. Exploiting an exogenous and differential change in similar products' profitability due to the Basel II implementation, I estimate the causal effect of this new profit channel on credit supply. A 20 percent decrease in non-loan products' profitability (i) reduces credit supply to affected firms by 13 percent (600,000 USD) compared with unaffected firms, and (2) reduces likelihood of receiving lenient treatment for affected firms by 30 percent (13 pp) compared with unaffected firms, conditional on being delinquent.

Keywords: relationship banking, cross-selling, credit allocation, debt renegotiation, financial distress.

JEL Classification: G01, G21, G28.

*Department of Finance at the Stockholm School of Economics & Swedish House of Finance, Drottninggatan 98, 111 60 Stockholm, Sweden; yingjie.qi@phdstudent.hhs.se. Please see latest version here. I am indebted to Per Strömberg for his continuous support and guidance. I am grateful to Bo Becker, Vincent Maurin, Jan Starmans, and Dong Yan for numerous discussions and valuable feedback. For comments and discussions, I thank Niklas Amberg, Adrien d'Avernas, Laurent Bach, Ramin Baghai, Christoph Bertsch, Marieke Bos, Jens Dick-Nielsen, Michael Halling, Jungsuk Han, Fatemeh Hosseini, Isaiah Hull, Mariassunta Giannetti, Tor Jacobson, Jieying Li, Alexander Ljungqvist, Gyöngyi Lóránth, Daniel Metzger, Kristian Miltersen, Marcus Opp, Kasper Roszbach, Farzad Saidi, João Santos, Tuomas Takalo, Erik von Schedvin, Xin Zhang, and participants at the NFN PhD workshop, SSE, Sveriges Riksbank, and EFA Doctoral Tutorial 2019. This paper was written while I was visiting the Research Division of Sveriges Riksbank, I am grateful for Tor Jacobson and Jesper Lindé's hospitality. The opinions expressed in this article are the sole responsibility of the author and should not be interpreted as reflecting the views of Sveriges Riksbank.

1 Introduction

The revenue composition of the banking industry is changing. Non-loan revenue has been contributing to nearly half of the net operating revenue of large banks since the early 2000s.[1] Given that bank loans are the predominant source of external finance in most countries (Gorton and Winton 2003; Allen et al. 2013), it is important that we investigate the implications of this worldwide prevalence of non-loan products in large banks' business models for bank lending.

The interactions between commercial banking and investment banking activities are well studied.[2] In contrast, we know little about how the products that are commonly offered by commercial banks and used in firms' daily businesses—for example, account services, card services, trade-related documentation, merchant acquiring services, leasing, factoring, and sales solutions—affect banking relationships.[3] More specifically, how does combining loan and non-loan products in a relationship affect credit supply? And what are the underlying mechanisms?

There are at least three challenges in answering these questions: (1) a lack of data that capture the full picture of the relationship between firms and lenders over time; (2) challenges in disentangling credit supply from credit demand; and (3) identification concerns related to causally distinguishing the economic forces underlying these effects from one another.

This paper studies how cross-selling affects credit supply in a banking relationship, and identifies the underlying mechanisms. I use an internal database from a major Nordic bank that contains detailed information on the universe of its corporate borrowers in Sweden. I investigate how the maximum amount of credit the bank is *willing to lend* to a firm—an internal credit supply measure that is not contaminated by the firm's demand for credit—is affected by the non-loan profit it generates from this firm. Using a stylized model, I illustrate two economic forces: the increased return to the relationship (profit channel) and the reduced information asymmetry (information channel), that give rise to credit supply. In order to identify the underlying mechanisms and establish a causal relationship, I exploit an exogenous shock to the profitability of similar non-

[1] See Figure 1 for a description of the world as of 2014, and US and Sweden for the period of 2002 to 2012.
[2] See, e.g., Yasuda (2005); Yasuda (2007); Neuhann and Saidi (2018).
[3] A few exceptions include Mester et al. (2006); Drucker and Puri (2005); Norden and Weber (2010); and Santikian (2014).

loan products due to implementation of the Basel II Accord at the bank level. To be specific, I test whether the bank reduced credit supply to firms whose non-loan products purchased before the shock became less profitable (affected group), compared with firms that purchased similar yet unaffected products (unaffected group) in a difference-in-differences setting.

I document two benefits when combining loan and non-loan products in a relationship. First, it increases the bank's willingness to lend, especially during recessions. Second, it increases the likelihood that firms receive lenient treatment in delinquency. To identify the source of favoritism, I provide causal estimation of the profit channel. When non-loan products that firms purchased before the Basel II Accord become exogenously less profitable, the bank reduces credit supply by 13% to these firms relative to the unaffected firms. I also provide some indicative evidence of the information channel. Compared to borrowers who do not purchase any non-loan products, the bank's information acquisition pattern changes after firms add non-loan products to the relationship.

I begin my analysis by studying whether non-loan relationships affect credit supply. I focus on a variable used internally by the bank: the credit limit, which is the maximum amount the bank is willing to lend to a borrower at a given time.[4] The credit limit variable is never directly communicated to borrowers, and is therefore not affected by the firm's demand for credit.[5] Endogenous selection remains an issue: We cannot simply compare borrowers that have a non-loan relationship with their bank (henceforth, "cross-buyer") and those that only borrow because of omitted variable bias.[6] To alleviate this concern, I focus on within-firm non-loan relationship variation over time. Controlling for firm-level characteristics as well as industry by time fixed effect, I test how credit supply to a specific firm responds to changes in its non-loan relationship with the bank. To capture variation in the firm's creditworthiness, I control for the bank's internal rating assigned to the firm over time.[7] To the extent that the internal rating captures the unobservables that are not absorbed

[4] Degryse et al. (2012) is the first in using this measure.

[5] Identifying credit supply has been a challenge in the literature, because common measures, such as loan amount granted or the size of credit lines, are equilibrium outcomes of both the firm's demand and the bank's supply. Khwaja and Mian (2008) make a significant contribution to this empirical challenge. However, their strategy relies on firms having multiple banking relationships, which is not common in Nordic countries, since the majority of firms only have one bank relationship.

[6] For example, a firm might buy non-loan product in addition to borrowing due to better investment opportunities, increased quality, or creditworthiness. Therefore, any differential treatment from the bank could simply be due to some omitted variables that simultaneously cause firms to cross-buy and get differential treatment from the bank.

[7] Ratings (0 (low credit quality) - 21 (high credit quality)) incorporate information about the credit quality of the

by the firm-level controls and firm, and industry by time fixed effects, this approach should alleviate any concern over within-firm omitted variable bias.

I show that the bank supplies more credit to customers that also buy non-loan products, especially during recessions.[8] Holding all control variables fixed, a 205 percent (97,182 SEK) increase in non-loan profit per year, representing a one-standard-deviation increase, is expected to increase loan supply by 3.4 percent (1.1 million SEK) in normal times, and an additional 0.4 percent (128,000 SEK) in recession times.

In addition, I explore whether the bank is more lenient when cross-buyers are in delinquency. Conditional on being delinquent, I find that the bank is more likely to extend or waive the cross-buyers' interest payments.[9] Economically, a one-standard-deviation increase in non-loan profit increases the probability of lenient treatment by 3.69 (=205*0.018) percentage points, which translates to a 9.2 percent (=3.69/39.91) higher chance compared with what an average delinquent firm gets.

Next, I investigate the channels underlying these effects. There are two mechanisms through which cross-selling can affect a bank's lending decision, and I illustrate how they both increase the credit supply in a stylized model building on Holmstrom and Tirole (1997). First, the profit earned from non-loan products simply increases the net present value of the relationship.[10] As a firm purchases more and more services from the bank, the bank holds a share in the firm's future profits.[11] Also, the implicit equity stake allows the bank to benefit from the continued survival of the firm, making it more willing to renegotiate in financial distress. Second, the additional information gathered from cross-sold products can help to alleviate information asymmetry and moral hazard problems, and make bank lending more informed.[12] Even though the prediction for

borrower, seniority of the bank loan, trends in the industry, and the macroeconomic environment the borrower is exposed to, and are a strong predictor of default.

[8]This finding provides potential explanation why banking relationships act as an insurance in recession times in earlier literature. See, e.g., Becker and Ivashina (2014); Bolton et al. (2016); Beck et al. (2018).

[9]A firm is considered to be delinquent if it is late with a loan repayment for more than 90 days, consistent with earlier literature.

[10]Compared with loans, cross-sold services and products are less regulated, have higher margins, and carry much less credit risk. Therefore, banks have an incentive to sell these products to maximize profits. A negative example in the retail market is the cross-selling scandal at Wells Fargo in 2016. https://www.bloomberg.com/news/articles/2018-10-22/wells-fargo-to-pay-65-million-to-new-york-over-cross-selling

[11]Rajan (1992); Petersen and Rajan (1995); Loranth and Morrison (2012); Srinivasan (2014)

[12]For example, a bank can learn about a firm's detailed cash flow condition through managing its transaction

lenient treatment is less obvious,[13] both channels effectively increase pledgeable income and the bank's willingness to supply credit.

In order to identify the profit channel, I exploit variation in the profitability of certain products caused by a plausibly exogenous change in their capital requirements after the implementation of Basel II. The products I examine became significantly different in their profitability due to the change in the amount of equity capital the bank would need to hold when offering them. This allows for a difference-in-differences test in which a firm is considered to be affected if any of the products it purchased before the shock were assigned higher capital requirements. Control firms are cross-buyers who, before the shock, purchased products that were unaffected by Basel II, even though the products were similar in their function to the affected products. The reason that similar products are assigned different risk weights could be that regulators are unaware of the similar risk characteristics, or it is too costly to regulate the full scope of non-loan products that banks offer. The identifying assumption is that the profitability differentials of similar products are unrelated to lending decisions, except through the bank's for-profit motive. I first show that the bank internalizes the higher cost instead of passing it on to borrowers. In addition, I find that the bank's information acquisition behavior was indeed unaffected. Therefore, any difference in the treatment received by the affected and unaffected firms is arguably due to the change in profitability.

Consistent with the prediction of the model, I document that after certain products became less profitable (on average, a drop of 20 percent in profitability) due to the Basel II capital requirement, the bank decreased the credit supply to affected firms by 13 percent. This translates to a decrease of 4 million SEK (roughly 600,000 USD in 2007), compared with control firms that purchased similar but unaffected products before the shock. This shows that cross-selling profits play an economically and statistically significant role in banks' credit allocation decisions.

In order to identify the information channel, I examine how adding or dropping a certain non-loan product affects a bank's information acquisition behavior. I employ the firm monitoring

accounts; they can learn about the riskiness of the business, financial or liquidity conditions, future profitability, and their customer profiles through offering sales-solution services, etc. (Fama 1985; Srinivasan 2014). See, for example, Stiglitz and Weiss (1981); Ramakrishnan and Thakor (1984); Diamond (1984b); Diamond (1991); Holmstrom and Tirole (1997); Berger et al. (1999); Loranth and Morrison (2012)

[13] Norden and Weber (2010) documents that early warning indications result in higher loan spreads and in a higher likelihood of limit reductions and complete write-offs.

intensity, which is measured as the months between two consecutive reviews of the firms, as a measure of the bank's knowledge of its borrowers.[14] Any change in this measure therefore reflects change in the information environment that the bank is exposed to. I document that comparing firms who picked up or dropped non-loan products during their borrowing relationship with the bank also experience changes in the frequency the bank is collecting information about them. To the extent that internal rating absorbs any within firm over time omitted variable that is not captured by the standard firm level controls included in the tests, this is reflecting the fact that banks receive superior information from the products they sell to their borrowers and can reduce the cost of information production.

My paper makes two contributions. First, I document two novel empirical findings on how combining lending and non-lending products benefits borrowers. Cross-buyers receive more credit, especially in recessions. While price benefit has been suggested in some previous studies (Santikian, 2014), this paper adds to literature by demonstrating the credit supply effect using a novel measure that is plausibly unrelated to the demand for credit from the borrower. In addition, I add to the literature by showing that cross-buyers also receive more lenient treatment in financial distress. Second, the paper's findings further our understanding of why banks engage in relationships with borrowers.[15] The benefits are not only due to the informational synergies, but also increased return to the banks' investment in a relationship with borrowers. The provision of these services helps tie the firm to its creditor in the long run, making the creditor more willing to extend funds (Petersen and Rajan, 1995). They also offer the opportunity for firms that have no prior relationship with their bank to build a valuable one. To the best of my knowledge, this is the first paper that successfully documents the existence, and demonstrates the causal effect, of the profit channel.

My findings have important policy implications regarding regulation of the scope and breadth of banks' activities and the ongoing switching of some firms from relationship-oriented to transaction-oriented financial intermediaries. Since financial intermediaries' cross-selling businesses affect their credit allocation and debt renegotiation decisions, regulators should take financial intermediaries'

[14]The time between two events when the bank requests financial statements from a borrower.

[15]Boot (2000) states: "Existing empirical work is virtually silent on identifying the precise sources of value in relationship banking."

non-loan business into account when deciding on optimal policies. Although both the profit and the information channels have the effect of boosting pledgeable income, they may have different policy implications. If information is the pure driving force, any seemingly risk-taking behavior by the banks—for example lending to cross-buyers with lower ratings—is well justified. It could simply mean that external proxies for credit risk is not taking into account the full informational advantage of banks. Regulations that limit the scope of banks' business models, and the rise of recent transaction-oriented lending (FinTech), could potentially lead to a contraction in credit supply due to deterioration in the information that banks receive from borrowers (René M. Stulz 2019; Parlour et al. 2019; Philippon 2019). This might be an even more important issue in a recession, when funding is limited and adverse selection is a particularly severe problem. However, if the profit channel prevails, then policy makers and regulators need to trade off the potential conflicts of interest and the benefit of multi-producing.[16] On the one hand, the increase in return to the relationship offers lenders a long-term role in the relationship, which might help mitigate the debt-equity holder conflict that leads to credit constraints or excessive liquidation of distressed firms.[17] On the other hand, this also potentially gives rise to capital misallocation and evergreening behaviors by the bank.

Even though my test is executed in a traditional banking context, application of the results can be extended more generally to every institution whose customers face the trade-offs of combining loan and non-loan products.[18]

The remainder of this paper is organized as follows. Section 2 reviews the paper's contribution to the literature. Section 3 details the data and variables used in the study. Section 4 explains the empirical methodology and discusses the baseline findings. Section 5 describes the theoretical framework and derives empirical predictions to identify the mechanisms. Section 6 empirically tests and discusses the two mechanisms through which cross-selling affects the bank's lending-related decisions. Section 7 concludes.

[16] See, e.g., DeYoung and Roland (2001); Liberti (2011); Laeven and Levine (2007); Lepetit et al. (2008); Baghai and Becker (2018); Abedifar et al. (2018)

[17] Debt-equity holder conflict refers to the conflict between bank as a debt-holder and entrepreneur as an equity-holder to the firm in distress.

[18] Amazon, Alibaba, Apple, Tencent, and several traditional technology companies are in the process of developing credit products for qualified existing customers.

2 Related literature

This paper is related to several strands of literature. The first is relationship banking. One characteristic that may distinguish banks from other financial institutions is the role of relationships between the bank and its borrowers (Petersen 1999). Banking relationships are proven to be important in overcoming various frictions in the capital market (Leland and Pyle 1977; Diamond 1984a; Hoshi et al. 1990), and insure credit access in economic downturns (Beck et al. 2018; Bolton et al. 2016). Therefore, obtaining and maintaining a good relationship with bank(s) is of vital importance for firms (Petersen and Rajan 1994). While the benefits of a banking relationship for firms have been well identified (James 1987; Lummer and McConnell 1989; Hellmann et al. 2008; Bharath et al., 2011; Schäfer 2018), we know relatively little about a bank's motivation to be engage in a relationship with its borrowers (Boot 2000). We have some evidence that banks gain informational rents (Liberti and Petersen 2017; Bharath et al. 2007; Schenone 2010; Hale and Santos 2009; Giannetti et al. 2017), repeated interaction with firms over time or multiple product exposure at the same time (Freixas and Rochet 2008; Srinivasan 2014). However, we have little understanding of how banks learn about their borrowers and whether synergy generation is limited to reduced information asymmetry. The findings of this paper provide some answers to these questions.

This paper also contributes to the debate whether relationship with banks help during borrower distress. On the one hand, large strands of literature argue that relationships should benefit borrowers in distress, either because of information friction mitigation (Sharpe, 1990; Diamond, 1991), or implicit contracting incentives (Serdar Dinç, 2000). On the other hand, increased likelihood of bankruptcy may also lead to a reduction of the benefits of relationship lending as the relationship bank sees little benefit in continuing relationship in future due to lower likelihood of business from the same borrower (Bharath et al., 2007; Li and Srinivasan, 2017). My finding of lenience in delinquency relates to the first view. In addition, I also provide findings indicating that the benefits of non-loan relationship is absent for firms close to bankruptcy (Figure 6), which relates to the second view.

In addition, by emphasizing the importance of banks' cross-selling incentive in a relationship,

this paper contributes to the interpretation of other studies that uses geographical distance between bank and firm (Degryse and Ongena 2005; Hauswald and Marquez 2006; Agarwal and Hauswald 2010);[19] length of relationship (Ongena Steven & Smith 2001); or whether the bank is a main bank (or intensity of lending) as proxies for relationship.[20] My findings document the importance of cross-selling activity as a main determinant of the strength of banking relationships, and contribute to discussion of the sources of value in relationship banking.

