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Abstract

We study how firm-bank lending relationships affect firms' access to and terms of credit. We use bank mergers and acquisitions (M&As) as exogenous events that affect lending relationships. Bank M&As lead to organisational changes at the involved banks, which may reduce the amount of soft information encompassed in the firm-bank relationship. Using a unique Norwegian dataset, which combines information on companies' bank accounts, annual accounts, bankruptcies, and bank M&As for the years 1997-2009, we find that domestic bank mergers increase interest rate margins by 0.24 percentage points for opaque small and medium sized firms, relative to less opaque firms. Since, due to information asymmetries, opaque firms are typically more dependent on bank lending relationships, our results indicate that these relationships are advantageous for such borrowers, and the destruction of a relationship during the merger process has adverse effects for the firm. Conversely, the results are not consistent with a lock-in effect due to an information monopoly by the relationship lender that on average increases a firm's borrowing costs over its life cycle. The results are robust to the inclusion of variables that control for effects of market competition.

1 Introduction

Salvaging the value of banks' relationships with their corporate customers has been put forward as one of the main reasons for bailing out banks during banking crises. Seminal work by Bernanke (1983) claimed that the destruction of such relationships contributed to the depth of the Great Depression in the US during the 1930s. This has spurred a large literature on relationship banking. One strand of this literature focuses on the information asymmetries between existing lenders and outside banks, which stem from banks possessing private information about their current debtors. A significant part of this private information is often "soft" in the sense that it is held by individual loan officers employed by the bank, and is not easily transferable to others, not even internally in the bank. This information asymmetry creates switching costs which limit businesses' ability to approach new lenders and thus realise benefits from competition between banks (Sharpe (1990), Rajan (1992), von Thadden (2004)). Another branch of the relationship banking literature is represented by Boot and Thakor (2000), where economic value is created through the lending relationship, and may be shared between banks and borrowers. If the effects from the first theory branch are more important, firms are adversely affected by banking relationships, while if the latter theory is dominating, relationships are beneficial to firms. Our paper aims to understand better which effect is more important in explaining firm-bank lending relationships. We use a dataset with the population of Norwegian firms and their banks for the period 1997-2009.

Bank mergers and acquisitions (M&As) may lead to the loss of soft information in the involved banks. Stein (2002) develops a model where changes in loan officers' responsibilities or lending guidelines following bank consolidations impair banks' abilities to grant credit based on soft information. Scott (2006) and Uchida, Udell, and Yamori (2011) provide evidence that loan officers play an important role in creating soft information about small firm borrowers, and that loan officer turnover reduces the likelihood that firms' credit applications are accepted. Bank M&As therefore provide exogenous events that affect the bank lending relationships. Changes in the merging banks' management, organisation, and strategy may lead to a deterioration in the banks' abilities to produce necessary relationship-related services, e.g., monitoring, at least in the short term. The bank may respond by increasing its interest rates or reducing its credit volumes to relationship-dependent customers.

Bank M&As have several potential implications for borrowers. On the one hand, increased market concentration reduces competition among banks, with potentially negative effects for customers. On the other hand, efficiency gains, realised in larger, restructured banks, may to some extent be passed on to the bor-

rower. These effects are not necessarily related to relationship banking. To isolate and identify the effects that bank M&As have on lending relationships, we analyse how these M&As affect relationship-dependent borrowers relative to less relationship-dependent borrowers. In the literature¹, size is commonly seen as an indicator of information asymmetry, whilst tangible assets may be used as loan collateral and thus reduce the overall importance of information asymmetry to a bank lender. Smaller firms and firms with fewer assets pledgeable as collateral are therefore expected to be less transparent and more dependent on banking relationships. By investigating the effect of the M&A events on relationship-dependent borrowers' access to credit, we can separate the following two hypotheses:

1. If the firm suffers from a detrimental lock-in effect due to an information monopoly prior to the bank M&A event, the firm's access to credit will improve *ex post*. (I.e., banking relationships have a negative net effect.)
2. Alternatively, if the firm benefits from a banking relationship, the firm's access to credit will deteriorate *ex post*. (I.e., banking relationships have a positive net effects.)

In particular, we expect the largest effects on the interest rates charged by the banks, rather than on credit volumes. Interest rates are easily changed on a few weeks' notice, while changes in loan amounts are determined by existing loan contracts as long as the loan is not defaulted. For example, if the firm benefits from a lending relationship, the loss of soft information during the merger process may lead the bank to use automatic pricing schedules, which take the "winner's curse" problem into account, rather than relying on soft information that would have indicated a lower interest rate.

To our knowledge, ours is the first paper to use this approach to investigate which of these effects is the more salient to the firm. Our results suggest that the positive effects related to the second hypothesis outweigh any negative effects related to the first hypothesis. We find that for borrowing companies whose main bank is involved in a bank merger event, informationally opaque firms pay 0.24 percentage points higher interest rate margins on their total bank loans in the year of the merger. This is relative to a sample median interest rate margin of 3.0 percent. This effect is still present after we control for effects of the M&As related to market concentration and competition. We also find that relationship-dependent borrowers of acquired banks (i.e., targets in M&A transactions) are less likely to obtain new bank loans following the bank M&A event. In our test, we control for firm-, bank-, and loan market characteristics,

¹See, e.g., Freixas and Rochet (2008 (2nd ed.)), for an introductory overview.

and firm-, M&A event-, and year fixed effects. Our results indicate that lending relationships are valuable for the firms.

The rest of this paper is organised as follows: Section 2 reviews the theoretical background. Section 3 describes the data set. The empirical analysis is shown in Section 4. Finally, Section 5 concludes.

2 Theoretical and Empirical Framework

2.1 Relationship Lending

There is no universally accepted, precise definition of relationship banking in the literature. Freixas and Rochet (2008 (2nd ed.)) define relationship banking as *"the investment in providing financial services that will allow dealing repeatedly with the same customer in a more efficient way."*

This definition is not specific on how to identify a lending relationship empirically. Bank lending may be split into two broad categories: relationship lending and transactional lending. Relationship lending occurs when banks acquire proprietary information about its borrowers throughout the duration of the relationship. The alternative lending technology is transactional bank lending, where the bank is simply a passive intermediary in channelling funds from savers to borrowers, without any proprietary information. It is hard to empirically directly distinguish between these two types of lending technologies without detailed data on the type of interactions and production of information which occur between the banks and the borrowing firms.