The second strand of literature is cross-selling in banking. The literature provides some evidence on how loan and non-loan products interact with each other through the information channel (Mester et al. 2006; Norden and Weber 2010; Agarwal et al. 2018). Much evidence has been provided on the interaction between commercial banking and investment banking business (Yasuda 2005; Ivashina and Kovner 2011; and Neuhann and Saidi 2018). In contrast, we know little about how the products that are commonly offered by commercial banks and used in firms' daily businesses—for example, account services, card services, trade-related documentation, merchant acquiring services, leasing, factoring, and sales solutions—affect banking relationships. Some evidence are documented in retail and SME commercial banking on how banks benefit from information from deposit and transaction accounts. For example, Mester et al. 2006 and Norden and Weber 2010 find that information from cross-sold accounts helps intermediaries better monitor commercial borrowers. Using data from credit card usage, Agarwal et al. 2018 show that relationship accounts exhibit lower probabilities of default and attrition, and have higher utilization rates, compared to non-relationship accounts.

The closest paper in the literature, Santikian (2014) documents that non-loan profit is associated with lower loan price for 2,981 loans drawn by 1,704 unique SMEs in a mid-sized U.S. bank. My paper differs in three dimensions. First, I look at the bank's credit supply, which is free from contamination of the borrowers' demand for credit as in this paper, and is of first-order economic importance. Second, I estimate the causal effect of the profit channel, which is an improvement

[19] Previous literature assumes that a bank's ability to gather information decreases with its distance from the borrower, although geographical distance is considered to be less and less important with advances in modern communication technology.

[20] Srinivasan 2014 reviews theoretical and empirical literature on the relationship-banking field and raises concern over potential biases caused by employing existing proxies such as the length, scope, and intensity of the relationship.

in identification and the key innovation.[21] Third, I look at within-firm variation instead of cross-sectional differences in cross-selling, which addresses the cross-firm omitted variable bias issues. The richness of the data, especially being able to observe the time-series of the relationship, in combination with the identification strategy, allows this paper to provide richer insights that previous paper could not test. For example, I show that the credit discount result documented in Santikian (2014) is not only determined by competition environment faced by the bank, but also by the length of the relationship. The discount is only present in the beginning of the relationship, as the relationship intensifies and therefore switching cost increases, the effect is gone. Not incorporating the time-series variation could lead to a partial understanding of the relationship.

The third literature strand is studies that document banks' tendency to internalize negative spillover (Petersen and Rajan 1995; Favara and Giannetti 2017; Giannetti and Saidi 2018).

Lastly, while most of the focus on the Basel II Accord has been on the internal risk models implemented by large banks (Behn et al. 2016; Behn et al. 2014), the capital requirement on non-loan products I exploit in this paper is used for the first time in the literature. This could contribute to identification of more studies to investigate how the capital requirement on non-loan products could affect lending, and could have real effects.

3 Data and description of products

This section details the source of data and the key variables used in the analyses. The selection criteria are (1) the borrower must have been assigned an internal rating, and (2) the borrower is a limited liability firm. The final dataset is an unbalanced panel of monthly observations of 28,000 unique limited liability borrowers' exposure, both in terms of loan and non-loan products, with yearly financial condition from both the balance sheet and income statements. A detailed description of the profiles of borrowers is presented in Table 1.

[21] The paper states "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."

3.1 Bank data

I use a unique and comprehensive data set containing all corporate accounts of a major Nordic commercial bank. This bank is one of the largest banks in Northern Europe, and is ranked among the 40 largest banks in Europe, with hundreds of billion euros in total assets. Data are available from 2002:4 to 2012:12, and cover all corporate customers' exposure with the bank at a monthly frequency. For each customer, I observe what products they have, the prices charged (including fees and interest rate), and dates when the account is set up and is supposed to end (some products don't have a maturity date). For customers with total assets above a certain threshold, an internal rating is assigned. Since the internal rating is a key variable for this study in order to deal with the endogeneity issue, I focus on the period after 2004.[22]

3.2 Financial data

Financial data are obtained from the company registration office (Bolagsverket) in Sweden. Financial outcomes and ownership structure are reported at yearly frequency. The data set includes the universe of limited liability companies in Sweden.

3.3 Sample construction

To construct the final dataset used in the empirical analyses, the bank dataset and financial dataset are merged. As a result, non limited liability firms, non Swedish firms, firms that never borrowed from the bank, and organizations in the public sector are excluded from the sample. The final dataset is composed of around 35,000 firms.

3.4 Products offered at the bank

Without revealing the identity of the bank, I will describe as much in detail as possible the non-loan products that are offered by the bank to its corporate customers. In total, there are nearly

[22]With this data set Degryse et al. 2012 investigate the non-exclusivity of lending relationships; Cerqueiro et al. 2014 study the role collateral plays in the design of debt contracts, provision of credit, and incentives of lenders to monitor borrowers. Cerqueiro et al. 2019 study the real effects of loss in collateral value. Becker et al. 2015 study the predictability of internal rating over business cycle.

200 unique and finely defined products over the sample period, with some very close to each other in terms of purpose. I first exclude all products that are similar to a loan, and then classify the remaining products into seven categories based on their functionalities. Below is a brief description of the products. A comparison of how much, on average, each product contributes to the total non-loan profit to the bank is detailed in Figure 2. In terms of the dynamics, even though cards and accounts contribute to more than half of non-loan profits, their significance has been decreasing over the years.

Cards and accounts The most common product is cards and accounts, which are usually bundled together. A firm cannot have a card product from this bank without setting up an account, which is a common practice in the card business. A certain number of credit or debit cards are usually offered for free to the corporate customer when they set up an account, and they can purchase more cards for their business use if they wish. The cards are for business use only, and the drawn amounts are recorded as operating expenses in their accounting reports. Foreign currency exchange, payroll management, automatic payment services etc., are also included in this category, since they are usually bundled within the account service.

Trade-related documentation Extensive documentation is required in trading, especially cross-border trade. For example, to mitigate risks such as fraud, documents issued from creditworthy banks are needed for importers to collect their goods from the harbor. Sometimes the document can even be used as collateral for the exporter to obtain financing from its local bank.

Merchant acquiring service Merchant acquiring service allows the bank to process credit and debit card payments on behalf of a merchant. This is a valuable product for banks. Historically, price discrimination was used so that a bank could increase the market share of their card business. In recent years, banks can no longer do that; instead, they make sure that the information generated by their systems can only be accessed by themselves.

Leasing A common contract by which the bank leases certain property to its borrowers, for a specified period of time, in exchange for a periodic payment. Ownership of the property lies with the bank, and is therefore different from a loan contract.

Factoring Factoring is a service where by a borrower sells accounts receivables or invoices to its

bank, usually at a big discount. Alternatively, a firm could borrow against its receivables. Depending on the form of factoring, ownership of the debt—together with its credit risk—is transferred to the bank (the factor).

Sales solution To increase sales for the borrower, the bank offers financial solutions to their customers. One common example is leasing contracts. Many heavy-duty vehicles and car dealerships offer ready-made lease contracts to their customers that are actually supported by the bank. The dealer pays for the service, and gets to decide on the terms of the contract. Ownership of the property lies with the borrowing firm. In some cases, the end customer has the opportunity to purchase the residual value from the borrowing firm.

Similar to the leasing to customer service, the borrowing firm can also choose to offer its customers financing solutions that break down the payments for items they purchase on several occasions. The contract is drafted between the borrower and its customers, and the borrower can also decide whether they want to set the terms of the contract. Ownership of the property lies with the end customer from day one, and the service has higher requirements for the credit worthiness of the customer.

Negotiable instrument A negotiable instrument is a document that guarantees payment of a specific amount of money, either on demand or at a set time, with the payer usually named on the document[23]. This is a common and important instrument for payment settlement between firms.

Figure 2 shows the source of non-loan profit for the year of 2012 as an example. While the composition changes from year to year, cards and account services consistently make up more than half of the profit.

3.5 Profit at firm-product-month level

In the internal dataset, net profit is recorded at product-by-month level. The measure is developed in order to calculate the return on investment for every customer, and it is risk-adjusted. Loan officers and their respective branches are also evaluated internally, based on how much risk-adjusted profit they generate; even though no monetary benefit is awarded, the measure is used for

[23] https://https://en.wikipedia.org/wiki/Negotiable_instrument

promotion and performance evaluation.[24]

An average firm generates 47,000 Swedish Krona (roughly 7,000 US dollars as of 2009) for the bank in non-loan profit per year, which contributes to around 20 percent of the bank's total profits.

4 Baseline results

In this section, I first detail four measures of non-loan relationships. I then test how non-loan relations affects credit supply, especially in recessions and when a firm is delinquent, and discuss the results.

4.1 Measuring non-loan relationships

I measure cross-buying, or non-loan relationships, in two ways. First, I use the natural logarithm of profits generated from non-loan products. Second, I use the number of distinct non-loan products. The main analyses will focus on these two measures, while I include a fourth measure—the ratio of non-loan profits divided by total profits—in the robustness check section. An average borrower has about two non-loan products per year. non-loan products contribute 47,000 SEK net profit from to the bank, in addition to the interest income. This number corresponds to about 0.3 percent of the borrower's total assets (Table 1).

The two variables complement each other in terms of the specific type of information they reflect about the non-loan relationship. The first measure captures the intensity and how profitable the non-loan relationship is to the bank at a given point in time, while the second one sheds light on the breadth of the relationship.

4.2 Non-loan relationship and credit supply

I first test whether cross-buyers have more access to credit. Identifying credit supply is challenging. Petersen and Rajan 1994 identify firms' access to credit by observing whether the firm is late in trade credit repayment. Other papers use loan application outcome and proxy granting a

[24] According to this bank, the variable is an accurate measure of profitability, since operational cost, expected losses, and other costs are already considered in production of the profit measure.

loan for obtaining credit supply.[25] Even though I observe all of the loans this bank has made over the years, simply running a regression on loan origination would yield biased estimates, because observed loan amount or size of credit line are the equilibrium outcome of demand and supply. For example, cross-buyers could have more loans from the bank because they have more investment opportunities, and therefore more demand for credit.

The key variable for measuring credit supply is the internal credit ceiling generated by the credit office. The measure is created with financial factors and qualitative inputs, according to the bank. Loan officers can grant any loan application less or equal to the limit amount without asking for further confirmation from management. The internal limit indicates the maximum amount this creditor is willing to lend to a borrower; it represents the amount for which the bank's loan supply becomes vertical. Changes in the internal limit represent changes in the loan supply (Degryse et al. 2012). Borrowers normally are not aware of the measure, nor how much their measure is valued at. An average borrower has a credit supply of 32 million SEK (Table 1). The main specification is as follows:

$$\begin{aligned} Credit\ supply_{f,i,t} = \beta_1\ Non\ Loan\ Relation_{f,i,\ year-1} \\ + \gamma X_{f,\ year-1} + A_f + B_{j,t} + C_r + \epsilon_{f,t}, \end{aligned} \tag{1}$$

where f is firm, j is industry, t is time (year-month), and r is internal rating (1(bad) - 21(good)). The dependent variable is the natural logarithm of the internal credit ceiling assigned to each customer at each month. Non-loan relation is measured in two ways. In columns 1 and 2, it is measured as the natural logarithm of total non-loan profits generated by a customer from the previous year. In columns 3 and 4, it is measured as the raw number of non-loan products that were purchased in the previous year. In column 5 and 6, both measures are included in the same regressions. Firm (A), and Industry by year-month (B) fixed effects are included in the tests to remove any factors that are nonvariant in each specific dimension that might instead cause the difference we capture. Regression coefficients are reported in Table 4. All of the coefficients are

[25] Even though loan application perfectly observes whether a loan is granted or not, one could still be concerned that some firms might have stayed away from applying, especially when loan rejection has externalities. Therefore, we observe only firms that are more likely to have been granted a loan.

statistically significant at the 1 percent statistical level. Internal rating (C) fixed effects are included in even number columns. In column 2, an increase of 1 percent (474.17 SEK) in non-loan profit is expected to increase loan supply by roughly 0.029 percent (9,510.55 SEK). Alternatively, a one-standard-deviation increase in non-loan profit, which translates to 205% (= 97182/47417) increase from the mean, corresponds to a 3.4% (= $(1 + 205\%)^{0.029}$) increase in credit limit.

In both column 3 and 4, an additional non-loan product which corresponds to the difference between borrowers in the 50th and 25th percentiles or the difference between the 75th and 50th percentiles—increases the credit ceiling by roughly 9 percent (2.9 million SEK). Including both measures of non-loan relationship in the same regression specifications in column 5 and 6 yield statistically similar results, although the economic magnitude decrease slightly.

I then test whether this relationship is more pronounced in recessions, since theory (Bolton et al. 2016) predicts that relationship banks may play a prominent role in the continuation of lending during crisis times. The main specification is as follows:

$$\begin{aligned} Credit\ supply_{f,t} = {} & \beta_1\ Non\ Loan\ Relation_{f,\ year-1} \\ & + \beta_2\ Non\ Loan\ Relation_{f,\ year-1} *\ Recession\ Dummy_t \\ & + \beta_3\ Recession\ Dummy_t + \gamma X_{f,\ year-1} + A_f + B_{j,t} + C_r + \epsilon_{f,t}, \end{aligned} \tag{2}$$

where f is firm, j is industry, t is time (year-month), and r is internal rating (1(bad) - 21(good)). The specifications are exactly the same as in the earlier test, except that interactions of the non-loan relation measures and the recession dummy are included for each measure.

Regression coefficients are reported in Table 5. All of the coefficients on the non-loan relation measures are statistically significant at the 1 percent statistical level. In column 2, an increase of 1 percent (474.17 SEK) in non-loan profit is expected to increase loan supply by roughly 0.028 percent (9,182.6 SEK) in normal times, and an additional 0.0046 percent (1,472 SEK) in recession time.

In column 4, an additional non-loan product—which corresponds to the difference between borrowers in the 50th and 25th percentiles or the difference between the 75th and 50th percentiles—

increases the credit ceiling by 8.9 percent (2.9 million SEK). However, the correlation is not statistically significant during recession times.

Including both measures of non-loan relationship in the same regression specifications in column 5 and 6 yield statistically similar results, although the economic magnitude decrease slightly. In sum, non-loan relationships are associated with higher credit supply, and it seems there is an even stronger effect for crisis times, when credit constraints are especially severe. However, non-loan profit seems to be a better predictor for better access to credit supply during recession times than simply the number of products a borrower purchases.

4.3 Non-loan relationship and and default probability

Does cross-selling cause the bank to lend more efficiently, or does it give the bank incentive to loosen its lending standards? In this section, I test whether cross-buyers are more likely to default on their payments. Consistent with earlier literature, I define a loan as being in default if interest payments or scheduled amortization has been late for 90 or more days. The empirical specification is as follows:

$$\begin{aligned} Default_{i,f,t} = \beta Non\ loan\ relation_{f,\ year-1} \\ + \gamma_1 X_{f,\ year-1} + \gamma_2 Z_{i,f} + B_t + C_r + D_j + E_p + \epsilon_{i,f,t}, \end{aligned} \tag{3}$$

where f denotes the firm, i the loan, and t the time (year-month). Each unit of observation is a unique loan. B is year-by-month (when the loan was issued) fixed effects, absorbing macro trends, business cycle, and other time-varying factors that might instead cause the default outcome.[26] C is the internal rating fixed effect that absorbs the firm's credit-related risk. E is loan type fixed effects that control for factors related to the riskiness of the type of loan. Firm-level controls X include length of relationship, firm age, size, and leverage level (all lagged by one year). Loan-level controls Z include loan size, contracted maturity, and whether the loan is secured.

Table 6 reports results for ordinary least squares regressions. Higher non-loan profit is associated with higher default probability (Column 1), however the effect is statistically insignificant after

[26] For example, the time-varying riskiness of the loans the bank issues.

including internal rating fixed effects (column 2). Having more products is associated with higher default probability, and the effect survives the inclusion of internal rating fixed effects. Given that the average probability of default is 2.3 percentage points, having an additional non-loan product is associated with a 9%(0.0021/0.023) higher likelihood of default.

4.4 Non-loan relationship and treatment in delinquency

Conditional on a firm being delinquent on its loan repayment, which therefore indicates financial distress, the bank has two options in terms of how it handles such a situation. It could seek repayment by formally initiating a bankruptcy or reorganization process (Strömberg 2000), or it could extend help to the firm and rescue it from the difficult situation. The choice between these two actions depends on how the bank evaluates its trade-off. There are two reasons the bank might be more lenient towards cross-buyers.[27] The first is reduced information asymmetry: All else equal, a bank is more likely to know the exact cause of delinquency when it concerns a borrower the bank has multiple exposure to. The second reason is the bank's long-term incentive in the firm. The bank's share in the firm's future surplus will disappear once the firm defaults. By offering help when a firm is in distress, the bank faces a trade-off between the loss of future income generated by the firm if the bank allows the firm to default, and the payment it is willing to give up so that the firm can regain financial health.[28] The empirical specification used to test the effect of cross-buying on the bank's willingness to help when a firm defaults is as follows:

$$\begin{aligned} Lenient_{i,f,t} =& \beta Non\ loan\ relation_{f,\ year-1} \\ &+ \gamma_1 X_{f,\ year-1} + \gamma_2 Z_{i,f} + B_t + C_r + D_j + E_p + \epsilon_{i,t}, \end{aligned} \tag{4}$$

where i is loan, f is firm, p is loan type, t is time of default (year-month), r is internal rating, and j is industry. The dependent variable is a dummy that equals one if the bank pauses or waives interest payments on the loan. The rest of the regressors are similar to specification 3. Each

[27] Many practitioners confirm that they often reach out to relationship borrowers when they are delinquent on their payments, especially when it is an illiquidity rather than an insolvency issue, and offer various solutions to resolve the distress. Some common examples of help offered include investigation and advice on the cause of delinquency, pause or waive interest payments, and sometimes an additional loan to ease the liquidity problem.

[28] Debt renegotiation is also a possibility here, and adds additional hold-up cost for the bank.

unit of observation is a unique loan. B is default time (year by month) fixed effects, absorbing macro trends, business cycle, and other time-varying factors that might cause the effect instead. D stands for industry fixed effect, which absorbs the industry-specific time-invariant characteristics that might instead cause the effect. E is product fixed effects that control for the type of the loan. C is the internal rating fixed effect, which absorbs the firm's credit-related risk. Firm-level controls X include length of relationship, firm age, size, and leverage level (all lagged by 1 year). Loan-level controls Z include loan size, contracted maturity, and whether the loan is secured.

Coefficients from ordinary least squares regressions are shown in Table 7. The specifications are the same throughout all three sets of tests using three measures of non-loan relationship, except that internal rating fixed effects is only included for even-numbered columns.

Without controlling for internal rating fixed effects, the coefficient in column 1 indicates that a 205 percent (97,182 SEK), which corresponds to a one-standard-deviation increase in non-loan profit increases the probability of lenient treatment by 5.125 (=205*0.025) percentage points. Given that the average ratio of lenient treatment is 39.9 percentage points (Table 2), this translates to a 12.8 percent (=5.125/39.91) higher chance of getting lenient treatment compared with the average delinquent firm. After including internal rating fixed effects in the even-numbered columns, the economical significance decreases. This demonstrates how important the internal rating is when banks are making decisions about distressed firms. In column 2, the coefficient decreases to 1.8% from 2.5% in column 1. A one-standard-deviation increase in non-loan profit increases the probability of lenient treatment by 3.69 (=205*0.018) percentage points, which translates to a 9.2 percent (=3.69/39.91) higher chance compared with what an average firm gets.

In column 3, an additional non-loan product—which corresponds to the difference between borrowers in the 50th and 25th percentiles or the difference between the 75th and 50th percentiles—increases the likelihood of receiving lenient treatment by 3.1 percentage points, which corresponds to a 7.8% (=3.1/39.91) increase relative to the average delinquent firm. In column 4, controlling for internal rating, the economic magnitude drops slightly. An additional product increases the likelihood of receiving lenient treatment by 2.3 percentage points, which corresponds to a 5.8% (=2.3/39.91) increase relative to the average delinquent firm.

When including both measures of non-loan relationship in the same regression, as presented in column 5 and 6, number of non-loan products become statistically insignificant while both the economic and statistical significance remain similar for the non-loan profit measure. This indicates that profit, rather than number of products, is the key determinant of receiving lenient treatment in case of delinquency.

Overall, I interpret the results as consistent with the hypothesis that cross-buying contributes to the formation of a valuable banking relationship.

5 Theoretical framework

Following the seminal paper by Holmstrom and Tirole (1997), I show that a bank increases the supply of credit to customers who receive bundled loan and non-loan products,[29] a fortiori increases investment, in a stylized continuous-investment model.[30] I illustrate two channels through which non-loan products have an impact on the lending decision: First, the bank learns proprietary information about the entrepreneur, and this translates into an informational advantage for the bank (the information channel); second, purchasing production inputs from the bank instead of external suppliers increases the bank's profit (the profit channel). The two channels are independent. The purpose of the theoretical framework is to illustrate that both channels have the same prediction in terms of credit supply. Therefore we rely on empirical tests to tell the two channels apart.

[29] Much theoretical research has been devoted to solving the coexistence of loan and non-loan products in a bank (Kanatas and Qi 1998; Kashyap et al. 2002; Kanatas and Qi 2003; Laux and Walz 2007; Loranth and Morrison 2012, etc), yet the focus has been on investment banking services. Assuming the reusability of information, i.e., the bank pays a firm-specific sunk cost of monitoring initially, and after that the updating cost is much lower (Rajan 1992; von Thadden 2004), as firm and bank repeatedly interact with each other, bank learns more about the firm and reduce information asymmetry (Leland and Pyle 1977; Ramakrishnan and Thakor 1984; Fama 1985). Black 1975 suggests that banks have a cost advantage in making loans to depositors. The ongoing history of a entrepreneur as a depositor provides information that allows a bank to identify the risks of loans to depositors and to monitor the loans at lower cost than other lenders. Similarly, banks also enjoy information synergies by providing other services to the firms. However, the fact that the pure profit from bundling loan and non-loan services has not been considered in a theoretical framework before.

[30] My case with a simple borrowing relationship is similar to the case without monitoring in this original paper, while the bundling case is developed further based on the case with monitoring. I choose to study a variable investment case to avoid the discontinuities in credit demand faced by fixed investment models.

5.1 A stylized model

I show with a stylized model how bundling increases debt capacity. There are two periods, $t = 0, 1$ in the model. Constant returns to scale in the investment technology is assumed. An investment $I \in [0, \infty)$ yields income IR, in the case of success, and 0 in the case of failure at time $t = 1$. A competitive lending market is assumed, so the bank makes zero profit from its loan business. The bank charges interest rate r for its loan to the entrepreneur. r can be viewed as the opportunity cost of the bank's funds, which is exogenous to the model. The probability of success is $p \in \{p_L, p_H\}$, and the probability of failure is $1 - p$. There is no time discounting. The borrower initially has cash A, and must therefore borrow $I - A$ to finance a project of size I. In order for the project to take place, one unit of non-credit service is needed as input for every unit of investment. The entrepreneur chooses to buy this service between the market (which can be viewed as a FinTech firm or another bank) and the lending bank. This non-credit service costs C to produce, and is priced at $C(1 + m)$ by any service provider, with m being the margin.

The entrepreneur has a choice between choosing the good project (Table A), in which case she derives no private benefit and the probability of success is p_H, and choosing the bad project, that is, enjoying some private benefit,[31] but reducing the probability of success to $p_L = p_H - \Delta p < p_H$. The private benefit is equal to $B > 0$ per unit of investment. It can be reduced to $b \in (0, B)$ if the bank carries both lending and non-lending activities. This assumption captures the information or monitoring benefits for the bank from providing the service.

I assume that the project is viable only if the entrepreneur exerts effort. That is, the project has positive NPV per unit of investment if the entrepreneur works, i.e.,[32]

$$p_{\mathrm{H}}R - (1 + r)(1 + m)C - (1 + r) > 0, \tag{5}$$

[31] The entrepreneur's private benefit from misbehaving is also assumed to be proportional to investment.

[32] Note condition (5) implies $p_{\mathrm{H}}R - (1+r)C - (1+r) > 0$, which is the assumption for positive NPV when exerting effort in the bundled case.

and negative NPV otherwise, i.e.,[33]

$$p_{\mathrm{L}}R + b - (1+r)C - (1+r) < 0. \tag{6}$$

These conditions will ensure that the investment has positive (resp. negative) NPV when the bank exerts effort (resp. shirks) for any choice of the service provider by the entrepreneur.

Let R_e denote the entrepreneur's reward per unit of loan investment in the case of success. The entrepreneur's incentive compatibility constraint determines that R_e is a function of the entrepreneur's private benefit (agency cost). To keep the equilibrium investment finite, I also assume that pledgeable income — expected income after taking into account the agency cost — is smaller than the total investment, irrespective of the choice of service provider:[34]

$$p_{\mathrm{H}}(R - \frac{b}{\Delta p}) < (1+r)C + 1 + r. \tag{7}$$

Table A: Project description

	Good project	Bad project with bundling	Bad project without bundling
Pr(Success)	p_H	p_L	p_L
Private benefit	0	Ib	IB

5.1.1 Case 1: Borrow from the bank and purchase from the market

I start with the case in which the firm engages in a single-dimensional relationship with the bank, i.e., the firm only borrows from the bank, while she buys the non-loan service from the market.

[33] Note condition (6) implies $p_{\mathrm{L}}R + B - (1+r)(1+m)C - (1+r) < 0$, which is the assumption for negative NPV when shirking in the unbundled case.

[34] Pledgeable income per unit of credit investment is $p_{\mathrm{H}}(R - R_e)$, where $(\Delta p)IR_{\mathrm{e}} \geqslant IB$ in the unbundled case and $(\Delta p)IR_{\mathrm{e}} \geqslant Ib$ in the bundled case. Note condition (7) implies $p_{\mathrm{H}}(R - \frac{B}{\Delta p}) < (1+r)(1+m)C + 1 + r$, which is the assumption to insure finite investment in the unbundled case.

The entrepreneur's **Incentive Compatibility Constraint** reads:

$$(\Delta p) I R_{\mathrm{e}} \geqslant I B. \tag{8}$$

Funding requires that the pledgeable income exceeds the bank' investment plus interest payment. The total cost of the project is the sum of the loan (I) and what it costs to purchase the non-loan-service ($I(1+m)C$), therefore the bank's **Individual Rationality Constraint** reads:

$$p_{\mathrm{H}} \left(I R - I R_{\mathrm{e}} \right) \geqslant (1+r)(I - A + I(1+m)C). \tag{9}$$

In equilibrium, the bank's **IR** binds. Therefore, the entrepreneur wants to maximize I because his utility is simply the project's NPV:

$$\Phi_e = \left(p_{\mathrm{H}} R - 1 - r - (1+r)(1+m)C \right) I, \tag{10}$$

which is increasing in size I; therefore, the size of the investment and also debt capacity is determined by the entrepreneur's **IC** (8) and the bank's **IR** (9). Substituting (8) into (9), we get

$$I \leqslant kA, \tag{11}$$

where

$$k = \frac{1}{1 - \frac{p_{\mathrm{H}}(R - B/\Delta p)}{1+r} + (1+m)C}. \tag{12}$$

We easily obtain that the $k > 1$ from the assumption (7). Debt capacity is simply $k - 1$.

5.1.2 Case 2: Bundling

In the bundling case, the entrepreneur buys the non-loan service from the bank. Two effects take place in such a relationship: First, the non-loan services work as an information gathering tool (or interaction platform), which reduces the scope of moral hazard by decreasing the entrepreneur's private benefits from B to b (information channel). Second, this changes the bank's income from

only loan repayment to both repayment and cross-selling (profit channel).

The entrepreneur's **IC** changes because private benefit is reduced from B in (8) to b, and therefore reads:

$$(\Delta p) I R_{\mathrm{e}} \geqslant I b. \tag{13}$$

The bank now provides both the lending and the non-loan-service. In sum, the **IR** for the bank when bundling is

$$p_{\mathrm{H}} \left(I R - I R_{\mathrm{e}} \right) \geqslant (1 + r)(I - A + IC). \tag{14}$$

Compared to the bank's IR in the unbundled case (equation (9)), this is easier to satisfy because the investment needed from the bank decreases by mC. Bundling avoids paying the margin on the service to a third party.

The entrepreneur's utility is the same as in (10). Therefore, the size of the investment and also debt capacity is determined by the entrepreneur's **IC** (13) and the bank's **IR** (14). Substituting (13) into (14), we get

$$I \leqslant k' A, \tag{15}$$

where the new equity multiplier is

$$k' = \frac{1}{1 - \frac{p_{\mathrm{H}}(R - b/\Delta p)}{1+r} + C}. \tag{16}$$

We easily obtain that the $k' > 1$ from the assumption (7). Debt capacity is simply $k' - 1$.

5.2 Predictions

5.2.1 Credit supply

We now show that it is optimal for the firm to bundle with the bank, i.e., $d' > d$. To solve for the conditions, we work backward:

$$\iff \frac{p_{\mathrm{H}}}{\Delta p(1+r)} * \underbrace{(B-b)}_{\text{information channel}} + \underbrace{mC}_{\text{profit channel}} > 0 \qquad (17)$$

$k' > k$

Prediction 1: Bundling increases debt capacity if condition (17) holds.

Prediction 2a: The information channel always increases debt capacity by limiting the scope of the moral hazard problem.

Proof: It is easy to see that

$$\frac{p_{\mathrm{H}}}{\Delta p(1+r)} * \underbrace{(B-b)}_{\text{information channel}} > 0$$

is always satisfied when $B > b$, since $\frac{p_{\mathrm{H}}}{\Delta p(1+r)}$ is positive.

Prediction 2b: The profit channel increases debt capacity because bundling avoids paying the markup on the input to a third party. Instead, this markup becomes a profit of the bank who can then offer a larger loan to the firm.

Proof: It is easy to see that condition (17) is more satisfied when

$$\underbrace{mC}_{\text{profit channel}} > 0.$$

Both the information and profit channel increase debt capacity independently. We see from equation (17) that even if there is no information benefit ($b = B$), for example for products with little informational content, pledgeable income is higher thanks to the profit channel. Since the debt capacity benefit of bundling is increasing in m, a decrease in m implies a decrease in this benefit.

6 Identification of the mechanisms

Why would non-loan products affect a bank's loan-related decision making? My theoretical framework provides two explanations: Information synergies and profit maximization. However, for a better understanding and design of policies related to banks' cross-selling business, it is important to identify each effect separately. Even more important, it is important to know whether (and to what extend) banks' lending behavior is affected by their economic incentives in cross-selling to borrowers.

This topi,c has attracted great interests in the literature, and probably even more in policy debates. However, data limitations and lack of good identification strategies have limited its examination. Ideally, one would like to perfectly separate the two channels by holding one constant and giving the other a shock, one channel at a time. Fortunately, we now have an opportunity to identify the profit channel, although examination of the information channel is rather limited. In this section, I provide tests for and discussion of these two mechanisms.

6.1 Identifying the profit channel

In order to identify the profit channel, I exploit implementation of the Basel II rule at the bank in 2007, which exogenously increased the capital requirements for and decreased the profitability of certain products. Similar products in the same product group were unaffected, and therefore qualify as a unaffected group. This allows for a difference in differences test, in order to cleanly document the effect of the profit channel. The identifying assumption is that in the absence of the treatment, both unaffected and affected groups would have received the same credit supply going forward.

6.1.1 The Basel II Accord and capital requirements for certain non-loan products

Basel II is the second of the Basel Accords, which are recommendations for banking laws and regulations from the Basel Committee on Banking Supervision.[35] The accord was first published in 2004, as an update to the first accord in 1986, but went through revisions for many years. A

[35] See original document from 2006 at https://www.bis.org/publ/bcbs128.htm

Swedish bank must apply to the Nordic and local FSAs for approval to implement certain models in the rules, and therefore the timing of adoption is rather exogenous. While the main focus of the accord is on the lending side, the Basel committee was aware of the risk associated with certain non-loan or off-balance-sheet items that could potentially become a threat to the health of the banks. According to the Basel II rules, capital will have to be reserved toward exposure to certain products, which was not required under Basel I. In addition, certain off-balance-sheet items, such as trade documentation products (letter of guarantee, documentary collection, etc.), are given a credit conversion factor,[36] so that the proper amount of capital is reserved in case default happens and exposure becomes on-balance-sheet items.[37] The complexity of the products banks offer means that accurate regulations that correctly access the riskiness of each product are hardly achievable. The reason behind this could either be that regulators' regulatory capital, toolkit, and knowledge about real-life banking business is limited, or that it simply incurs too much cost to take every single product that (especially large) banks offer into account when designing regulations. It could also be that the regulators are trying to limit the complexity of regulatory compliance, in which case a simpler and more concise rule is preferred. What happens, and what is most important for the purpose of my research, is that similar products within the same product group were assigned different capital requirements, which provides a nice setting for testing the bank's incentive change when certain customers become less profitable for reasons unrelated to the fundamentals.

In 2007, the bank was approved to implement most of the Basel II capital requirements. A key feature of Basel II is that not only traditional loan products, but also non-loan products, are subject to capital requirements. For example, depending on who bears the residual risk of the property, leasing and leasing to customer have different capital charge. Depending on whether the firm leases directly from the bank or through a dealer in between, the capital charge ranges from 100 percent to zero. The two kinds of leasing bear the same kind of credit risk before and after the

[36]The face amounts of certain specified off-balance-sheet items are assigned conversion factors, and the resulting credit-equivalent amounts are assigned to the appropriate risk category. Guarantees and other direct credit substitutes have a 100 percent conversion factor. Transaction-related contingencies, such as bid bonds, performance bonds, and standby letters of credit related to particular transactions, have a 50 percent conversion factor. Short-term, trade-related contingencies, such as commercial letters of credit have a 20 percent conversion factor.

[37]A letter of guarantee is a type of contract issued by a bank on behalf of a customer who has entered a contract to purchase goods from a supplier. A documentary collection is a trade transaction in which exporters allow their bank to act as a collection agent for payment of shipped goods to the buyer.