Early contributions to the relationship literature are Sharpe (1990) and Rajan (1992). They show how monitoring by a bank lender can lead to an *textitex* post information monopoly for the incumbent bank lender. The current bank lender has more information about its borrowers than bank competitors *textitex* post. These competitors will therefore take into account adverse selection problems when being approached by a loan applicant who is borrowing or has recently borrowed from the incumbent bank. Since competing banks are unable to fully distinguish between firms of good versus bad credit quality, they must offer a single interest rate², at which high credit quality borrowers must subsidise poor credit quality borrowers. Anticipating that high credit quality borrowers will not want to participate in this subsidisation, and therefore stay at their current bank, the market effectively collapses and the competing banks will offer a

²We do not consider sorting devices such as, e.g., collateral. Collateral may work less well as a sorting device if information about its value is asymmetric.

high interest rate to price their loan offers as if loan applicants are of a low credit quality type. Knowing this, the incumbent bank's bargaining power is high, and it is able to effectively obtain monopoly rents from its high credit quality borrowers.

Boot and Thakor (2000) model relationship banking in a different way, where a relationship provides benefits that can be shared between the bank and the borrower. Boot (2000) argues that channels through which relationship lending can provide value include increased flexibility and discretion in contracts, enhanced abilities of the contracting parties to include covenants to reduce conflicts of interest, facilitated monitoring of collateral, and intertemporal transfers in loan pricing. This conjecture of beneficial relationships is consistent with previous empirical evidence, showing that financial distress of a bank negatively affects its borrowers. Slovin, Sushka, and Polonchek (1993) analyse the U.S. bank Continental Illinois during 1984, when it suffered financial difficulties. They show that negative (positive) news about the bank lead to negative (positive) returns for firms associated with the bank.

Several other papers study how bank lending relationships determine borrowing interest rates, e.g., Petersen and Rajan (1994) and Berger and Udell (1995). Their lending relationship intensity measures include duration and scope of a bank-firm relationship, and/or the number of borrowers that a firm has. We follow Degryse, Masschelein, and Mitchell (2010) in defining a relationship to exist whenever a firm currently borrows from a bank. Kim, Kristiansen, and Vale (2011) show that there is a lock-in effect for Norwegian firms, where interest rate markups vary over the firm's life cycle. Initially, the firm pays a low interest rate markup, which increases as the firm grows older and is locked in by the bank. Eventually, as the firm matures, asymmetric information is reduced and firms can borrow at lower markups. Recent extensive surveys of the relationship banking literature include Boot (2000), Freixas (2005), and Udell (2008).

Due to a lack of data, some of the most influential studies, e.g. Slovin, Sushka, and Polonchek (1993), have only analysed large, publicly listed firms. Other studies focusing on small firms suffer from the potential endogeneity issue inherent in firms' borrowing decisions. It is therefore hard to draw inferences from observing a firm's borrowing at a random point in time. For example, if certain idiosyncratic firm-specific characteristics enable the firm to obtain inexpensive financing at a particular bank, e.g., geographical distance, we would expect that firm to remain with its main bank for a long time. To test the effect of lending relationships on borrowing firms, we need an event that changes the bank-firm lending relationship, but is otherwise exogenous to the firm. In this paper, we argue that bank mergers and acquisitions provide such exogenous events, and use this to identify the effects of lending relationships.

2.2 Opaqueness

Certain firm characteristics are associated with external banks' ³ abilities to distinguish the riskiness of a loan applicant, and thus provide a measure of the asymmetric information for a given group of borrowers. Borrower accounting information is publicly available. For companies where noncurrent, tangible assets (long-term financial investments and physical assets, e.g., property, machinery etc.) constitute a large fraction of total assets, we expect information asymmetries to be smaller. These assets may be used as collateral for bank loans, and they are arguably more difficult for management to divert for personal benefits. Although the value of collateral may be exposed to asymmetric information, this problem is likely to be smaller compared to other assets. Additionally, the liquidation value of current assets like accounts receivables and inventories is usually more uncertain, since its value is potentially more firm-dependent than that of, e.g., real estate. In other words, irrespective of how the firm's operations are exposed to information asymmetries, the tangibility of its assets impacts the firm's ability to obtain financing. Therefore, we expect the effect of information asymmetry experienced by external banks to be higher for firms with a large fraction of current or intangible assets on the balance sheet. We denote these firms as 'opaque'. Since low transparency increases the occurrence of a high interest rate charged by the relationship lender, opaque borrowing firms will suffer the most from the information monopoly lock-in effect, in the form of either increased interest rates or reduced loan amounts.

On the other hand, if the benefits of a close relationship are substantially large, opaque firms will gain more from a relationship than transparent firms. In their access to borrowing, opaque firms are likely to depend more on soft information held by the bank and individual loan officers, while the value of transparent firms is easier to evaluate through "hard" measures like key figures from the financial accounts. According to Boot (2000) and Freixas and Rochet (2008 (2nd ed.)), theory predicts that relationship banking should be most valuable for smaller and less transparent firms.

If a firm can pledge collateral with a common, known value, the bank may not have to rely as much on soft information about the firm's operations when evaluating a credit application. The extent to which a firm pledges collateral for borrowing is therefore likely to be negatively correlated with the firm's opaqueness.

³External banks are banks who do not currently have an association with the borrowing firm.

2.3 Bank Mergers and Acquisitions

When a relationship bank merges with another bank, the merging process could lead to the loss of the information obtained by dedicated loan officers about individual existing borrowers due to internal reorganisations. Stein (2002) develops a model where consolidation into larger and more hierarchical banks affects their abilities to advance loans based on "soft" (i.e., proprietary and less transferrable) information. Scott (2006) provides empirical evidence that loan officer turnover reduces firms' access to credit. Uchida, Udell, and Yamori (2011) show that loan officer turnover reduces the production of soft information in a sample of Japanese banks. They also find that large banks produce less soft information, which suggests that merging two banks into a larger entity may in itself have a negative effect on lending relationships that depend on soft information.

We therefore propose that bank mergers and acquisitions can be used as an exogenous event to shed some light on the existence of bank-firm lending relationships, and in particular what effects these relationships have on small and medium sized companies' access to credit. Such M&A events are unlikely to occur for reasons related to the individual lending relationship between a bank and a specific borrowing firm. But, since M&As usually cause substantial reorganisations of the involved banks, and may temporarily or permanently affect the banks' lending operations, it is plausible that such events may have implications for firms' borrowing relationships with the affected banks.

We can think of two distinct effects of bank M&As on lending relationships, with opposing implications on a firm's credit availability. On the one hand, if an existing relationship has led to a "lock-in" effect on the customer before the M&A event, and this "lock-in" effect has had negative effects on the firm on average, its destruction will have benefits for the borrowing firms, since the "lemon" problem when approaching an external, less informed, bank is reduced. Following a bank merger, other banks may face a more attractive pool of loan applicants. This could happen because customers of merging banks are more inclined to switch bank under these circumstances, independent of their credit quality. One reason could be, say, that their relationship manager has been made redundant or moved to new responsibilities during the reorganisation process following the merger. Since the event makes good credit quality firms more likely to switch bank, the merging banks' competitors compete more fiercely for the merging banks' customers due to reduced winner's curse problems. Under normal circumstances, and not following a merger, the incumbent bank will be able to use its information advantage to match external offers given by external banks to high quality borrowers, while letting borrowers of lower credit quality go. External banks will therefore only offer lending terms that reflect the borrower being of a low credit quality type.