Basel II implementation, but the profitability of the two changed dramatically afterward. Second, trade-related documentation and import collection documents are considered risk free, while export collection documents are heavily charged in terms of capital. Third, one group of factoring services was charged 150 percent and became much less profitably afterward, while another that was very similar in nature were charged 0 percent. I therefore define a product as being affected if the capital requirement in offering such a product increases due to Basel II. Products that are in the same product group and similar in terms of their function and nature, but experienced no change in capital requirement, will be considered the unaffected product in this paired relationship. I further define a firm as being affected if it bought any affected product, and a firm as being unaffected if it bought only unaffected products, both prior to the Basel event. This is the strictest rule in terms of grouping the affected firms into two groups; any other choice of treatment definition will only likely bias our result upward.[38]

The final dataset include 935 affected firms and 4,377 unaffected firms. A comparison of the loan- and firm-level variables can be found in Table 3. A t-statistic might suggest that two groups are significantly different, even though the actual difference is small if the sample is large enough. Therefore I perform a normalized difference test of the variables as well.[39] Following Imbens 2015, I consider an absolute value below 0.3 of the normalized differences being a reasonable threshold to identify substantial differences between two groups. Firms from the two groups look rather similar. The only noticeable difference is that affected firms received better loan terms, and have more secured loan, in addition to having a larger credit ceiling. However, these differences are not considered substantial, given the results from normalized difference tests.

[38]For example, the affected firm being a firm that bought only affected products, or the unaffected firm being a firm that bought any unaffected product.

[39]I follow Imbens and Wooldridge 2009 and calculate the normalized differences as

$$\bar{X}_1 - \bar{X}_0 / \sqrt{(S_1^2 + S_0^2)/2}, \tag{18}$$

where $i = 1$ refers to the treatment group and $i = 0$ to the unaffected group. $\bar{X}_i$ is the mean, and S_i^2 the standard deviation of matching variable X.

6.1.2 The effect of non-loan product capital requirement on credit supply

To verify that the effects that I observe in the affected firms relative to the unaffected firms are not driven by differences in the trajectories of the firms, I need to test whether the variables of interest evolved in a parallel manner in the period preceding the shock. The specification of the model I test is as follows:

$$\begin{aligned} y_{f,t} =& Affected_f * \sum_{t=2004m1}^{t=2012m12} * \beta_t D_t \\ &+ Affected_f + \sum_{t=2004m1}^{t=2012m12} * D_t \\ &+ controls_{f,year-1} + A_f + B_t + D_r + \epsilon_{f,t}, \end{aligned} \tag{19}$$

Figure 3 provides evidence consistent with the identification assumption of parallel trends.

We then move on to the main difference-in-differences test. In Table 9 I test whether the negative shock to profitability of non-loan products had a negative spillover effect on the credit side, following the specification

$$\begin{aligned} y_{f,t} =& \beta Affected_f * Post_t + Affected_f + Post_t \\ &+ \gamma X_{f,t-1} + A_f + B_{j,t} + D_r + \epsilon_{f,t}, \end{aligned} \tag{20}$$

where f is firm, t is year-month, j is industry, and r is internal rating. The unit of observation is firm-year-month. Post is a dummy equal to one after Basel II implementation at the bank. The dependent variable is credit supply, measured as ln(credit limit). I then include control variables such as lagged ln(total assets), ln(years of relation), leverage, and firm age. Industry by time (year-month), firm, and internal rating fixed effects are also included. I cluster standard errors at the firm level.

The empirical results of OLS regressions in Table 9 show that once certain products become less profitable, while holding their informativeness unchanged, the bank lowers the credit supply to the affected firms. In column 1 and 2, the economic magnitude is around 14 percent compared

with unaffected firms. Given that the average credit supply is 33 million SEK, this translates to a on average decrease of 4.3 million SEK for the affected firm. In column 3 and 4, where industry by year-month fixed effects is included, the economic magnitude is around 10 percent compared with unaffected firms. Given that the average credit supply is 33 million SEK, this translates to a on average decrease of 3.3 million SEK for the affected firm.

In addition to defining whether a firm is negatively affected by the Basel II event using a dummy variable, I also use the intensity in terms of what fraction of a firm's pre-Basel II non-loan profit was negatively affected as an explanatory variable, instead of the dummy variable, and find similar results (Table 10).

6.1.3 Discussion of the effectiveness of the shock to the profit channel

In this section, I conduct three tests to ensure the shock's effectiveness, i.e., that the affected non-loan products did become less profitable to the bank, while holding other channels unaffected. Three major concerns post challenges over how we can interpret the effect of higher capital charge on non-loan products on how the bank's incentives change on the lending side. First, one might be concerned that the bank might have engaged in regulatory arbitrage, or failed to comply to the rules, since the products are so profitable for them and they have developed a big customer base. To address this concern, we need to find out whether the affected products' profitability was actually negatively affected. Second, if I find that the bank actually took a negative hit in terms of affected products' profitability, one might be concerned that the loss might have been transfered to customers instead. If this is indeed the case, then there is little or limited impact on the bank's own profitability. Ideally, we would want to show that pricing of the affected products did not increase following the event. However, detailed data about pricing of the products iareonly available for a small subgroup of products. In addition, there might also be compositional change in terms of the products firms buy after the shock. I instead focus on comparing the pricing of loans made to affected and unaffected firms before the event. The assumption is that the bank will increase the price of the loan in order to smooth the negative effect on profitability. Last, my identification strategy relies on the assumption that the informativeness of the products was not

affected by the Basel shock. If the amount of information the bank gets from the products differs between unaffected and affected group after the shock, then we cannot attribute the effect to a profit channel.

To address the above concerns, I do three difference-in-differences tests in this section, speaking to each concern about the effectiveness of the shock to profitability. First, I show that due to the exogenous capital requirements, affected products did suffer a decrease in profitability compared to unaffected products, after the shock, using the following specification:

$$\begin{aligned} y_{p,t} =& \beta Affected_p * Post_t + Affected_p + Post_t \\ &+ X_{p,t} + F_p + B_t + \epsilon_{p,t}, \end{aligned} \tag{21}$$

where p is product and t is time (year-month). The dependent variable is product profitability, which is measured as $\frac{sum\ of\ profit}{sum\ of\ capitalemployed}$. Unit of observation is product-year-month. A non-loan product is considered affected if it became less profitable due to the Basel II regulation on capital requirements, and it is considered a unaffected product if it is classified within the same product class—and therefore functionally similar—but did not face regulation, and therefore decreases in profitability. Post is a dummy equal to one after Basel II was adopted by the bank. Total volume sold of the respective products is included as a control variable. Time (year-month) and product fixed effects F are also included. The coefficient of interest is reported in column 1 of Table 8. I find a negative and significant effect of 0.11 percent on affected products. Given that the average profitability is 0.5 percent (per month), this corresponds to a more than 20 percent drop in profitability for affected products. Second, I test whether the bank passed the additional cost on to its borrowers; i.e., affected firms' existing loans did not become more expensive compared with unaffected firms'. The econometric specification is as below:

$$\begin{aligned} y_{i,t} =& \beta Affected_i * Post_t + Affected_i + Post_t \\ &+ X_{i,t-1} + Z_{f,year-1} + A_f + B_{j,t} + C_r + F_i + \epsilon_{i,t}, \end{aligned} \tag{22}$$

where i is loan, t is year-month, r is rating category, j is industry, and f is firm. The purpose of this

table is to show that the bank internalized the cost of higher capital requirement instead of passing it on to the affected borrowers. Coefficients of interest are reported in Table 12. I test whether affected firms' loan spreads are increased by the shock, compared with those of the unaffected firms'. The dependent variable is loan spread, which is measured as the difference between the interest rate on the loan and the bank's internal estimate of the cost of the loan at each month. In columns 1 and 2, I conduct the analysis on a panel dataset of loans to affected and unaffected firms. The unit of observation is loan-year-month. A loan is affected if the firm is affected. Post is a dummy equal to one after Basel II was adopted at the bank. Controls at the firm level include age, leverage, size, and years of relationship. Whether the loan is secured (dummy variable) is included as a loan-level control. Industry by time (year-month), firm, internal rating, and loan fixed effects are also included. Standard errors are presented in parenthese and clustered at the loan level.

In columns 3 and 4, I restrict the sample to the first observation of each loan. A loan is considered affected if the company is affected, and unaffected otherwise. Firm controls include age, leverage, size, and years of relationship. Industry by time (year-month), firm, and internal rating fixed effects are also included. Standard errors are clustered at the loan type level. None of the coefficients of interest are statistically significant, and therefore we conclude that we fail to reject that the bank passed the extra cost to affected borrowers.

Third, I show that the affected products did not become less informative compared with unaffected products; i.e., the information channel was held unchanged, and therefore any change in the affected firms' credit supply is plausibly due to the change in the profit shock to non-loan products they bought. Information acquisition is measured as (1) the time interval (in months) between two firm reviews by the bank; (2) the likelihood of a change in internal rating from month to month. I follow the same econometric specification as the previous test, and report the coefficient of interest in Table 14. Again, statistically insignificant coefficients on all columns for both measures for information indicate that we fail to reject the hypothesis that the bank's information acquisition pattern changed due to the shock.

Another concern one might have is that certain unobservable shocks negatively affected the affected group rather than the unaffected group, and therefore lead us to find the reduction in credit

supply to the affected group. To address this concern, I test whether affected group became downgraded after the Basel shock. OLS regression estimates are presented in Table 13. An insignificant coefficient indicates that affected firms did not deteriorate in any sense in terms of credit quality, from the bank's perspective.

6.2 External validity

An obvious caveat of this study is the limited data coverage. While we ideally would like to have the universe of banks' internal evaluation of each of their customers, such a scenario is not likely to realize. The dataset used in this study is by far the most detailed and comprehensive in the literature in terms of the description of firms' non-loan relationships with their banks, as far as I am aware. Given that the big banks are consolidating the banking industry in many countries in recent years,[40] findings from this dataset are highly informative for the understanding of large financial institutions' credit allocation decisions.

While the findings are more informative of large banks' incentives, they also shed light on the understanding of any large organization that is engaged in both lending and non-lending activities.

7 Conclusion

In this paper, I study empirically the role non-loan products play in a bank's credit allocation decisions—and, more important, the underlying mechanisms—with the guidance of a stylized model. Using a unique and comprehensive dataset that contains firm-product-level information on all corporate customers of a large commercial bank for nearly a decade, I show that a non-loan relationship increases credit supply, especially during recessions. A bank is also more likely to make concessions and offer support when cross-buyers are at distress. Speaking to concerns over conflicts of interest and evergreening of lending, I do not find increased default probability for these loans; rather, the bank learns more about the firms through providing certain services. More important, I causally estimate the profit channel underlying the effect by exploiting an exogenous shock to

[40] As of 2014, the total assets of the largest five institutions—JPMorgan Chase, Bank of America, Wells Fargo, Citigroup, and US Bancorp—accounted for 44.6 percent of the industry total in the U.S. See https://www.cnbc.com/2015/04/15/5-biggest-banks-now-own-almost-half-the-industry.html

some firms' non-loan profitability to the bank. I document a 13 percent (4 million SEK) drop in the credit supply due to a 20 percent drop in profitability.

My findings not only have implications for the banking industry, but also contributes to understanding the increasing presence of BigTech firms in the credit market (Philippon 2019, René M. Stulz 2019), and how this change might affect credit access. In addition, regulators should take financial intermediaries' non-loan business into account when deciding on optimal policies.

To summarize, cross-selling business not only mitigates information asymmetry problems in lending, but also provides banks with a long-term incentive to sustain its relationships with borrowers. Combining reduced information asymmetry and long-term interest, banks are more likely to support borrowers when times are tough, and to be more tolerant and willing to help when a firm is in distress. However, this also calls for more careful policy evaluations of potential trade-offs between conflicts of interest and the benefit of allowing financial intermediaries to multi-produce.

References

Abadie, Alberto, and Imbens, 2011, Bias-Corrected Matching Estimators for Average Treatment Effects, *Journal of Business and Economic Statistics* . 44

Abedifar, Pejman, Philip Molyneux, and Amine Tarazi, 2018, Non-interest income and bank lending, *Journal of Banking and Finance* 87, 411–426. 6

Agarwal, Sumit, Souphala Chomsisengphet, Chunlin Liu, and Nicholas S. Souleles, 2018, Benefits of relationship banking: Evidence from consumer credit markets, *Journal of Monetary Economics* 96, 16–32. 8

Agarwal, Sumit, and Robert Hauswald, 2010, Distance and Private Information in Lending, *The Review of Financial Studies* 23, 2757–2788. 8

Allen, Franklin, Elena Carletti, Jun Qianc, and Patricio Valenzuela, 2013, *Financial Intermediation, Markets, and Alternative Financial Sectors*, volume 2 (Elsevier B.V.). 1

Baghai, Ramin P., and Bo Becker, 2018, Non-rating revenue and conflicts of interest, *Journal of Financial Economics* 127, 94–112. 6

Beck, Thorsten, Hans Degryse, Ralph De Haas, and Neeltje Van Horen, 2018, When arm's length is too far: Relationship banking over the credit cycle, *Journal of Financial Economics* 127, 174–196. 3, 7

Becker, Bo, Marieke Bos, and Kasper Roszbach, 2015, Bad times, good credit, *Working Paper* . 10

Becker, Bo, and Victoria Ivashina, 2014, Cyclicality of credit supply: Firm level evidence, *Journal of Monetary Economics* . 3

Behn, Markus, Rainer Haselmann, and Paul Wachtel, 2016, Procyclical Capital Regulation and Lending, *Journal of Finance* 71, 919–956. 9

Behn, Markus, Rainer F. H. Haselmann, and Vikrant Vig, 2014, The Limits of Model-Based Regulation, *SSRN Electronic Journal* . 9

Berger, Allen, Rebecca S Demsetz, and Philip E Strahan, 1999, The consolidation of the financial services industry: Causes, consequences, and implications for the future, *Journal of Banking & Finance* 23, 135–194. 4

Bharath, Sreedhar, Sandeep Dahiya, Anthony Saunders, and Anand Srinivasan, 2007, So what do I get? The bank's view of lending relationships, *Journal of Financial Economics* 85, 368–419. 7

Bharath, Sreedhar T., Sandeep Dahiya, Anthony Saunders, and Anand Srinivasan, 2011, Lending Relationships and Loan Contract Terms, *The Review of Financial Studies* 24, 1141–1203. 7

Black, Fischer, 1975, Bank funds management in an efficient market, *Journal of Financial Economics* 2, 323–339. 19

Bolton, Patrick, Xavier Freixas, Leonardo Gambacorta, and Paolo Emilio Mistrulli, 2016, Relationship and Transaction Lending in a Crisis, *Review of Financial Studies* 29, 2643–2676. 3, 7, 15

Boot, Arnoud W.A. A, 2000, Relationship Banking: What Do We Know?, *Journal of Financial Intermediation* 9, 7–25. 5, 7

Cerqueiro, Geraldo, Steven Ongena, and Kasper Roszbach, 2014, Collateralization, Bank Loan Rates and Monitoring, *Journal of Finance* . 10

Cerqueiro, Geraldo, Steven Ongena, and Kasper Roszbach, 2019, Collateral damaged? Priority structure, credit supply, and firm performance, *Journal of Financial Intermediation* . 10

Degryse, Hans, Vasso Ioannidou, and Erik von Schedvin, 2012, On the non-exclusivity of loan contracts: An empirical investigation, *FBE Research Report - AFI_1264* 1–36. 2, 10, 14

Degryse, Hans, and Steven Ongena, 2005, Distance, lending relationships, and competition, CSEF Working Papers 80, Centre for Studies in Economics and Finance (CSEF), University of Naples, Italy. 8

DeYoung, Robert, and Karin P Roland, 2001, Product Mix and Earnings Volatility at Commercial Banks: Evidence from a Degree of Total Leverage Model, *Journal of Financial Intermediation* 10, 54–84. 6

Diamond, Douglas W, 1984a, Diamond84, *Review of Economics Studies* . 7

Diamond, Douglas W, 1984b, Financial Intermediation and Delegated Monitoring, *The Review of Economic Studies* 51, 393–414. 4

Diamond, Douglas W, 1991, Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt, *Journal of Political Economy* 99, 689–721. 4, 7

Drucker, Steven, and Manju Puri, 2005, On the benefits of concurrent lending and underwriting, *Journal of Finance* . 1

Fama, Eugene F., 1985, What's different about banks?, *Journal of Monetary Economics* 15, 29–39. 4, 19

Favara, Giovanni, and Mariassunta Giannetti, 2017, Forced Asset Sales and the Concentration of Outstanding Debt: Evidence from the Mortgage Market, *Journal of Finance* 72, 1081–1118. 9

Freixas, Xavier, and Jean Rochet, 2008, *Microeconomics of Banking, 2nd Edition*, volume 1, second edition (The MIT Press). 7

Giannetti, Mariassunta, José María Liberti, and Jason Sturgess, 2017, Information Sharing and Rating Manipulation, *The Review of Financial Studies* 30, 3269–3304. 7

Giannetti, Mariassunta, and Farzad Saidi, 2018, Shock Propagation and Banking Structure, *The Review of Financial Studies* . 9

Gorton, Gary, and Andrew Winton, 2003, *Chapter 8 Financial intermediation*, volume 1 (Elsevier Masson SAS). 1

Hale, Galina, and João A.C. Santos, 2009, Do banks price their informational monopoly?, *Journal of Financial Economics* 93, 185–206. 7

Hauswald, Robert, and Robert Marquez, 2006, Competition and Strategic Information Acquisition in Credit Markets, *The Review of Financial Studies* 19, 967–1000. 8

Hellmann, Thomas, Laura Lindsey, and Manju Puri, 2008, Building Relationships Early: Banks in Venture Capital, *The Review of Financial Studies* 21, 513–541. 7