On the other hand, the adverse changes to the bank-firm relationship may reduce synergies enjoyed by both the lender and the borrower, leading to worse borrowing terms *ex post*. If a relationship manager, who possessed the valuable relationship-specific knowledge that initially facilitated lending, is replaced, a firm may face more restrictions in its access to credit. Alternatively, the bank may change its strategy, leading to increased interest rates for some customers. If relationship synergies are not important, a firm should be able to switch bank and receive similar borrowing terms at the new bank. If, on the other hand, a firm ends up paying higher interest rates and/or has more limited access to credit after a merger, it indicates that it could not find an attractive alternative bank, perhaps because the competing banks have not made the relationship investments necessary to offer attractive borrowing terms.

A bank M&A event typically has wide-ranging consequences, and it is hard to disentangle changes in borrowers' interest rate margins or loan volume that are caused by an altered lending relationship from changes caused by more market power or operational efficiency gains for the merged banks. An extensive literature has studied the effects of mergers, although with different approaches, and using more limited data sets than our paper. These papers find that bank M&As have effects on borrowers, and support our claim that these events can have potential effects on the bank-firm lending relationships.

Berger, Saunders, Scalise, and Udell (1998) study the effects of U.S. bank M&As on the involved banks' total amounts of lending to small businesses. They find that the static effect of such transactions is reduced lending to small businesses by the incumbent bank lenders, but that competitors to a large degree offset this by increasing lending. The paper focuses on the supply-side of the credit-market without including borrower or market characteristics in the analysis.

Sapienza (2002) uses an extensive Italian dataset of banking relations in the form of credit lines to small business customers. The paper studies the effect of banking mergers on the individual borrower and in particular on the interest rate margin charged. She finds that in-market mergers involving smaller banks create efficiency gains that benefit borrowers, whilst mergers with larger banks result in more market power and increased interest rates. The effect on an individual firm is also subject to its number of lenders. Bonaccorsi di Patti and Gobbi (2007) also use Italian data on banks, borrowers and banking M&A-activity. They find a persistent negative effect of bank M&As on firm credit, the termination of banking relationships, and on borrowing firms' investments. However, since most Italian firms keep several banking relationships, the average usually being in the range of 5-10 relationships per firm, it is not clear that there should be a large impact on the firm's access to bank credit when one of these relationships are terminated. Clearly, losing one banking relationship out of a total of, say, eight, has smaller repercussions

on the firm than losing its only relationship. This point is also made by Degryse, Masschelein, and Mitchell (2010). Norwegian firms, on the other hand, borrow from relatively few banks, with a median of only one borrowing relationship per firm. Our data set is thus arguably better suited for studying the hold-up hypothesis of banking relationships.

Panetta, Schivardi, and Shum (2009)⁴ find that bank mergers permanently increase banks' ability to lend based on hard information. This is consistent with our assumptions, in so far as banks deemphasise soft information-lending following mergers since hard information-lending has become more profitable on the margin.

Karceski, Ongena, and Smith (2005) study the effects of banking M&As in Norway on listed Norwegian companies and find a small negative announcement effect on share prices. They also find an increased number of terminated banking relationships, but do not study the effects on overall firm borrowing. By focusing solely on listed firms, the paper excludes any effects on small businesses. Erel (2009) analyses the effects of banking M&As on US commercial loans and the interest spreads paid by borrowers. The main finding is that most mergers lead to reduced interest rate margins subject to actual efficiency gains obtained in the merger.

Degryse, Masschelein, and Mitchell (2010) study Belgian corporate borrowers of banks involved in mergers. The focus is on small and medium sized firms and their subsequent performance explained by whether the firms continue the relationship, are dropped, or switch bank post-merger. They find that single-relationship borrowers who are able to replace their relationship by borrowing from a new bank are less harmed by the merger than borrowers who are not able to replace their relationship. In addition, borrowers of target banks are more likely to be "dropped" after the merger.

Our focus differs from most of these papers, as we are interested in using mergers in an identification strategy to test and compare the main theories of relationship banking, rather than studying the overall effects of bank mergers and acquisitions *per se*.

2.4 Empirical Strategy

The current literature has two alternative explanations regarding the effects of bank relationships on borrowers, i.e., either a detrimental lock-in effect or a valuable bank-customer relationship.

Our identifying assumption is that alternative, non-relationship-dependent, explanations of the overall

⁴They also use the Italian data set, with the same caveats that this implies.

effects of bank M&A events, such as changes in banks' market power or efficiency gains, would be expected to lead to a uniform change in interest margins across a bank's customers. Increases or decreases in interest rate margins caused by worsened lending relationships should, on the other hand, fall more heavily on opaque firm borrowers which are more dependent on relationship lending. We therefore expect that the opaque firm borrowers at merging banks will obtain a higher or lower interest rate margin and/or loan availability than more transparent firm borrowers at the same merging banks, with the direction depending on which of the suggested relationship effects dominates.

We contribute to the literature by using the cross-sectional variation among firms which are affected by a bank M&A event. While previous studies typically focus on how an M&A event uniformly affect the involved firm borrowers, we look at how the effect of a bank M&A varies between affected firms with different characteristics as borrowers. We also control for market concentration, and we use both time-invariant heterogeneous firm fixed effects as well as standard pooled OLS regressions without firm fixed effects.

We expect different categories of bank M&As to have diverging effects on lending relationships. We define three categories of bank M&A events. We expect the strongest effects from a *domestic merger*. Generally, a merger between two banks with significant operations in the domestic market (in-market mergers) is more likely to lead to organisational changes and potential severing of existing relationships. A borrower will in this case experience greater availability and more favourable terms of credit from outside banks if the event breaks a relationship associated with a hold-up problem. On the other hand, if a relationship is valuable to a firm, we expect a negative effect of the merger from the firm's point of view. This category is the main focus of our study.

The organisational changes will probably be largest at the *target bank* of the merger, which is defined as the smallest of the two banks involved in a merger as measured by total assets in the year prior to the merger. The largest bank may dominate the merging process, leading to less interference in its daily operations, while the target bank may be expected to introduce the larger bank's internal systems, structures, and routines. The target bank will probably also be more affected by employee redundancies following the merger. We therefore expect that the effects on opaque borrowers will be largest for firms borrowing from target banks. This is confirmed by interviews with representatives of merging banks in Belgium done by Degryse, Masschelein, and Mitchell (2010). They found that branches of the acquiring bank were more likely to be kept, and that the new branch head after the merger was more likely to come from the acquiring bank.