Holmstrom, Bengt, and Jean Tirole, 1997, Financial Intermediation, Loanable Funds, and The Real Sector, *The Quarterly Journal of Economics* 112, 663–691. 3, 4, 19

Hoshi, Takeo, Anil Kashyap, and David Scharfstein, 1990, The role of banks in reducing the costs.. of financial distress in Japan*, *Journal of Financial Economics* 27, 67–88. 7

Imbens, Guido W., 2015, Matching methods in practice: Three examples, *Journal of Human Resources* 50, 373–419. 27, 44

Imbens, Guido W., and Jeffrey M. Wooldridge, 2009, Recent developments in the econometrics of program evaluation, *Journal of Economic Literature* 47, 5–86. 27

Ivashina, Victoria, and Anna Kovner, 2011, The private equity advantage: Leveraged buyout firms and relationship banking, *Review of Financial Studies* 24, 2462–2498. 8

James, Christopher, 1987, SOME EVIDENCE ON THE UNIQUENESS OF BANK LOANS*, *Journal of Financial Economics* 19, 7–235. 7

Kanatas, George, and Jianping Qi, 1998, Underwriting by Commercial Banks: Incentive Conflicts, Scope Economies, and Project Quality, *Journal of Money, Credit and Banking* 30, 119–133. 19

Kanatas, George, and Jianping Qi, 2003, Integration of Lending and Underwriting: Implications of Scope Economies, *Journal of Finance* . 19

Kashyap, Anil K, Raghuram G Rajan, and Jeremy C Stein, 2002, Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-taking, *The Journal of Finance* 57, 33–73. 19

Khwaja, Asim Ijaz, and Atif Mian, 2008, Tracing the impact of bank liquidity shocks: Evidence from an emerging market, *American Economic Review* . 2

Laeven, Luc, and Ross Levine, 2007, Is there a diversification discount in financial conglomerates?, *Journal of Financial Economics* . 6

Laux, C., and U. Walz, 2007, Cross-Selling Lending and Underwriting: Scope Economies and Incentives, *Review of Finance* 13, 341–367. 19

Leland, Hayne E, and David H Pyle, 1977, American Finance Association Informational Asymmetries, Financial Structure, and Financial Intermediation, Technical Report 2. 7, 19

Lepetit, Laetitia, Emmanuelle Nys, Philippe Rous, and Amine Tarazi, 2008, Bank income structure and risk: An empirical analysis of European banks, *Journal of Banking & Finance* 32, 1452–1467. 6

Li, Yan, and Anand Srinivasan, 2017, *Relationship Bank Behavior During Borrower Distress and Bankruptcy*, number 86. 7

Liberti, Jose Maria, 2011, Initiative, Incentives and Soft Information: How Does Delegation Impact The Role of Bank Relationship Managers?, *SSRN Electronic Journal* . 6

Liberti, José María, and Mitchell A Petersen, 2017, Information: Hard and Soft* . 7

Loranth, Gyongyi, and Alan D Morrison, 2012, Tying in Universal Banks, *Review of Finance* 16, 481–516. 3, 4, 19

Lummer, Scott L, and John J McConnell, 1989, Further evidence on the bank lending process and the capital-market response to bank loan agreements, *Journal of Financial Economics* 25, 99–122. 7

Mester, Loretta J, Leonard I Nakamura, and Micheline Renault, 2006, Transactions Accounts and Loan Monitoring, *The Review of Financial Studies* 20, 529–556. 1, 8

Neuhann, Daniel, and Farzad Saidi, 2018, Do universal banks finance riskier but more productive firms?, *Journal of Financial Economics* 128, 66–85. 1, 8

Norden, Lars, and Martin Weber, 2010, Credit Line Usage, Checking Account Activity, and Default Risk of Bank Borrowers, *The Review of Financial Studies* 23, 3665–3699. 1, 4, 8

Ongena Steven & Smith, David., 2001, The duration of bank relationships, *Journal of Financial Economics* 61, 449–475. 8

Parlour, Christine A, Uday Rajan, and Haoxiang Zhu, 2019, FinTech Disruption, Payment Data, and Bank Information * Preliminary and Incomplete * We thank seminar participants at the Bank of Canada for helpful comments FinTech Disruption, Payment Data, and Bank Information, Technical report. 6

Petersen, Mitchell A, 1999, Banks and the Role of Lending Relationships: Evidence from the U.S. Experience, Technical report. 7

Petersen, Mitchell A, and Raghuram G Rajan, 1994, The Benefits of Lending Relationships: Evidence from Small Business Data, *Journal of Finance* 49, 3–37. 7, 13

Petersen, Mitchell A, and Raghuram G Rajan, 1995, The Effect of Credit Market Competition on Lending Relationships*, *The Quarterly Journal of Economics* 110, 407–443. 3, 5, 9

Philippon, Thomas, 2019, On Fintech and Financial Inclusion, *Working Paper* . 6, 33

Rajan, Raghuram G, 1992, Insiders and Outsiders: The Choice between Informed andh's-Eength Debt, *The Journal of Finance* XLVII, 1367–1400. 3, 19

Ramakrishnan, Ram T. S., and Anjan V. Thakor, 1984, Information Reliability and a Theory of Financial Intermediation, *The Review of Economic Studies* 51, 415–432. 4, 19

René M. Stulz, 2019, FINTECH, BIGTECH, AND THE FUTURE OF BANKS, *Working paper* 2019. 6, 33

Santikian, Lori, 2014, The ties that bind: Bank relationships and small business lending, *Journal of Financial Intermediation* 23, 177–213. 1, 5, 8, 9

Schäfer, Larissa, 2018, "Forgive but Not Forget": The Behavior of Relationship Banks When Firms Are in Distress, *Review of Finance* 1–36. 7

Schenone, Carola, 2010, Lending Relationships and Information Rents: Do Banks Exploit Their Information Advantages?, *Review of Financial Studies* . 7

Serdar Dinç, I., 2000, Bank reputation, bank commitment, and the effects of competition in credit markets, *Review of Financial Studies* 13, 781–812. 7

Sharpe, Steven A., 1990, Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model of Customer Relationships, *The Journal of Finance* 45, 1069–1087. 7

Srinivasan, Anand, 2014, Long Run Relationships in Banking, *Foundations and Trends® in Finance* 8, 55–143. 3, 4, 7, 8

Stiglitz, Joseph E, and Andrew Weiss, 1981, Credit Rationing in Markets with Imperfect Information, *American Economic Review* 71, 393–410. 4

Strömberg, Per, 2000, Conflicts of Interst and Market Illiquidity in Bankruptcy Auctions, *Journal of Finance* LV, 2641–2692. 17

von Thadden, Ernst-Ludwig, 2004, Asymmetric information, bank lending and implicit contracts: the winner's curse, *Finance Research Letters* 1, 11–23. 19

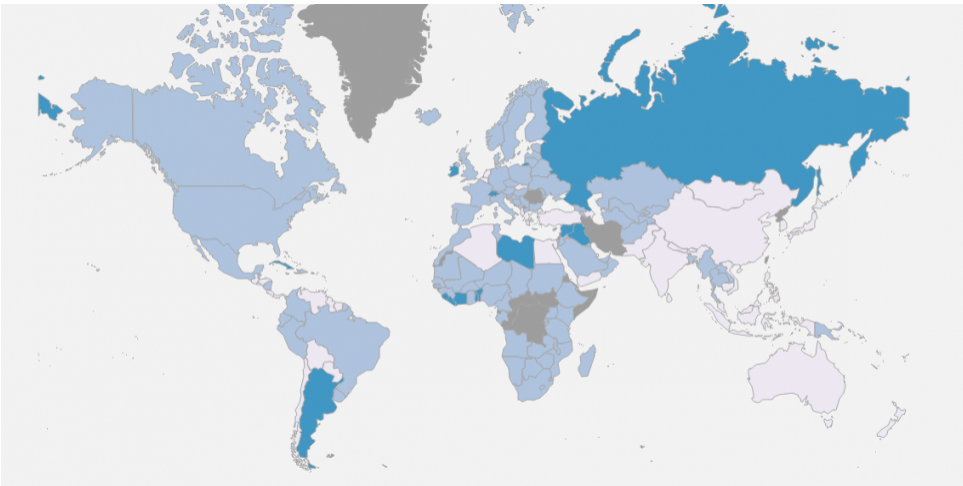
Yasuda, Ayako, 2005, Do Bank Relationships Affect the Firm's Underwriter Choice in the Corporate-Bond Underwriting Market?, *The Journal of Finance* 60, 1259–1292. 1, 8

Yasuda, Ayako, 2007, Bank relationships and underwriter competition: Evidence from Japan, *Journal of Financial Economics* 86, 369–404. 1

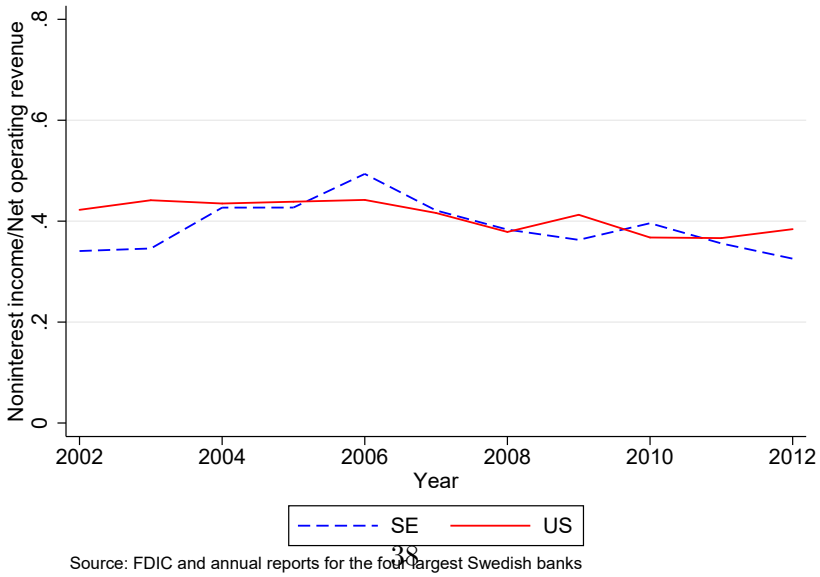
Figure 1: Non-interest income share by nation and over time

Panel a shows the ratio of non-interest income divided by total income for 176 nations in 2014 (the most recent year when data are available). Data source is the Federal Reserve Bank of St. Louis. Gray areas are countries where data are not available. White areas are countries where the ratio is between 2.47% (minimum) and 28.63%. Light blue areas, which include the majority of countries (110 countries), stand for countries with a ratio between 28.63% and 54.79%. Dark blue areas are countries with a ratio between 54.79% and 80.95% (maximum). Darker color mean higher ratios.
Panel b shows the (quarterly) share of non-interest income of total operating income, for banks with asset size over 1 billion USD. The blue (dotted) line represents the weighted (by asset size) average of the four largest Swedish banks (Swedbank, Nordea, Handelsbanken, and SEB). I obtained the data from their annual reports. The red (solid) line represents large US banks, where data are obtained from the FDIC's historical banking data.

Panel a: Non-interest income share by nation



Panel b: Non-interest income share over time



Source: FDIC and annual reports for the four largest Swedish banks

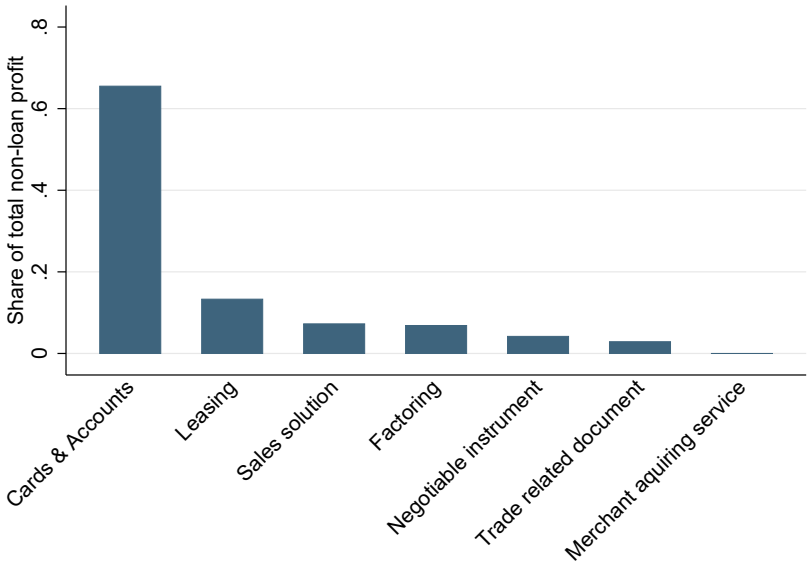
Figure 2: Non-loan profit share in the sample

This figure presents the average share of non-loan profit to total profit in the dataset used in this paper, for the years between 2002 and 2012. Panel a shows the source of non-loan profit. Profit is calculated as aggregated reported net profit across all corporate (both incorporated and unincorporated) customers for each product class. According to the bank, labor cost is already considered in the internal calculation of profit. For more details on the measure and non-loan products, please see Section 3.
Panel b shows weighted (by firm size) average share of non-loan profit as a porportion of total profit generated per customer, i.e.,

$$\frac{\text{Total profit from non-loan products}}{\text{Total profit from both loan and non-loan products}}$$

by industry.

Panel a: Non-loan profit share by product group



Panel b: Non-loan profit share by industry

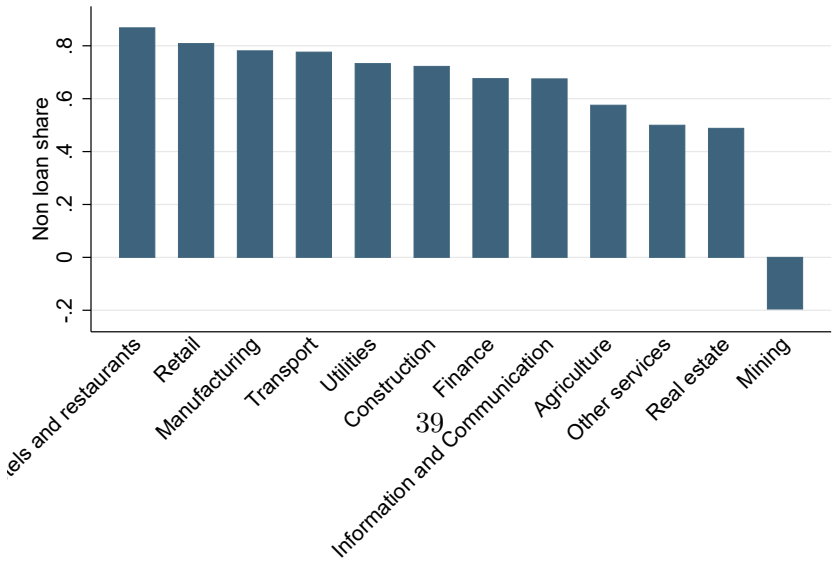


Figure 3: Pre-trends in credit supply

Notes: This figure lends support to the parallel growth assumption for the difference between borrowers with non-loan products that became less (Affected group) profitable, and those with **similar** products but did not (Control group) become less profitable, for the main outcome - internal credit limit measure. The panel depicts estimates of the β_t coefficients (dark blue solid line) and their 95% confidence intervals (light grey area) from the following model:

$$\begin{aligned} y_{i,t} =& Affected_i * \sum_{t=2004m1}^{t=2012m12} \beta_t D_t \\ &+ Affected_i + \sum_{t=2004m1}^{t=2012m12} * D_t \\ &+ controls_{i,year-1} + A_f + B_t + C_j + \epsilon_{i,t} \end{aligned}$$

The dark grey area marks the year this bank started its implementation of the Basel II rules regarding certain non-loan products (leasing, factoring, and trade related documentation products). The dependent variable is credit supply, measured as ln(internal credit limit). The controls include lagged ln(total assets), ln(years of relation), leverage, and firm age. Time (year-month), firm, internal rating and industry fixed effects are also included. Standard errors are clustered at the firm level.