A *domestic bank acquisition* is a more ambiguous category. We use this category when a target bank is not fully legally and operationally integrated with the acquiring bank post transaction. Since the extent to which these events cause direct borrower-related organisational changes is probably smaller than for the domestic merger category, and more uncertain, we do not impose any specific predictions on the domestic bank acquisitions.

The *foreign acquisitions* of Norwegian banks differ from the other events. The purchase of a domestic bank by a foreign bank, without overlapping operations in the domestic market, would not be expected to cause direct changes in the acquired bank's lending relationships. During our sample period, acquisitions typically mark the expansion of large Nordic (foreign) banks into a new market (Norway) where they formerly did not have any significant presence. On some occasions, such takeovers could change the credit granting procedures in accordance with group policy, implying a potential severing of relationships. On other occasions, the purchase may reflect the foreign bank's expansionist strategy and/or better funding terms, and therefore lead to improved terms after the acquisition in order to capture customers. Hence, our expectations regarding this category are ambiguous.

We focus on the *domestic merger* category. The other M&A categories have both fewer observations, and the implications are less clear. Banks involved in a domestic merger are also more likely to operate in markets with geographical overlap, implying a greater likelihood of organisational changes and loss of soft information during the merger process. In our regressions, we include a substantial set of control variables, including both firm-, bank-, and firm-bank relationship characteristics, and firm-, bank M&A event-, and time fixed effects.

3 Data

3.1 The Norwegian Banking Market

Norway is an open, advanced economy with a remarkable availability of relevant micro-data which both allows for uniquely precise empirical research and makes the results generally applicable.

The Norwegian banking market includes 121 savings banks, 17 commercial banks incorporated in Norway and 8 branches of foreign commercial banks (as of end 2009). The corporate lending market is highly concentrated with a combined market share of the three largest banks of 60 percent and a national Herfindahl-Hirschman index of 0.14 (Mjøs and Phan, 2011). A Norwegian company typically borrows from

a single bank. Table 3 shows that only 17.6 percent of the firms in our sample borrow from more than one bank.⁵ Norway is thus more suited for studying close banking relationships than other bank markets where firms tend to maintain multiple bank relationships.

During our sample period, the consolidation of the bank sector lead to several mergers and acquisitions. These events involved both large and small banks. The end-of year 2009 total market share of banks which had been involved in an M&A event during the sample period 1998-2009 exceeded 80 percent.

3.2 The Datasets

Our analysis benefits from complete population data from Norway on both public and private companies as well as their bank relationships for the period 1997-2009. We apply three main data-sets covering all company annual accounts, bank accounts and company bankruptcies in Norway for up to 16 years. We also include detailed data on bank mergers and acquisitions.

The combined data-set provide for a comprehensive description of the relationships between companies and banks as well as the possibility of analyzes without any cross-sectional selection biases.

The (Norwegian) National Registry of Business Enterprises⁶ allocates all business entities a unique organisation number which is used for general company identification and allows for connecting complementary sources of data.

3.2.1 The Bank Database

The Norwegian Tax Administration has since 1997 electronically collected annual statements of all deposit- and lending-accounts from all banks and other financial counterparties⁷. The statements are made for each separate (bank-)account and include end-of-year balances, total amounts of interests earned (deposits) or accrued (loans) during the preceding year, and also paid or restituted previously defaulted interest payments on loans. The statements include an account number, and the name and organisation number of both the

⁵Note that since we group all legal entities of a consolidated banking group into one bank for analytical reasons, this number would be higher if we count the number of borrowing relationships a firm has with bank legal entities, rather than with the number of relationships with consolidated banking groups.

⁶Presented also in English at www.brreg.no.

⁷The Tax Administration collects such data both for individuals and corporations, but our research focus leads us naturally to only apply for the corporate data. Data on individuals' accounts would, if at all available, be provided under even more restrictive confidentiality conditions.

customer and the reporting entity (bank). This organisation number allows for linking the data to registries with, e.g., accounting and corporate information. Interest on loans include any related fees or commissions in addition to regular (proportional) interest amounts⁸. The database is confidential, but has in its entirety (1997 - 2009) been made available to us by the Norwegian Ministry of Finance⁹ under strict confidentiality conditions regarding data access and the disclosure of the identities of the contracting parties.

The database includes both limited companies, partnerships, and any other non-governmental entities as clients, and both banks, cooperatives, insurance companies, municipalities, public sector financing entities, law firms, and other categories as providers of loans and/or takers of deposits. The only bank accounts missing are direct commercial banking business by foreign banks without any reporting duties in Norway. However, branches of foreign banks are included, which leads us to believe that only some bank accounts held by a few, and predominantly large, corporations are outside our sample. All accounts are held by single legal entities, as opposed to consolidated groups of companies, and this applies to both sides of the market. Our research studies commercial companies' banking relationships and we consequently limit our dataset to limited liability companies and to regular financiers with commercial objectives. The latter includes commercial banks (limited liability and foreign branches), savings banks, private insurance companies, and any subsidiaries of such. Savings banks and mutual insurance companies have no equity owners in the traditional understanding of the term, but are included since they may be expected to act commercially in the market place even though the profits are distributed in a different manner compared to, e.g., commercial banks. By assuming that none of the member companies of a consolidated banking or insurance group would wish to actually compete with other group companies for a specific customer, we have conducted a detailed study of the banking group structures and the mergers and acquisitions in the sector on a yearly basis during the period. We consider all consolidated banking groups in a given year as one entity for the purpose of the analysis.

Our database of bank accounts is unique in its level of details, in that it covers the whole national population of companies, the inclusion of deposits, and the identification of all contracting parties in a way which allows both for consolidating the providers (lenders) and for combining the data with other datasets.

⁸The database does not contain information on collateral, currency, loan covenants, maturity, or other contractual terms.

⁹Approval gratefully received by letters dated 12 November 2008, 27 August 2009, and 26 March 2010.

3.2.2 The Accounting Database

We use annual accounting data for all Norwegian private and public limited companies for the years 1992 - 2009. Norwegian companies have, with very few exceptions, a financial reporting year equal to the calendar year. Companies are obliged to have an authorised auditor, and to file their annual financial accounts with the The National Registry of Company Accounts by end of July the year after the accounting year. The dataset includes both single company accounts and consolidated accounts and is made available through Dun&Bradstreet. Large and medium-sized companies owning subsidiaries (ownership $\geq 50\%$) have to file both company accounts and consolidated accounts. As of now, we choose to only use the company accounts (as opposed to consolidated accounts) since the banking database also reports accounts at this level and exact group compositions and structures are incomplete during part of the period. The database includes specified profit and loss accounts, balance sheet, selected items from the notes to the accounts, and other company related information such as, e.g., 5 digit industry codes and legal form.