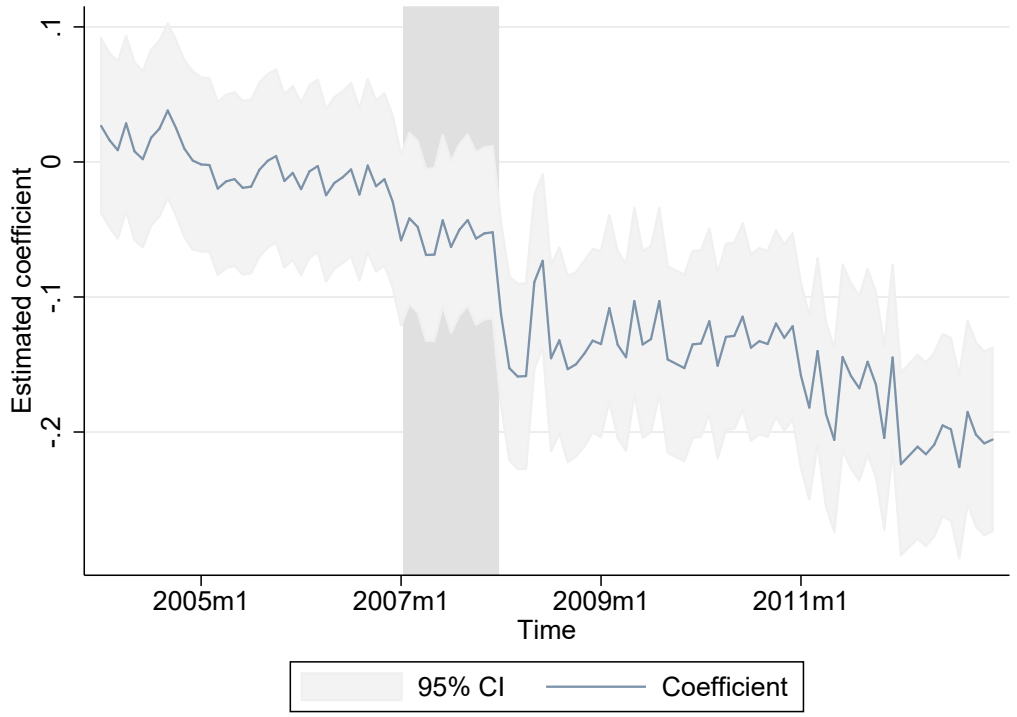


Figure 4: Pre-trends in credit supply

Notes: This figure lends support to the parallel growth assumption for the difference between borrowers with non-loan products that became less (affected group, solid blue line, and left y-axis) profitable, and those with **similar** products but did not (unaffected group, dash red line, and left y-axis) become less profitable, for the main outcome - internal credit limit measure. The average credit limit for all limited liability borrowers at the bank level is also plotted in black dot (right y-axis). The dark grey area marks the year this bank started its implementation of the Basel II rules regarding certain non-loan products (leasing, factoring, installments, and trade related documentation products).

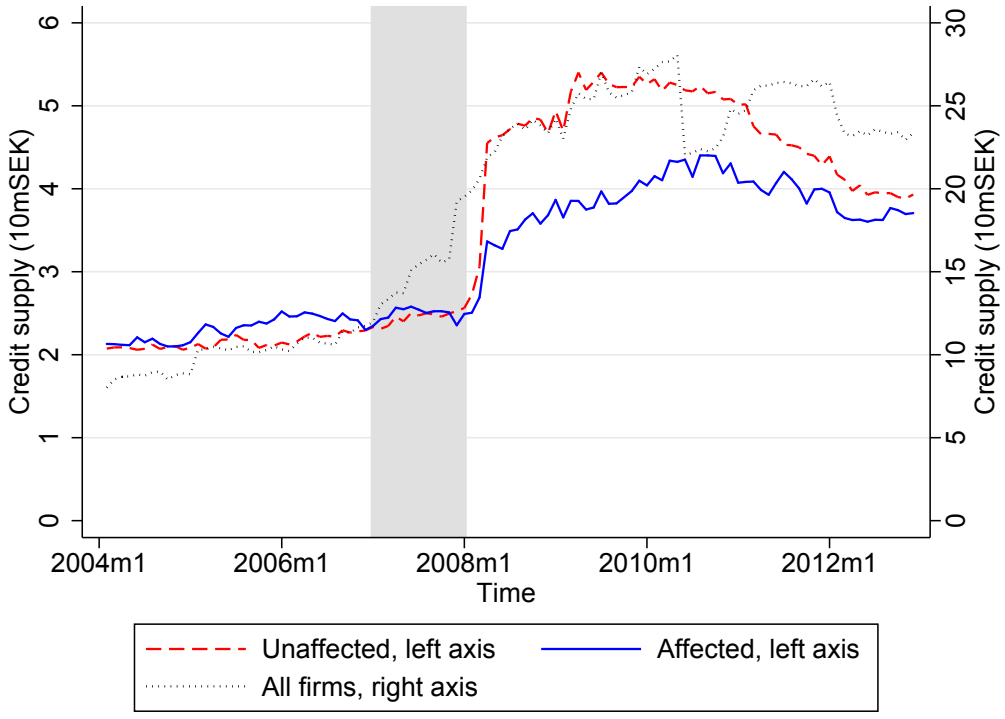


Table 1: Summary statistics for the whole sample

This table presents the summary statistics of the whole sample. Firm-by-month-level variables are presented in panel A, and firm-by-year-level characteristics in panel B. Panel C reports default events for all 838,726 loans. Panel D reports profit margins of about 130 non-loan products. All variables are winsorized at the 1st and 99th percentage levels.

	Mean	Std	P25	P50	P75	No.
Panel A *firm-by-month level*						
Internal credit limit (mSEK)	32.795	83.225	2.603	5.481	17.196	665,968
Utilized amount (mSEK)	13.659	31.208	1.160	2.968	8.768	665,968
Distance to ceiling (mSEK)	10.759	33.647	0.152	0.861	3.718	665,968
Internal rating (1(bad)-21(good))	12.416	2.985	11.000	12.000	14.000	665,968
Rating change=1	0.076	0.265	0.000	0.000	0.000	665,968
Months between two reviews on borrower	17.250	17.303	6.000	12.000	23.000	20,088
Panel B *firm-by-year level*						
Non loan profits (kSEK)	47.417	97.182	0.000	13.818	46.075	55,709
No. of non-loan products	1.909	1.589	1.000	2.000	3.000	55,709
Leverage	0.335	0.276	0.091	0.284	0.536	55,709
Total assets (mSEK)	260.448	1292.170	5.289	12.482	43.526	55,709
Sales (mSEK)	115.484	485.962	3.434	12.605	44.164	55,709
No. of employees	34.952	124.531	2.000	7.000	20.000	55,709
Sales growth	0.160	0.727	-0.054	0.040	0.174	55,709
Age	21.884	18.517	9.000	17.000	28.000	55,709
Years of relationship	6.021	4.963	2.083	5.250	8.917	55,709
Panel C *loan level*						
Default (0/1)	0.0230	0.1498	0.0000	0.0000	0.0000	167,164
Contracted maturity (month)	42.7614	46.7111	4.0000	6.9167	100.0000	167,164
Collateralized loan (0/1)	0.3500	0.4770	0.0000	0.0000	1.0000	167,164
Loan size (mSEK)	6.7981	16.5000	0.1993	0.5890	3.0289	167,164
Panel D *loan-by-month level*						
Spread (pp)	2.0113	3.8727	0.4100	1.5100	3.4900	17,892,843
Panel E *loan-type level*						
Profit per SEK and month - loan	0.001	0.001	0.000	0.001	0.001	5,843
Panel F *product-type level*						
Profit per SEK and month	0.169	1.798	-0.000	0.001	0.003	7,226

Table 2: Summary statistics for the **Lenient** test

This table presents summary statistics for the variables included in Table 4. A firm is considered affected if the non-loan products it purchased from the bank became less profitable due to the Basel II regulation, and a control firm if its non-loan products are similar in purpose to that of the affected firm's but did not decrease in profitability. Spread is measured as the difference between charged interest rate and the reference rate. A loan is secured if there is collateral posted against the exposure.

	Mean	Std	P25	P50	P75	No.
Panel A *loan level*						
Lenient (0/1)	0.399	0.490	0.000	0.000	1.000	2,081
Secured loan	0.181	0.385	0.000	0.000	0.000	2,081
Contracted maturity	33.348	44.198	3.000	5.000	100.000	2,081
Loan size (in kSEK)	1247.263	2558.292	164.717	248.254	1082.025	2,081
Panel B *firm-by-month level*						
Internal credit limit (mSEK)	73.496	345.285	3.671	9.823	31.668	1,438
Utilized amount (mSEK)	22.535	70.432	2.222	5.673	18.779	1,438
Distance to ceiling (mSEK)	31.032	213.008	0.256	1.568	7.479	1,438
Internal rating	10.468	4.178	8.000	11.000	14.000	1,438
Panel C *firm-by-year level*						
Non loan profits (kSEK)	76.604	311.862	0.398	2.930	19.268	1,051
No. of non-loan products	3.040	1.992	2.000	3.000	4.000	1,051
Leverage	0.301	0.276	0.043	0.250	0.478	1,051
Total assets (mSEK)	417.133	2307.942	6.123	18.220	97.329	1,051
Sales (kSEK)	348.943	1106.617	5.266	25.299	165.593	1,051
No. of employees	112.636	306.362	3.000	17.000	72.000	1,051
Sales growth	0.103	0.667	-0.101	0.025	0.167	1,051
Age	23.155	20.741	9.000	17.000	29.000	1,051
Years of relationship	8.463	2.162	6.583	8.167	10.250	1,051

Table 3: Summary statistics for the difference-in-differences test

This table presents summary statistics for the variables included in Table 6, just before Basel II implementation, in 2006. A firm is considered affected if the non-loan products it purchased from the bank became less profitable due to the Basel II regulation, and a control firm if its non-loan products are similar in purpose to that of the affected firm's but did not decrease in profitability. Spread is measured as the difference between charged interest rate and the reference rate. A loan is secured if there is collateral posted against the exposure. We follow Abadie and Imbens 2011 and calculate the normalized differences as

$$\bar{X}_1 - \bar{X}_0 / \sqrt{(S_1^2 + S_0^2)/2},$$

where $i = 1$ refers to the treatment group, and $i = 0$ the control group. $\bar{X}_i$ is the mean, and S_i^2 the standard deviation of matching variable X. Imbens 2015 suggests that an absolute value below 0.3 of the normalized differences is a reasonable threshold to identify substantial differences between two groups. A t-statistic might suggest that two groups are significantly different even though the actual difference is small if the sample is large enough. The paper also notes that it may be large in absolute value simply because the sample is large and, as a result, small differences between the two sample means are statistically significant even if they are substantively small, Large values for the normalized differences, in contrast, indicate that the average covariate values in the two groups are substantially different.

	Treat				Control					
	Mean	S.D.	p50	No.	Mean	S.D.	p50	No.	Diff	Normalized difference
Panel A *loan-by-month level*										
Spread	1.53	1	2.30	61,004	1.72	2	2.58	323,260	0.45***	-.07626891
Secured loan	0.20	0	0.40	61,004	0.15	0	0.36	323,260	-0.05***	.13493724
Panel B *firm-by-month level*										
Internal credit limit(mSEK)	50	5	252	9,231	40	4	238	43,299	-10***	.0402216
ln(credit limit)	2	2	2	9,231	2	1	2	43,299	-0***	.10540648
Distance to ceiling (mSEK)	23	1	165	9,231	21	1	163	43,299	-2	.01060641
ln(distance to ceiling)	14	14	2	9,231	14	14	2	52,530	-0	.04923244
Panel C *firm-by-year level*										
Ln(Total assets)	10	9	2	935	10	9	2	4,377	-0	.05086658
Years of relationship	6	7	0	935	6	7	0	4,377	-0	.01943822
Age	20	16	17	935	22	17	18	4,377	2***	-.12948502
Leverage	0	0	0	935	0	0	0	4,377	0	-.04349698
No. of non-loan products	3	2	1	935	3	2	2	4,377	-0	.03011803

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Non-loan relationship and *credit supply*

This table presents results from the following specification:

$$Credit\ supply_{f,t} = \beta_1\ Non\ Loan\ Relation_{f,\ year-1} + \gamma X_{f,\ year-1} + A_f + B_{j,t} + C_r + \epsilon_{f,t}.$$

The dependent variable is the natural logarithm of the internal credit ceiling assigned to each customer at each month. Non-loan relation is measured in two ways. In columns 1 and 2, it is measured as the natural logarithm of total non-loan profits generated from a customer from the previous year. In columns 3 and 4, it is measured as the total number of non-loan products purchased by the firm in the previous year. In columns 5 and 6, both measures are included. Firm (A), year-month by industry (B), and internal rating (C) fixed effects are included throughout the tests to remove any factors that are nonvariant in each specific dimension that might instead cause the differences we capture. Standard errors are clustered at the firm level and presented in parentheses under the coefficients.

	Dependent variable: ln(credit limit)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(NL. profit)	0.027***	0.028***			0.016***	0.017***
	(0.002)	(0.002)			(0.002)	(0.002)
No. of products			0.084***	0.085***	0.064***	0.065***
			(0.006)	(0.006)	(0.006)	(0.006)
Age	0.004	0.004	0.004	0.005	0.005	0.005
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Leverage	0.553***	0.607***	0.559***	0.612***	0.560***	0.615***
	(0.036)	(0.037)	(0.036)	(0.036)	(0.036)	(0.036)
ln(years of relationship)	-0.090***	-0.081***	-0.095***	-0.085***	-0.100***	-0.090***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
ln(total assets)	0.461***	0.448***	0.456***	0.443***	0.451***	0.438***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
ln(loan profit)	0.113***	0.116***	0.112***	0.115***	0.112***	0.114***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Industry-Year-Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Internal rating FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.909	0.910	0.909	0.910	0.910	0.910
No of obs	665,968	665,968	665,968	665,968	665,968	665,968

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Non-loan relationship and *credit supply* in recessions

This table presents results from the following specification:

$$Credit\ supply_{f,t} = \beta_1\ Non\ Loan\ Relation_{f,\ year-1} + \beta_2\ Non\ Loan\ Relation_{f,\ year-1} * Crisis\ Dummy_t + \beta_3\ Crisis\ Dummy_t + \gamma X_{f,\ year-1} + A_f + B_{j,t} + C_r + \epsilon_{f,t}.$$

The dependent variable is the natural logarithm of the internal credit ceiling assigned to each customer at each month. Non-loan relation is measured in two ways. In columns 1 and 2, it is measured as the natural logarithm of total non-loan profits generated from a customer from the previous year. In columns 3 and 4, it is measured as the total number of non-loan products purchased by the firm in the previous year. In columns 5 and 6, both measures are included. Recession is a dummy variable that equals one if real GDP growth has been negative for two consecutive quarters, which corresponds to periods from 2008Q3 to 2009Q1 (the Great Recession), and 2012Q3 to 2012Q4 (European debt crisis). Firm (A), year-month (B), and internal rating (C) fixed effects are included in the tests to remove any factors that are nonvariant in each specific dimension that might instead cause the differences we capture. Standard errors are clustered at the firm level and presented in parentheses under the coefficients.

	Dependent variable: ln(credit limit)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(NL. profit)	0.026***	0.027***			0.015***	0.016***
	(0.002)	(0.002)			(0.002)	(0.002)
Recession x ln(NL. profit)	0.005***	0.005***			0.007***	0.006***
	(0.001)	(0.001)			(0.002)	(0.002)
No. of products			0.083***	0.084***	0.065***	0.066***
			(0.006)	(0.006)	(0.006)	(0.006)
Recession x No. of products			0.007**	0.007**	-0.005	-0.004
			(0.003)	(0.003)	(0.004)	(0.004)
Age	0.002	0.002	0.002	0.003	0.003	0.003
	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Leverage	0.552***	0.606***	0.558***	0.611***	0.559***	0.613***
	(0.036)	(0.037)	(0.036)	(0.036)	(0.036)	(0.036)
ln(years of relationship)	-0.101***	-0.091***	-0.106***	-0.096***	-0.111***	-0.101***
	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)
ln(total assets)	0.462***	0.448***	0.457***	0.444***	0.452***	0.438***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
ln(loan profit)	0.113***	0.116***	0.112***	0.115***	0.112***	0.114***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Industry-Year-Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Internal rating FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.909	0.909	0.909	0.909	0.909	0.910
No of obs	665,968	665,968	665,968	665,968	665,968	665,968

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Non-loan relationship and *default* probability

This table reports coefficients of regressing default outcome, which equals one if the interest payment is late for more than 90 days, and zero otherwise, on measures of non-loan relations. Non-loan relation is measured in two ways. In columns 1 and 2, it is measured as the natural logarithm of total non-loan profits generated from a customer from the previous year. In columns 3 and 4, it is measured as the total number of non-loan products purchased by the firm in the previous year. In columns 5 and 6, both measures are included. Dummy variables indicating what type of non-loan products are included in column 7 and 8. Year-month by industry (B), loan type (E), and internal rating (C) fixed effects are included throughout the tests to remove any factors that are nonvariant in each specific dimension that might instead cause the differences we capture. Standard errors are clustered at the firm level and included within the parentheses under the coefficients. The empirical specification is as below:

$$Default_{i,f,t} = \beta Non\ Loan\ Relation_{f,\ year-1} + \gamma_1 X_{f,\ year-1} + \gamma_2 Z_{i,f} + B_{j,t} + C_r + E_p + \epsilon_{i,f,t}.$$

	Dependent variable: Default=1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(NL. profit)	0.001**	0.000			-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)			(0.000)	(0.000)	(0.000)	(0.000)
No. of products			0.004***	0.002**	0.004***	0.003**	0.002	0.001
			(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Accounts and cards=1							-0.002	0.001
							(0.004)	(0.004)
Trade documentation=1							-0.003	-0.001
							(0.004)	(0.004)
Merchant acquiring=1							0.010	0.009
							(0.017)	(0.018)
Leasing=1							0.001	0.002
							(0.003)	(0.003)
Factoring=1							0.030***	0.016
							(0.010)	(0.011)
Sales solution=1							0.010	0.007
							(0.006)	(0.005)
Negotiable instrument=1							-0.004	0.000
							(0.006)	(0.005)
ln(loan profit)	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
ln(yrs of relation)	-0.008***	-0.008***	-0.009***	-0.008***	-0.009***	-0.008***	-0.008***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	0.037***	0.018**	0.040***	0.021***	0.040***	0.021***	0.040***	0.022***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln(total assets)	-0.003***	-0.001	-0.004***	-0.002**	-0.004***	-0.002**	-0.004***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secured loan	-0.014***	-0.008**	-0.014***	-0.008***	-0.014***	-0.008***	-0.014***	-0.008**
	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Ln(loan size)	0.001	0.003***	0.002*	0.003***	0.002*	0.003***	0.002**	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Contracted maturity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year-month x industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Internal rating FE	No	Yes	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.025	0.098	0.026	0.098	0.026	0.098	0.029	0.099
No of obs	43,612	43,612	43,612	43,612	43,612	43,612	43,612	43,612