As discussed above, this paper focuses on the banking relationships of private limited liability non-financial companies. Financial institutions have fundamentally different financing structures which have to be studied separately. We have also excluded public sector non-commercial companies. The database is further described in Mjøs (2007) and Mjøs and Øksnes (2011). The selection of companies studied in this paper is defined by this methodology and subsequently applied towards the banking database. The strength of this database is that it covers the Norwegian population of companies, the common organisation number allows for applying a total of 174 variables to all banking customers, the accounts have been approved by an auditor, and there are records of company information for up to 16 years.

3.2.3 The Bankruptcy Registry

Norway has since September 1993 collected information on all bankruptcies in a National Registry of Bankruptcies¹⁰. We have access to the complete database from the inception until 2009, a total of 50,392 company bankruptcies. This also includes bankruptcies where the company subsequently has entered into regular operation again. The database includes information on the identity (and organisation number) of the bankrupt company, date of opening and closing of the bankruptcy procedure, categories of bankruptcies and reasons for closing, as well as some incomplete information as to the repayments to claimants. The bankruptcy registry allows for identification of explicit legal bankruptcies as opposed to only noting if a

¹⁰Presented also in English at www.brreg.no.

company leaves the sample. The combination of the bankruptcy registry with the accounting database also allows for modelling bankruptcy probabilities.

3.2.4 Bank Mergers and Acquisitions

There have been several bank mergers and acquisitions in Norway over the sample period, as listed in Table 1. This list is based on information found on the websites for the Norwegian Savings Banks Association and the Norwegian Financial Services Association¹¹. The transactions are classified into three groups: *Domestic mergers*, *Domestic acquisitions* and *Foreign bank mergers and acquisitions*. The first group is used for most events involving Norwegian banks, unless it was clearly an event we believe only affected the target bank due to the dominance of the acquiring bank. Only three significant events fall into the second category, domestic acquisitions. The first is Vår Bank, which was bought by an alliance of larger savings banks in the year 2000. The loan portfolio was subsequently distributed among the acquiring banks. The second is Nordlandsbanken, which was purchased by Den norske Bank in 2003, but continues to operate under its own brand name and remains a separate legal entity after the acquisition. The third was Sparebank 1 Gruppen's purchase of BN Bank in 2008, where BN Bank continued to operate under its own brand name as a separate legal entity. "Foreign bank mergers and acquisitions" is used whenever a foreign bank was involved, usually as the acquirer.

Our advantages compared to previous studies of the impact of bank M&As on lending relationships are twofold. First, we have more comprehensive data. This is particularly relevant compared to the US, where research on small and medium sized companies has mostly been based on survey data. Second, compared to, e.g., the Italian bank lending market, the Norwegian bank lending market is arguably more representative for most other national markets. In Italy, the number of bank relationships per firm is comparatively high (ref., e.g., Sapienza (2002)), while most Norwegian firms have a single bank lender. It is dubious whether changes in a single relationship is very important for firms that borrow from several banks. We expect information asymmetries to be larger, and thus relationships to be more important, for firms with fewer bank relationships, thus making our sample more relevant for this purpose.

A particular advantage of our sample is that the vast majority of the domestic mergers were not related to a particular crisis at one (or both) of the merging banks, where the merger was undertaken to avoid a bank failure. This suggests that the rationale for doing the mergers were not caused by banks having a particularly weak portfolio of corporate loans. This further supports our arguments that bank M&As and

¹¹www.sparebankforeningen.no and www.fnh.no, respectively.

individual lending relationships are independent. In this sense, the domestic mergers can be thought of as exogenous to the individual bank-firm relationships of the participating banks' loan portfolios.

Additionally, our main focus is to use M&A events to better understand lending relationships, not to learn about the M&A events per se.

3.3 Sample Specification

The bank database contains 11,087,413 individual bank account-years over the sample period 1997-2009. This constitutes 4,755,393 bank-firm relationship-years, and 3,450,823 unique firm-years. Of these firms, many are non-limited liability companies, financial intermediaries or public firms which we exclude from our sample. The non-limited liability companies are excluded because they generally do not have obligation to report their financial statements to the Accounts Registry, and we therefore do not have accounting information for these firms. After doing these exclusions, we are left with a sample of 1,737,161 firm-years with a total of 2,511,887 relationship-years.

In our main analysis we focus on observations at the firm-year level. We require observations to have at least two consecutive years to calculate a company's interest rate margin, and to include lagged variables in our regressions. As we are interested in studying lending relationships, we naturally restrict ourselves to companies with bank loans. We therefore exclude at time t firms with less than NOK 100,000¹² in bank loans at the beginning of year t . We further exclude observations due to: missing firm geography and industry information; the firm's average total assets over the years they were present in the sample did not exceed NOK 500,000¹³ or the firm's total assets in a given year did not exceed NOK 100,000 (\$13,600); average total assets over the sample period were greater than NOK 1,000,000,000 (\$136,200,000); when the firm's average revenues over the sample period was less than NOK 500,000; balance sheet and cash flow accounting identities from the accounting database did not add up; and yearly growth in total assets exceeded 200 percent. This leaves us with a baseline sample of 423,394 firm-year observations. Summary statistics for our sample are shown in Table 3.

We try different cut-off values for the sample selection criteria to investigate the robustness of our results. The results do not differ much from those reported in this paper.

¹²The average exchange rate USD/NOK was 7.34 during our sample period. Based on this exchange rate, this amounts to \$13,600.

¹³Equivalent USD amount is \$68,100.

4 Empirical Analysis

4.1 Regression Equations

Our regression equations are:

$$\text{Interest rate margin}_{it} = X_{it-1}\beta^1 + Z_{it-1}\gamma^1 + \epsilon_{it}^1$$

$$\Delta\text{Bank loan amount}_{it} = X_{it-1}\beta^2 + Z_{it-1}\gamma^2 + \epsilon_{it}^2$$

$$\text{New account}_{it} = X_{it-1}\beta^3 + Z_{it-1}\gamma^3 + \epsilon_{it}^3$$

$$\text{New bank}_{it} = X_{it-1}\beta^4 + Z_{it-1}\gamma^4 + \epsilon_{it}^4$$

where i and t indicate the firm and calendar year, respectively. X_{it-1} is the vector of variables in which we are most interested. The parameters of interest are the β^j s, which measure the marginal effects of X_{it-1} on the dependent variables. Z_{it-1} is a vector of control variables, which are presented in Table 2. The right-hand side variables are generally lagged one year to reduce potential endogeneity problems.