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Non-loan relationship and the bank's *lenient* treatment conditional on delinquency

This table reports coefficients from OLS regressions of bank's lenient treatment toward firm (a dummy variable that equals one if interest payment is paused or waived, and zero otherwise) on non-loan relationship measures, while controlling for a series of control variables and fixed effects. Non-loan relation is measured in two ways. In columns 1 and 2, it is measured as the natural logarithm of total non-loan profits generated from a customer from the previous year. In columns 3 and 4, it is measured as the total number of non-loan products purchased by the firm in the previous year. In columns 5 and 6, both measures are included. Standard errors are clustered at the firm level and included within the parentheses under the coefficients. The specification is as below.

$$\begin{aligned} Lenient_{i,f,t} =& \beta Non\ Loan\ Relation_{f,\ year-1} \\ &+ \gamma_1 X_{f,\ year-1} + \gamma_2 Z_{i,f} + B_{j,t} + C_r + D_j + E_p + \epsilon_{i,t}. \end{aligned}$$

	Dependent variable: Lenient=1					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(NL. profit)	0.017***	0.011***			0.015***	0.009**
	(0.004)	(0.004)			(0.005)	(0.005)
No. of products			0.021**	0.016**	0.009	0.009
			(0.008)	(0.007)	(0.009)	(0.008)
ln(loan profit)	-0.003	-0.001	-0.001	-0.000	-0.004	-0.001
	(0.010)	(0.009)	(0.010)	(0.008)	(0.010)	(0.008)
ln(years of relationship)	-0.062**	-0.079***	-0.051**	-0.072***	-0.060**	-0.077***
	(0.025)	(0.023)	(0.025)	(0.023)	(0.025)	(0.023)
Leverage	0.186***	0.112*	0.174***	0.104*	0.191***	0.116**
	(0.065)	(0.059)	(0.063)	(0.058)	(0.064)	(0.058)
Age	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secured loan	-0.035	-0.011	-0.021	-0.002	-0.033	-0.010
	(0.040)	(0.037)	(0.040)	(0.037)	(0.040)	(0.037)
Contracted maturity	0.000	-0.000	0.000	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(loan size)	-0.004	-0.002	-0.004	-0.002	-0.003	-0.002
	(0.012)	(0.010)	(0.012)	(0.010)	(0.012)	(0.010)
Default time x industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes	Yes	Yes
Internal rating FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.515	0.583	0.510	0.582	0.515	0.583
No of obs	2,081	2,081	2,081	2,081	2,081	2,081

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: The effect of higher credit conversion ratio on non-loan products' *profitability*

This table tests the following model:

$$y_{p,t} = \beta Affected_p * Post_t + Affected_p + Post_t + X_{p,t} + F_p + B_{j,t} + \epsilon_{p,t},$$

where p is product and t is time (year-month). The dependent variable in column 1 and 2 is total net product profit. The dependent variable in column 3 and 4 is product profitability margin, which is measured as $\frac{sum\ of\ profit}{sum\ of\ capitalemployed}$. Unit of observation is product-year-month. A non-loan product is considered affected if it became less profitable due to the Basel II regulation on capital requirements, and it is considered an unaffected product if it is classified within the same product class, and therefore functionally similar, but did not face regulation and therefore decreases in profitability. Post is a dummy equal to one after Basel II was adopted by the bank. Total volume sold of the respective products is included as a control variable. Time (year-month) and product fixed effects F are also included. Standard errors are clustered at the product level and included within the parentheses under the coefficients.

	Profit (mSEK)		Profit margin	
	(1)	(2)	(3)	(4)
Affected x Post	0.190	-0.582*	-0.001***	-0.001***
	(1.152)	(0.330)	(0.000)	(0.000)
Volume (mSEK)		0.001***		-0.000
		(0.000)		(0.000)
Year-Month FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Adj. R2	0.650	0.944	0.593	0.598
No of obs	2,402	2,402	2,402	2,402

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Shock to non-loan products' profitability and *credit supply*

This table tests the following model:

$$y_{i,t} = \beta Affected_i * Post_t + Affected_i + Post_t + \gamma X_{i,t-1} + A_f + B_{j,t} + C_j + D_r + \epsilon_{i,t}.$$

A firm is considered affected if the non-loan products it purchased from the bank became less profitable due to the Basel II regulation, and it is considered an unaffected firm if its non-loan products are similar in purpose but did not decrease in profitability. Post is a dummy equal to one after Basel II implementation by the bank.
The dependent variable is credit supply, which is measured as ln(internal credit supply). Controls in column 1 include lagged ln(total assets), ln(years of relation), leverage, and firm age. Time (year-month), firm, internal rating, and industry fixed effects are also included. Standard errors are clustered at the firm level and included within the parentheses under the coefficients.

	Dependent variable: ln(credit limit)			
	(1)	(2)	(3)	(4)
Affected x Post	-0.180***	-0.122***	-0.128***	-0.095***
	(0.039)	(0.032)	(0.040)	(0.033)
ln(loan profit)		0.183***		0.182***
		(0.009)		(0.009)
Ln(total assets)		0.492***		0.486***
		(0.024)		(0.024)
Age		0.017		0.008
		(0.026)		(0.026)
Leverage		0.416***		0.417***
		(0.059)		(0.059)
Ln(yrs of relationship)		-0.043		-0.052*
		(0.028)		(0.028)
Year-Month FE	Yes	Yes	No	No
Firm FE	Yes	Yes	Yes	Yes
Industry x Year-Month FE	No	No	Yes	Yes
Internal Rating FE	No	Yes	No	Yes
Controls	No	Yes	No	Yes
Adj. R2	0.855	0.876	0.856	0.877
No of obs	339,430	339,430	339,430	339,430

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Shock to non-loan products' profitability and *credit supply*

This table tests the following model:

$$y_{i,t} = \beta Intensity_i * Post_t + Intensity_i + Post_t + \gamma X_{i,t-1} + A_f + B_{j,t} + C_j + D_r + \epsilon_{i,t}.$$

Intensity is measured as the ratio of affected profit by total non-loan profit in the year before the regulatory shock. Post is a dummy equal to one after Basel II implementation by the bank.
The dependent variable is credit supply, which is measured as ln(internal credit supply). Controls in column 1 include lagged ln(total assets), ln(years of relation), leverage, and firm age. Time (year-month), firm, internal rating, and industry fixed effects are also included. Standard errors are clustered at the firm level and included within the parentheses under the coefficients.

	Dependent variable: ln(credit limit)			
	(1)	(2)	(3)	(4)
Intensity x Post	-0.200***	-0.102***	-0.148***	-0.086***
	(0.030)	(0.025)	(0.032)	(0.027)
ln(loan profit)		0.181***		0.181***
		(0.009)		(0.009)
Ln(total assets)		0.492***		0.486***
		(0.024)		(0.024)
Age		0.014		0.006
		(0.026)		(0.026)
Leverage		0.420***		0.420***
		(0.059)		(0.059)
Ln(yrs of relationship)		-0.043		-0.052*
		(0.028)		(0.028)
Year-Month FE	Yes	Yes	No	No
Firm FE	Yes	Yes	Yes	Yes
Industry x Year-Month FE	No	No	Yes	Yes
Internal Rating FE	No	Yes	No	Yes
Controls	No	Yes	No	Yes
Adj. R2	0.855	0.876	0.857	0.877
No of obs	339,430	339,430	339,430	339,430

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Shock to non-loan products' profitability and *lenience in delinquency*

This table tests the following model:

$$y_{i,t} = \beta Affected_i * Post_t + Affected_i + Post_t + \gamma X_{i,t-1} + A_f + B_{j,t} + C_j + D_r + \epsilon_{i,t}.$$

A firm is considered affected if the non-loan products it purchased from the bank became less profitable due to the Basel II regulation, and it is considered an unaffected firm if its non-loan products are similar in purpose but did not decrease in profitability. Post is a dummy equal to one after Basel II implementation by the bank.
The dependent variable is credit supply, which is measured as ln(internal credit supply). Controls in column 1 include lagged ln(total assets), ln(years of relation), leverage, and firm age. Time (year-month), firm, internal rating, and industry fixed effects are also included. Standard errors are clustered at the firm level and included within the parentheses under the coefficients.

	Dependent variable: Lenient=1			
	(1)	(2)	(3)	(4)
Affected x Post	-0.049	-0.101**	-0.093***	-0.133***
	(0.050)	(0.042)	(0.028)	(0.037)
ln(total assets)		0.018		0.009
		(0.024)		(0.025)
Age		0.000		-0.001
		(0.002)		(0.002)
Leverage		-0.027		0.079
		(0.164)		(0.180)
ln(yrs of relationship)		-0.053***		-0.031
		(0.016)		(0.038)
ln(loan profit)		-0.020		-0.005
		(0.026)		(0.021)
Secured loan		-0.072		-0.031
		(0.048)		(0.054)
Ln(loan size)		0.031*		0.029**
		(0.016)		(0.012)
Contracted maturity		0.001		0.000
		(0.001)		(0.002)
Product type FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Default time FE	Yes	Yes	No	No
Internal rating FE	No	Yes	No	Yes
Industry x default time FE	No	No	Yes	Yes
Controls	No	Yes	No	Yes
Adj. R2	0.214	0.301	0.427	0.486
No of obs	846	846	684	684

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Shock to non-loan products' profitability and *loan spread*

This table tests the following model:

$$y_{i,t} = \beta Affected_i * Post_t + Affected_i + Post_t + X_{i,t-1} + Z_{f,year-1} + A_f + B_{j,t} + C_r + F_i + \epsilon_{i,t}.$$

The purpose of this table is to test that the bank internalized the cost of higher capital requirement, instead of passing it on to the affected borrowers. I test whether affected firms' loan spreads are increased by the shock, compared with those of the unaffected firms'. The dependent variable is loan spread, which is measured as the difference between the interest rate on the loan, and the bank's internal estimate of the cost of the loan, at each month.
I restrict the sample to the first observation of each loan. A loan is considered affected if the company is affected, and unaffected otherwise. Firm controls include age, leverage, size, and years of relationship. Time (year-month), firm, internal rating, and industry fixed effects are also included. Standard errors are clustered at the loan type level and included within the parentheses under the coefficients.

	Dependent variable: loan spread			
	(1)	(2)	(3)	(4)
Affected x Post	0.029	-0.013	0.042	0.000
	(0.060)	(0.057)	(0.062)	(0.059)
ln(loan profit)		0.086***		0.085***
		(0.010)		(0.010)
Ln(total assets)		-0.169***		-0.164***
		(0.029)		(0.029)
Age		0.013		0.020
		(0.015)		(0.015)
Leverage		-0.007		0.005
		(0.068)		(0.068)
Ln(yrs of relationship)		-0.000		-0.005
		(0.039)		(0.039)
Secured loan		-0.065***		-0.058***
		(0.019)		(0.019)
Ln(loan size)		-0.140***		-0.139***
		(0.008)		(0.008)
Contracted maturity		0.000*		0.000
		(0.000)		(0.000)
Firm FE	Yes	Yes	Yes	Yes
Year-Month x loan type FE	Yes	Yes	Yes	Yes
Internal rating FE	No	Yes	No	Yes
Industry x Year-Month FE	No	No	Yes	Yes
Controls	No	Yes	No	Yes
Adj. R2	0.750	0.768	0.757	0.773
No of obs	39,134	39,134	39,002	39,002

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Shock to non-loan products' profitability and *firm rating*

The purpose of this table is to test whether the credit quality of the affected firms were also affected by the Basel shock. Credit quality is measured as the internal rating that the bank assigns the firms, reflecting the expected default probability for each class. Firm level control variables include size, loan profit, firm age, leverage, ln(years since the first relationship) (all lagged by one year). Standard errors are included in parentheses and clustered at firm level. Year-month, and firm fixed effects are included in column 1. Industry by year-month, and firm fixed effects are included in column 2.

	Dependent variable: Internal rating	
	(1)	(2)
Affected x Post	-0.129	-0.063
	(0.099)	(0.101)
ln(loan profit)	-0.227***	-0.245***
	(0.021)	(0.021)
ln(total assets)	0.680***	0.649***
	(0.053)	(0.053)
Age	-0.041	-0.063
	(0.051)	(0.048)
Leverage	-0.109	-0.110
	(0.070)	(0.068)
ln(yrs of relationship)	-0.444***	-0.409***
	(0.076)	(0.076)
Year-Month FE	Yes	No
Industry x Year-Month FE	No	Yes
Firm FE	Yes	Yes
Controls	Yes	Yes
Adj. R2	0.674	0.677
No of obs	418,484	418,484

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Shock to non-loan products' profitability and *information acquisition*

The purpose of this table is to test whether the learning about the affected firms were affected by the Basel shock. Firm level control variables include size, loan profit, firm age, leverage, ln(years since the first relationship) (all lagged by one year). Standard errors are included in parentheses and clustered at firm level. In column 1 to 4, the dependent variable is measured as the time (months) between two reviews on the firm. In column 5 to 6, the dependent variable is the likelihood of a change in internal rating. Year-month, and firm fixed effects are included throughout in both column 1, 2, and 5. Firm, industry by time fixed effects are included in column 3, 4, and 6. In column 2 and 4, internal rating fixed effect is also included.

	Time (months) between two reviews on the firm				*Rating change=1*	
	(1)	(2)	(3)	(4)	(5)	(6)
Affected x Post	-1.535	-1.727	-0.619	-0.747	0.007	0.004
	(1.595)	(1.526)	(1.058)	(1.100)	(0.006)	(0.006)
ln(loan profit)	0.550**	0.616***	0.490**	0.587***	0.006***	0.007***
	(0.264)	(0.229)	(0.199)	(0.182)	(0.001)	(0.001)
ln(total assets)	-1.575	-1.573	-1.757*	-1.840*	0.005*	0.006**
	(1.102)	(1.127)	(1.060)	(1.080)	(0.003)	(0.003)
Age	1.449	1.356	1.441*	1.382*	-0.002	-0.001
	(0.920)	(0.910)	(0.796)	(0.753)	(0.003)	(0.003)
Leverage	-0.010	-1.247	-0.014	-1.099	-0.001	-0.000
	(0.025)	(1.535)	(0.024)	(1.386)	(0.001)	(0.001)
ln(yrs of relationship)	1.147	1.186	0.821	0.806	0.008*	0.006
	(0.908)	(0.927)	(0.888)	(0.901)	(0.004)	(0.005)
Year-Month FE	Yes	Yes	No	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Internal Rating FE	No	Yes	Yes	Yes	No	No
Industry x Year-Month FE	No	No	Yes	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.588	0.588	0.595	0.595	0.007	0.008
No of obs	652,858	652,858	652,858	652,858	410,336	410,336

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Evidence on the *information* channel

This table tests the following model:

$$y_{f,t} = \sum_{p \in \Phi} \beta I_p * Post_t + X_{f,year-1} + A_f + B_{j,t} + C_r + \epsilon_{i,t}.$$

Dependent variable is the length of time (number of months) between two consecutive reviews of the firm. Control variables at the firm level are all lagged by one year, and include loan profit, age, size (as measured by ln(total asset)), and ln(years of relationship). In column 1 and 2, changed firms initially had only loans and then started cross-buying *cards and accounts*, *trade-related documentation*, *merchant acquiring service*, *leasing*, *factoring*, *sales solutions*, and *negotiable instruments*, respectively, as indicated by a dummy variable. Unchanged firms are those that remained borrowers throughout the sample period. Post is a dummy equal to one after an Changed firm has picked up the product. Standard errors are clustered at firm level and included within the parentheses under the coefficients. Column 3 and 4 have the same specification, except that changed firms initially bought *cards and accounts*, *trade-related documentation*, *merchant acquiring service*, *leasing*, *factoring*, *sales solutions*, and *negotiable instruments*, respectively, as indicated by a dummy variable, and later dropped the product and become sole borrowers. Unchanged firms are those that remained borrowers throughout the sample period. Post is a dummy equal to one after an Changed firm has picked up the product. Standard errors are clustered at firm level and included within the parentheses under the coefficients.