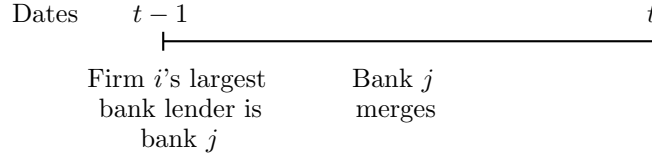
The *interest rate margin* is computed as follows:

$$\text{Interest rate margin}_{it} = \frac{\text{Interest accrued}_{it}}{\frac{1}{2}(\text{Bank Loan}_{it} + \text{Bank Loan}_{it-1})} - \text{NIBOR3m}_t$$

In the firm-year level analysis, the interest rate margin is measured using total interest paid by the firm and amounts borrowed across all its lending accounts and all relationships. *NIBOR3m* is the annual average of daily observed three-month Norwegian Inter-Bank Offered Rate, i.e., the standard reference rate in the Norwegian interbank market¹⁴. Our interest rate measure is noisy, since we do not observe how the account balances or interest payments vary within the year. This leads to a nontrivial number of outliers. Still, we have no indication suggesting that the noise is systematic, and the computed interest rates should be a good approximation of actual interest rates for most observations. To reduce the outlier problem, we winsorise the interest rate margin at the 1 percent and 99 percent level for the firm-year level analysis, while it is winsorised at the 5 percent and 95 percent level for the bank-firm-year (relationship) level observations. The choice of winsorisation level at the 5/95 percentiles versus the 1/99 percentiles does not qualitatively affect the regression estimates.

¹⁴We collect the NIBOR rates from the website of Norges Bank, Norway's central bank, at www.norges-bank.no.

Figure 1: **Timeline:** M&A indicator variable equals one for firm i in the following situation:



$\Delta Bank\ loan\ amount_{it}$ is computed as the change in outstanding loan balance from end-of-year $t-1$ to t , normalised by the firm's total assets at date $t-1$. This variable includes both changes in loan balance due to the granting of new loans, as well as any foreign exchange rate changes, increased credit limits, or repayment of existing loans. The amounts of existing, non-defaulted, loans are typically determined by existing agreements, and it is not obvious that these will be strongly affected by a bank M&A event. Our results will thus primarily apply to loans which are up for refinancing or some form of renegotiation in the year of the M&A event.

$New\ account_{it}$ takes the value of one if firm i borrows from a new bank account in year t , and zero otherwise. Newly granted loans are usually given a new account number, so this variable picks up whether the firm is granted a new loan or not during the year. This is likely to be a more precise measure of changes in credit availability, as the granting of a new loan typically requires a loan officer to undertake a credit evaluation. This variable is therefore more likely to be affected by bank mergers, and subsequent internal changes.

$New\ bank_{it}$ is equal to one if firm i borrows from a bank at date t that it did not previously have any lending or deposit relationship with.

The key independent variables, X_{it-1} , are cross terms where the M&A category indicator variables are multiplied by *Opaqueness*, a measure denoting the extent to which the firm is opaque. We define the *Opaqueness* measure as:

$$Opaqueness = 1 - Tangibles$$

where *Tangibles* is defined as the ratio of fixed assets and noncurrent financial assets to total assets (see Table 2).

We denote as $dommer_topbank_{it}$ a dummy variable equal to one when the borrower's top bank lender is involved in a domestic merger between $t-1$ and t , and zero otherwise. We similarly define $domacq_topbank_{it}$ and $foracq_topbank_{it}$ for the domestic and foreign acquisition categories, respectively. We define the firm's top bank lender to be the bank with whom the firm has the largest loan balance as of date $t-1$. The

timeline is illustrated in Figure 1.

The cross-term variables of interest, X_{it-1} , are computed as follows:

$$X_{it-1} = (\text{Dommer_topbank}_{it-1} \times \text{Opaqueness}_{it-1}, \\ \text{Domacq_topbank}_{it-1} \times \text{Opaqueness}_{it-1}, \\ \text{Foracq_topbank}_{it-1} \times \text{Opaqueness}_{it-1})'$$

An alternative measure of firm opaqueness is firm size. We implement this alternative specification by using cross-terms of bank M&A event indicators and the logarithm of firm total assets. Small companies are often considered as more exposed to costs of asymmetric information than larger firms. The effects of a deterioration in lending relationships from the bank mergers should therefore be more visible for small firms. The cross-term variables, X_{it-1} , are now:

$$X_{it-1} = (\text{Dommer_topbank}_{it-1} \times \text{Log}(\text{Firm's total assets})_{it-1}, \\ \text{Domacq_topbank}_{it-1} \times \text{Log}(\text{Firm's total assets})_{it-1}, \\ \text{Foracq_topbank}_{it-1} \times \text{Log}(\text{Firm's total assets})_{it-1})'$$

4.2 Control Variables

We include M&A event dummy variables, which get the value of one if the firm's largest bank lender at date $t-1$ was involved in an M&A event in the following year (i.e., between date $t-1$ and date t , see Figure 1). The M&A event dummies are included as control variables in Z_{it-1} to pick up the M&A effect caused by other reasons than the individual lending relationships. Since we introduce a separate indicator variable for each M&A event, these indicator variables are essentially M&A event fixed effects. Due to confidentiality restrictions, these coefficients are not reported. In some specifications, we also include dummy variables for whether the firm's bank was the acquirer or the target of a domestic merger. We define the largest bank in a merger, measured by total assets at the last year-end before merger, as being the acquiring bank, whilst the smallest bank is considered the target bank. Previous studies of bank M&As have looked at how these events affect market power and bank efficiency. The M&A event dummies avoid confounding these effects with our focus on bank-firm relationships.

We include several control variables in addition to the M&A event dummies in the vector Z_{it-1} . The control variables are generally lagged one year compared to the dependent variables. These are defined in Table 2. We control for *Size*, as measured by the logarithm of the firm's total assets. Larger companies

are usually more transparent than smaller companies, which could affect their access to credit. Also, if the granting of a loan has some fixed cost element, small loans may become prohibitively expensive. Fixed and tangible assets can potentially be used as collateral, which a company can put forth against a loan. We therefore include *Tangibles*, which is the share of total assets which consists of non-current tangible assets, i.e., physical assets and long-term loans and investments. Including *Tangibles* ensures that we do not confound the interaction terms in X_{it-1} with a general effect of tangible assets, but that the effects of the interaction terms are purely related to the M&A events.

Large cash flows and large amounts of cash on the balance sheet increase a company's opportunities to finance projects by internal financing. We therefore include *Ebitda_assets*¹⁵ and *Cash_assets*. Alternatively, a large cash balance could indicate that a firm is financially constrained, in the sense that it has to keep a large amount in cash to offset unexpected payment obligations because it does not have access to necessary financing. We generally find that the presence of large cash buffers both reduces the amount that a firm borrows, but it also reduces interest rates paid.

A company's bankruptcy risk affects its ability to raise external finance and the terms at which it can borrow. We estimate a bankruptcy probability using a logit regression, where the dependent variable for a firm-year observation takes the value 1 if it is the last year the firm files its annual accounts and it also enters a formal bankruptcy process within the next three years. The explanatory variables used are the same as those used by Norges Bank's "Sebra" Model (Eklund et al. (2001)): earnings/total assets, (liquid assets - short term debt)/turnover, unpaid indirect taxes¹⁶/total assets, trade credit/total assets, equity/total assets, book equity < paid-in equity (0/1), dividend payments (0/1), industry average equity/total assets, industry average trade credit/total assets, industry standard deviation for earnings/total assets, age dummies (years ≤ 8), and total assets. We first estimate updated parameters for every year in the sample, using information that was available up to and including that year. We then use these parameter estimates to compute an updated bankruptcy probability each year, using the most recent accounting information available at the time. This out-of-sample bankruptcy prediction reflects the information available to potential bank lenders at the time.

The availability of external credit at a given point in time is potentially affected by whether the firm already borrows from one or multiple banks. On the one hand, borrowing from several banks imposes deadweight costs through the duplication of for example administrative and monitoring costs. But, on the other hand,

¹⁵Ebitda is short for Earnings Before Interest, Taxes, Depreciation and Amortisation.

¹⁶Typically VAT.

a company is less exposed to the "lock-in" problem stemming from the relationship lender's information monopoly. We include both a dummy variable, *Multibank*, indicating whether the firm borrows from several banks, and a Herfindahl-Hirschman measure of how concentrated the firm's borrowing is, *rel_hhi_loan*.

Finally, we include various controls for the concentration of the commercial bank loan market in a firm's region and industry, and the market share of the firm's largest lender in the national, industry and regional market, respectively. We include a dummy variable for each 2-digit NACE industry code. The concentration measures we use are Herfindahl-Hirschman indices.

All regressions include year fixed effects. We run regressions both with and without firm fixed effects. The regressions without firm fixed effects include firm industry and geographic dummy variables to control for firm heterogeneity. The coefficients on the fixed effects and the control variables are not reported. Summary statistics for the control variables are reported in Table 3.

Note that our identification strategy is to use the variation between different firms affected by the same events, controlling for the aggregate effect of the event through the bank M&A event fixed effect. In addition, firm fixed effects reduce problems with firm heterogeneity, while year fixed effects eliminate the aggregate effects of the business cycle. An issue with this strategy is that it can lead to tests with low power, in particular due to the use of firm fixed effects. We therefore also show ordinary least squares (OLS) regressions without firm fixed effects.

4.3 Results

We first present the results of our main specifications, using the *Opaqueness* and *Size* measures, respectively. We then look at how the effects vary between acquirer and target banks of domestic mergers. Finally, we look at the firm-bank-year (relationship) level, before we do some robustness tests.

4.3.1 Opaqueness

Table 4 shows estimates from the regressions using the *Opaqueness* measure. Increasing *Opaqueness* from zero to one for a firm borrowing from a bank involved in a domestic merger increases interest rates by 0.53 percentage points and 0.24 percentage points in the regressions without and with firm fixed effects, respectively. Opaque firms thus pay a relatively higher price of borrowing during the year when the merger takes place. These firms may be less able to continue their financing at the same terms as before, which could indicate that they were benefiting from a relationship with one of the merging banks. Since the

analysis is done at the firm-year level, it is not clear that the increase in interest rates occurs directly from the bank in the M&A event in case of more than one lending bank. Another explanation for the result is that firms who need more credit may have problems in obtaining it from their existing bank lenders, and may need to approach a competing bank and pay a higher interest rate there. In either case, opaque borrowers are more harmed by the bank merger, suggesting that they suffer from a loss of relationship-specific soft information in their lending bank and a break in the lending relationship.

Column (3) shows that opaque firms involved in domestic bank mergers increase borrowing more than less opaque firms. This effect, however, disappears when we include firm fixed effects in column (4), suggesting that this is not a robust finding. The coefficients signs on *Dommer_opaq* in the equations with new account- and new bank lender indicator variables as dependent variables are generally negative. But the estimates are not statistically significant. The results thus do not reveal the effect of bank mergers on whether opaque borrowers are able to open new bank accounts and/or switch bank lender, relative to less opaque borrowers.

The coefficient estimates on *Domacq_opaq* and *Foracq_opaq* in columns (1) and (2) are not statistically significant. This supports our hypotheses, where we expect effects on interest rates to occur only in domestic mergers where markets overlap and disruptions to the existing bank organisations are the greatest. The results suggest that the effect on opaque borrowers from foreign bank acquisitions were little different from the effect on less opaque borrowers. This indicates that foreign acquisitions do not disrupt the relationship-dependent borrowers at the target bank more than less relationship-dependent borrowers, and in this respect supports that these event do not significantly damage lending relationships.

We should note that our results are not necessarily inconsistent with the findings of Kim, Kristiansen, and Vale (2011). They show that firms experience a lock-in effect that varies over the firm's life cycle. While firms initially pay low interest rates, the interest rate markup is gradually increased as the firm is getting more locked into the lending relationship, before it is reduced as the firm becomes more mature and the information asymmetry is resolved. We do not investigate how the lending relationship varies with firm age. As our sample includes firms of all ages, our specifications only address whether this lock-in effect has a negative effect on firms on average over the life cycle, and not at a specific point in time. We do not include specific age effects in our model, due to the low statistical power of the test, but do control for (the log of) firm age.

4.3.2 Firm Size

The estimates for the firm size specifications are shown in Table 5. Note that the interpretation of the signs are opposite of the analysis in the previous section, e.g., a negative sign in the interest rate equation is consistent with our hypothesis of bank M&As destroying positive synergies of bank-firm relationships. We see that interest rate margins are relatively more adversely affected for smaller firms than for larger firms, which is consistent with the previous analysis and the view that a domestic merger increases loan prices for firms that are more affected by costs of asymmetric information. Using the coefficient estimate from column (2), increasing firm assets from NOK 5 million to NOK 50 million reduces the interest rate paid during a merger by 0.16 percentage points. The effect using the pooled OLS estimates from column (1) is larger, with the increase of total assets from NOK 5 million to NOK 50 million reducing interest rates paid by 0.30 percentage points. This effect is additional to the general effect that larger firms usually pay lower interest rates, since we control for both the firm's total assets and firm fixed effects. Thus, the interpretation is that during the year of a merger, larger firms pay relatively lower interest compared to smaller firms than they usually do to any bank lender.

As in for the *Opaqueness*-specification, the coefficients on domestic and foreign acquisitions are not significant. This shows that such acquisitions did not affect small firms' interest payments in a way that differed significantly from how large firms were treated. Again, this strengthens our interpretation that the significance of the domestic merger coefficient is due to the disruption of beneficial lending relationship for opaque borrowers during the merger. This result is robust to the choice of *opaqueness* or *size* as measures of borrowers' dependence on lending relationships.