	Dependent variable: months between two firm reviews			
	Buyers		Droppers	
	(1)	(2)	(3)	(4)
Post=1 x Accounts and cards=1	-0.068	-0.246	0.178	0.155
	(0.734)	(0.808)	(1.004)	(0.960)
Post=1 x Trade documentation=1	-1.547	-1.929	1.553	1.304
	(1.801)	(1.915)	(1.416)	(1.375)
Post=1 x Merchant acquiring=1	6.029***	6.041***	-2.389	-2.665
	(2.207)	(2.217)	(2.697)	(2.920)
Post=1 x Leasing=1	3.186*	3.719**	-3.849**	-3.786**
	(1.642)	(1.737)	(1.750)	(1.766)
Post=1 x Factoring=1	9.595**	12.057***	1.265	2.069
	(4.034)	(4.258)	(1.614)	(1.774)
Post=1 x Sales solution=1	0.226	1.375	0.880	1.138
	(1.473)	(1.525)	(1.522)	(1.506)
Post=1 x Negotiable instrument=1	0.327	1.627	0.812	1.291
	(1.570)	(2.987)	(2.519)	(2.488)
ln(loan profit)	-0.786**	-0.758*	0.729	0.789
	(0.382)	(0.404)	(0.555)	(0.551)
Ln(Total assets)	-0.729	-1.126	-0.605	-0.750
	(1.040)	(1.298)	(1.275)	(1.250)
Age	1.277	1.121	1.240	1.224
	(0.793)	(0.767)	(1.584)	(1.559)
Leverage	6.800***	7.000***	-2.635	-2.017
	(2.282)	(2.463)	(2.374)	(2.336)
Ln(yrs of relation)	6.333**	7.030**	7.041**	7.323**
	(2.633)	(2.953)	(3.336)	(3.289)
Industry-Year-Month FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Internal rating FE	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes
Adj. R2	0.843	0.846	0.843	0.845
No of obs	30,969	30,969	29,063	29,063

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Earlier Working Papers:

For a complete list of Working Papers published by Sveriges Riksbank, see www.riksbank.se

Estimation of an Adaptive Stock Market Model with Heterogeneous Agents *by Henrik Amilon*	2005:177
Some Further Evidence on Interest-Rate Smoothing: The Role of Measurement Errors in the Output Gap *by Mikael Apel and Per Jansson*	2005:178
Bayesian Estimation of an Open Economy DSGE Model with Incomplete Pass-Through by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani	2005:179
Are Constant Interest Rate Forecasts Modest Interventions? Evidence from an Estimated Open Economy DSGE Model of the Euro Area *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2005:180
Inference in Vector Autoregressive Models with an Informative Prior on the Steady State *by Mattias Villani*	2005:181
Bank Mergers, Competition and Liquidity *by Elena Carletti, Philipp Hartmann and Giancarlo Spagnolo*	2005:182
Testing Near-Rationality using Detailed Survey Data *by Michael F. Bryan and Stefan Palmqvist*	2005:183
Exploring Interactions between Real Activity and the Financial Stance *by Tor Jacobson, Jesper Lindé and Kasper Roszbach*	2005:184
Two-Sided Network Effects, Bank Interchange Fees, and the Allocation of Fixed Costs *by Mats A. Bergman*	2005:185
Trade Deficits in the Baltic States: How Long Will the Party Last? *by Rudolfs Bems and Kristian Jönsson*	2005:186
Real Exchange Rate and Consumption Fluctuations follwing Trade Liberalization *by Kristian Jönsson*	2005:187
Modern Forecasting Models in Action: Improving Macroeconomic Analyses at Central Banks *by Malin Adolfson, Michael K. Andersson, Jesper Lindé, Mattias Villani and Anders Vredin*	2005:188
Bayesian Inference of General Linear Restrictions on the Cointegration Space *by Mattias Villani*	2005:189
Forecasting Performance of an Open Economy Dynamic Stochastic General Equilibrium Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2005:190
Forecast Combination and Model Averaging using Predictive Measures *by Jana Eklund and Sune Karlsson*	2005:191
Swedish Intervention and the Krona Float, 1993-2002 *by Owen F. Humpage and Javiera Ragnartz*	2006:192
A Simultaneous Model of the Swedish Krona, the US Dollar and the Euro *by Hans Lindblad and Peter Sellin*	2006:193
Testing Theories of Job Creation: Does Supply Create Its Own Demand? *by Mikael Carlsson, Stefan Eriksson and Nils Gottfries*	2006:194
Down or Out: Assessing The Welfare Costs of Household Investment Mistakes *by Laurent E. Calvet, John Y. Campbell and Paolo Sodini*	2006:195
Efficient Bayesian Inference for Multiple Change-Point and Mixture Innovation Models *by Paolo Giordani and Robert Kohn*	2006:196
Derivation and Estimation of a New Keynesian Phillips Curve in a Small Open Economy *by Karolina Holmberg*	2006:197
Technology Shocks and the Labour-Input Response: Evidence from Firm-Level Data *by Mikael Carlsson and Jon Smedsaas*	2006:198
Monetary Policy and Staggered Wage Bargaining when Prices are Sticky *by Mikael Carlsson and Andreas Westermark*	2006:199
The Swedish External Position and the Krona *by Philip R. Lane*	2006:200

Price Setting Transactions and the Role of Denominating Currency in FX Markets *by Richard Friberg and Fredrik Wilander*	2007:201
The geography of asset holdings: Evidence from Sweden *by Nicolas Coeurdacier and Philippe Martin*	2007:202
Evaluating An Estimated New Keynesian Small Open Economy Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2007:203
The Use of Cash and the Size of the Shadow Economy in Sweden *by Gabriela Guibourg and Björn Segendorf*	2007:204
Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns *by Sophie Claeys and Koen Schoors*	2007:205
Optimal Monetary Policy under Downward Nominal Wage Rigidity *by Mikael Carlsson and Andreas Westermark*	2007:206
Financial Structure, Managerial Compensation and Monitoring *by Vittoria Cerasi and Sonja Daltung*	2007:207
Financial Frictions, Investment and Tobin's q *by Guido Lorenzoni and Karl Walentin*	2007:208
Sticky Information vs Sticky Prices: A Horse Race in a DSGE Framework *by Mathias Trabandt*	2007:209
Acquisition versus greenfield: The impact of the mode of foreign bank entry on information and bank lending rates *by Sophie Claeys and Christa Hainz*	2007:210
Nonparametric Regression Density Estimation Using Smoothly Varying Normal Mixtures *by Mattias Villani, Robert Kohn and Paolo Giordani*	2007:211
The Costs of Paying – Private and Social Costs of Cash and Card *by Mats Bergman, Gabriella Guibourg and Björn Segendorf*	2007:212
Using a New Open Economy Macroeconomics model to make real nominal exchange rate forecasts *by Peter Sellin*	2007:213
Introducing Financial Frictions and Unemployment into a Small Open Economy Model *by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin*	2007:214
Earnings Inequality and the Equity Premium *by Karl Walentin*	2007:215
Bayesian forecast combination for VAR models *by Michael K. Andersson and Sune Karlsson*	2007:216
Do Central Banks React to House Prices? *by Daria Finocchiaro and Virginia Queijo von Heideken*	2007:217
The Riksbank's Forecasting Performance *by Michael K. Andersson, Gustav Karlsson and Josef Svensson*	2007:218
Macroeconomic Impact on Expected Default Freqency *by Per Åsberg and Hovick Shahnazarian*	2008:219
Monetary Policy Regimes and the Volatility of Long-Term Interest Rates *by Virginia Queijo von Heideken*	2008:220
Governing the Governors: A Clinical Study of Central Banks *by Lars Frisell, Kasper Roszbach and Giancarlo Spagnolo*	2008:221
The Monetary Policy Decision-Making Process and the Term Structure of Interest Rates *by Hans Dillén*	2008:222
How Important are Financial Frictions in the U S and the Euro Area *by Virginia Queijo von Heideken*	2008:223
Block Kalman filtering for large-scale DSGE models *by Ingvar Strid and Karl Walentin*	2008:224
Optimal Monetary Policy in an Operational Medium-Sized DSGE Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson*	2008:225
Firm Default and Aggregate Fluctuations *by Tor Jacobson, Rikard Kindell, Jesper Lindé and Kasper Roszbach*	2008:226
Re-Evaluating Swedish Membership in EMU: Evidence from an Estimated Model *by Ulf Söderström*	2008:227

The Effect of Cash Flow on Investment: An Empirical Test of the Balance Sheet Channel *by Ola Melander*	2009:228
Expectation Driven Business Cycles with Limited Enforcement *by Karl Walentin*	2009:229
Effects of Organizational Change on Firm Productivity *by Christina Håkanson*	2009:230
Evaluating Microfoundations for Aggregate Price Rigidities: Evidence from Matched Firm-Level Data on Product Prices and Unit Labor Cost *by Mikael Carlsson and Oskar Nordström Skans*	2009:231
Monetary Policy Trade-Offs in an Estimated Open-Economy DSGE Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson*	2009:232
Flexible Modeling of Conditional Distributions Using Smooth Mixtures of Asymmetric Student T Densities *by Feng Li, Mattias Villani and Robert Kohn*	2009:233
Forecasting Macroeconomic Time Series with Locally Adaptive Signal Extraction *by Paolo Giordani and Mattias Villani*	2009:234
Evaluating Monetary Policy *by Lars E. O. Svensson*	2009:235
Risk Premiums and Macroeconomic Dynamics in a Heterogeneous Agent Model *by Ferre De Graeve, Maarten Dossche, Marina Emiris, Henri Sneessens and Raf Wouters*	2010:236
Picking the Brains of MPC Members *by Mikael Apel, Carl Andreas Claussen and Petra Lennartsdotter*	2010:237
Involuntary Unemployment and the Business Cycle *by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin*	2010:238
Housing collateral and the monetary transmission mechanism *by Karl Walentin and Peter Sellin*	2010:239
The Discursive Dilemma in Monetary Policy *by Carl Andreas Claussen and Øistein Røisland*	2010:240
Monetary Regime Change and Business Cycles *by Vasco Cúrdia and Daria Finocchiaro*	2010:241
Bayesian Inference in Structural Second-Price common Value Auctions *by Bertil Wegmann and Mattias Villani*	2010:242
Equilibrium asset prices and the wealth distribution with inattentive consumers *by Daria Finocchiaro*	2010:243
Identifying VARs through Heterogeneity: An Application to Bank Runs *by Ferre De Graeve and Alexei Karas*	2010:244
Modeling Conditional Densities Using Finite Smooth Mixtures *by Feng Li, Mattias Villani and Robert Kohn*	2010:245
The Output Gap, the Labor Wedge, and the Dynamic Behavior of Hours *by Luca Sala, Ulf Söderström and Antonella Trigari*	2010:246
Density-Conditional Forecasts in Dynamic Multivariate Models *by Michael K. Andersson, Stefan Palmqvist and Daniel F. Waggoner*	2010:247
Anticipated Alternative Policy-Rate Paths in Policy Simulations *by Stefan Laséen and Lars E. O. Svensson*	2010:248
MOSES: Model of Swedish Economic Studies *by Gunnar Bårdsen, Ard den Reijer, Patrik Jonasson and Ragnar Nymoen*	2011:249
The Effects of Endogenuos Firm Exit on Business Cycle Dynamics and Optimal Fiscal Policy *by Lauri Vilmi*	2011:250
Parameter Identification in a Estimated New Keynesian Open Economy Model *by Malin Adolfson and Jesper Lindé*	2011:251
Up for count? Central bank words and financial stress *by Marianna Blix Grimaldi*	2011:252
Wage Adjustment and Productivity Shocks *by Mikael Carlsson, Julián Messina and Oskar Nordström Skans*	2011:253

The timing of uncertainty shocks in a small open economy *by Hanna Armelius, Isaiah Hull and Hanna Stenbacka Köhler*	2016:334
Quantitative easing and the price-liquidity trade-off *by Marien Ferdinandusse, Maximilian Freier and Annukka Ristiniemi*	2017:335
What Broker Charges Reveal about Mortgage Credit Risk *by Antje Berndt, Burton Hollifield and Patrik Sandåsi*	2017:336
Asymmetric Macro-Financial Spillovers *by Kristina Bluwstein*	2017:337
Latency Arbitrage When Markets Become Faster *by Burton Hollifield, Patrik Sandås and Andrew Todd*	2017:338
How big is the toolbox of a central banker? Managing expectations with policy-rate forecasts: Evidence from Sweden *by Magnus Åhl*	2017:339
International business cycles: quantifying the effects of a world market for oil *by Johan Gars and Conny Olovsson l*	2017:340
Systemic Risk: A New Trade-Off for Monetary Policy? *by Stefan Laséen, Andrea Pescatori and Jarkko Turunen*	2017:341
Household Debt and Monetary Policy: Revealing the Cash-Flow Channel *by Martin Flodén, Matilda Kilström, Jósef Sigurdsson and Roine Vestman*	2017:342
House Prices, Home Equity, and Personal Debt Composition *by Jieying Li and Xin Zhang*	2017:343
Identification and Estimation issues in Exponential Smooth Transition Autoregressive Models *by Daniel Buncic*	2017:344
Domestic and External Sovereign Debt *by Paola Di Casola and Spyridon Sichlimiris*	2017:345
The Role of Trust in Online Lending *by Christoph Bertsch, Isaiah Hull, Yingjie Qi and Xin Zhang*	2017:346
On the effectiveness of loan-to-value regulation in a multiconstraint framework *by Anna Grodecka*	2017:347
Shock Propagation and Banking Structure *by Mariassunta Giannetti and Farzad Saidi*	2017:348
The Granular Origins of House Price Volatility *by Isaiah Hull, Conny Olovsson, Karl Walentin and Andreas Westermark*	2017:349
Should We Use Linearized Models To Calculate Fiscal Multipliers? *by Jesper Lindé and Mathias Trabandt*	2017:350
The impact of monetary policy on household borrowing – a high-frequency IV identification *by Maria Sandström*	2018:351
Conditional exchange rate pass-through: evidence from Sweden *by Vesna Corbo and Paola Di Casola*	2018:352
Learning on the Job and the Cost of Business Cycles *by Karl Walentin and Andreas Westermark*	2018:353
Trade Credit and Pricing: An Empirical Evaluation *by Niklas Amberg, Tor Jacobson and Erik von Schedvin*	2018:354
A shadow rate without a lower bound constraint *by Rafael B. De Rezende and Annukka Ristiniemi*	2018:355
Reduced "Border Effects", FTAs and International Trade *by Sebastian Franco and Erik Frohm*	2018:356
Spread the Word: International Spillovers from Central Bank Communication *by Hanna Armelius, Christoph Bertsch, Isaiah Hull and Xin Zhang*	2018:357
Predictors of Bank Distress: The 1907 Crisis in Sweden *by Anna Grodecka, Seán Kenny and Anders Ögren*	2018:358

Diversication Advantages During the Global Financial Crisis *by Mats Levander*	2018:359
Towards Technology-News-Driven Business Cycles *by Paola Di Casola and Spyridon Sichlimiris*	2018:360
The Housing Wealth Effect: Quasi-Experimental Evidence *by Dany Kessel, Björn Tyrefors and Roine*	2018:361
Identification Versus Misspecification in New Keynesian Monetary Policy Models *by Malin Adolfson, Stefan Laseén, Jesper Lindé and Marco Ratto*	2018:362
The Macroeconomic Effects of Trade Tariffs: Revisiting the Lerner Symmetry Result *by Jesper Lindé and Andrea Pescatori*	2019:363
Biased Forecasts to Affect Voting Decisions? The Brexit Case *by Davide Cipullo and André Reslow*	2019:364
The Interaction Between Fiscal and Monetary Policies: Evidence from Sweden *by Sebastian Ankargren and Hovick Shahnazarian*	2019:365
Designing a Simple Loss Function for Central Banks: Does a Dual Mandate Make Sense? *by Davide Debortoli, Jinill Kim and Jesper Lindé*	2019:366
Gains from Wage Flexibility and the Zero Lower Bound *by Roberto M. Billi and Jordi Galí*	2019:367
Fixed Wage Contracts and Monetary Non-Neutrality *by Maria Björklund, Mikael Carlsson and Oskar Nordström Skans*	2019:368
The Consequences of Uncertainty: Climate Sensitivity and Economic Sensitivity to the Climate *by John Hassler, Per Krusell and Conny Olovsson*	2019:369
Does Inflation Targeting Reduce the Dispersion of Price Setters' Inflation Expectations? *by Charlotte Paulie*	2019:370
Subsampling Sequential Monte Carlo for Static Bayesian Models *by David Gunawan, Khue-Dung Dang, Matias Quiroz, Robert Kohn and Minh-Ngoc Tran*	2019:371
Hamiltonian Monte Carlo with Energy Conserving Subsampling *by Khue-Dung Dang, Matias Quiroz, Robert Kohn, Minh-Ngoc Tran and Mattias Villani*	2019:372
Institutional Investors and Corporate Investment *by Cristina Cella*	2019:373
The Impact of Local Taxes and Public Services on Property Values *by Anna Grodecka and Isaiah Hull*	2019:374
Directed technical change as a response to natural-resource scarcity *by John Hassler, Per Krusell and Conny Olovsson*	2019:375
A Tale of Two Countries: Cash Demand in Canada and Sweden *by Walter Engert, Ben Fung and Björn Segendorf*	2019:376
Tax and spending shocks in the open economy: are the deficits twins? *by Mathias Klein and Ludger Linnemann*	2019:377
Mind the gap! Stylized dynamic facts and structural models *by Fabio Canova and Filippo Ferroni*	2019:378
Financial Buffers, Unemployment Duration and Replacement Labor Income *by Mats Levander*	2019:379
Inefficient Use of Competitors' Forecasts? *by André Reslow*	2019:380
How Much Information Do Monetary Policy Committees Disclose? Evidence from the FOMC's Minutes and Transcripts *by Mikael Apel, Marianna Blix Grimaldi and Isaiah Hull*	2019:381
Risk endogeneity at the lender/investor-of-last-resort *by Diego Caballero, André Lucas, Bernd Schwaab and Xin Zhang*	2019:382
Heterogeneity in Households' Expectations of Housing Prices – Evidence from Micro Data *by Erik Hjalmarsson and Pär Österholm*	2019:383

Sveriges Riksbank
Visiting address: Brunkebergs torg 11
Mail address: se-103 37 Stockholm

Website: www.riksbank.se
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31
E-mail: registratorn@riksbank.se