Again, as in the previous section, columns (3)-(8), showing the relative effects between large and small firms of mergers on loan amounts, do not exhibit any significant results for the domestic merger category. This suggests that the effect of the mergers on loan volumes is generally quite weak. The coefficient estimates on *Domacq-size* in columns (3) and (4), as well as in column (4) in Table 4, show that loan volumes of relationship-dependent borrowers were significantly reduced during domestic acquisitions, relative to other borrowers. These coefficients are hard to interpret, as the domestic acquisitions category includes transactions where the quality of the target bank's loan portfolio was widely assumed to be a primary reason behind the acquisition.

4.3.3 Acquirer and Target Banks

Target banks tend to be more affected by a bank merger than the acquiring banks. Any reorganisations and personnel redundancies are likely to fall more heavily on the target banks, suggesting that the effects are potentially more detrimental for the customers of these banks. We therefore split the domestic merger category into acquirer and target banks. Our vectors of interaction variables are therefore now, for the regressions on *Opaqueness* and *Firm size*, respectively:

$$\begin{aligned}
 X_{it-1}^{Opaq} = & (Dommer_topbank_acquirer_{it-1} \times Opaqueness_{it-1}, \\
 & (Dommer_topbank_target_{it-1} \times Opaqueness_{it-1}, \\
 & Domacq_topbank_{it-1} \times Opaqueness_{it-1}, \\
 & Foracq_topbank_{it-1} \times Opaqueness_{it-1})' \\
 X_{it-1}^{Size} = & (Dommer_topbank_acquirer_{it-1} \times \text{Log}(Firm's\ total\ assets)_{it-1}, \\
 & (Dommer_topbank_target_{it-1} \times \text{Log}(Firm's\ total\ assets)_{it-1}, \\
 & Domacq_topbank_{it-1} \times \text{Log}(Firm's\ total\ assets)_{it-1}, \\
 & Foracq_topbank_{it-1} \times \text{Log}(Firm's\ total\ assets)_{it-1})'
 \end{aligned}$$

Tables 6 and 7 show coefficient estimates of regressions where the domestic merger category has been split between acquirer and target banks, whilst the domestic acquisition and foreign acquisition categories are as before. In both tables, the interest rate changes are relatively similar for target banks and acquirer banks, and the differences are not statistically significant. While the relative difference in interest rate is 0.25 percentage points higher for completely opaque borrowers at acquirer banks, the corresponding coefficient at target banks is 0.22 percentage points. The results thus are not strongly consistent with the hypothesis that relationship-dependent target borrowers should be harmed more by the mergers.

Columns (5) and (6) in Table 6 show, interestingly, that the likelihood of getting a new loan is significantly lower for a opaque borrowing firm at a target bank, relative to a transparent borrowing firm. The likelihood of getting a new loan at any bank, with whom the firm may or may not have had a previous relationship, is reduced by 0.0223 in the regression with firm fixed effects. This estimate compares to the sample average likelihood of obtaining a new bank loan, as shown in Table 3, of 0.332. The likelihood of getting a new loan during a domestic merger for borrowers at target banks is thus 7 percent lower, measured at the sample mean, for borrowers with *Opaqueness*-measure equal to one, relative to borrowers with *Opaqueness*-measure equal to zero. This finding is opposite of what we would expect if opaque borrowers were "locked into" a

lending relationship that was broken by the merger of the target bank into a larger bank. It is not entirely clear to us why it should be harder for an opaque borrower to get a loan at a new bank during the merger process. But the negative coefficient on the likelihood of getting a new loan is consistent with the bank organisation being distracted during the merger process, and therefore unable to grant loans to the more information-sensitive borrowers. The likelihood of getting a new loan at a bank with which the firm has no previous relationship, relative to a fully transparent one, is negative, but the coefficients in columns (7) and (8) are not statistically significant.

However, the effect on the firm's total borrowing across all banking relationships, shown in column (4), is not significant. This may be because the change in loan amounts includes both the granting of new loans as well as the repayment of previously granted loans. It is not obvious what effect the domestic merger should have on the firm's propensity to repay old loans, and this coefficient may be hard to interpret. Still, the small coefficient in column (4) implies that these results should be considered with caution.

Table 7 shows the estimates of the regression with firm size used as an alternative opaqueness measure. The effects on interest rates are slightly larger at target banks, compared with acquirer banks. The difference is not statistically significant, however. There are no significant differential effects on loan volume in columns (3)-(8).

4.3.4 Relationship Level

Tables 8 and 9 show estimates at the individual bank-firm relationship-year level. Only bank-firm relationships with positive borrowing at date $t - 1$ are included. These regressions estimate the effects of the bank M&A events on the interest rate margin, loan amounts, and granting of new loans in the bank firm relationships. The regressions are thus as follows:

$$\begin{aligned} \text{Interest rate margin}_{ijt} &= X_{ijt-1}\beta^1 + Z_{ijt-1}\gamma^1 + \epsilon_{ijt}^1 \\ \Delta \text{Bank loan amount}_{ijt} &= X_{ijt-1}\beta^2 + Z_{ijt-1}\gamma^2 + \epsilon_{ijt}^2 \\ \text{New account}_{ijt} &= X_{ijt-1}\beta^3 + Z_{ijt-1}\gamma^3 + \epsilon_{ijt}^3 \end{aligned}$$

Each observation is for the relationship between firm i and bank j in year t . The variables included in Z_{ijt-1} are the same as in the firm-year level specification, except that the M&A dummy variables are equal to one when the relationship-specific bank is involved in an M&A event. This contrasts with the specification at

the firm-year level, where the M&A event dummy variable was set to one only for M&A events involving the firm's main lender. Since the noise in the computation of the interest rate and Δ Bank loan is larger than at the firm-year level, we winsorise the variables at the 5 percent and 95 percent level, compared to the 1 percent and 99 percent in the firm-year level analysis. The vectors X_{ijt-1} , using *Opaqueness* and *Firm size*, respectively, are now:

$$\begin{aligned}
X_{it-1}^{Opaq} &= (Dommer_{ijt-1} \times Opaqueness_{it-1}, \\
&\quad Domacq_{ijt-1} \times Opaqueness_{it-1}, \\
&\quad Foracq_{ijt-1} \times Opaqueness_{it-1})' \\
X_{it-1}^{Size} &= (Dommer_{ijt-1} \times \text{Log}(Firm's\ total\ assets)_{it-1}, \\
&\quad Domacq_{ijt-1} \times \text{Log}(Firm's\ total\ assets)_{it-1}, \\
&\quad Foracq_{ijt-1} \times \text{Log}(Firm's\ total\ assets)_{it-1})'
\end{aligned}$$

The effects are generally smaller than for the firm level specifications. Columns (1) and (2) of Table 8 show a relative increase in interest rates for opaque firms, but the effects are smaller than in Table 4. Table 9 shows no significant differential effects of domestic mergers. Note that these regressions only include observations where the relationship was continued from between date $t - 1$ to date t . This may impose some survivorship bias issues. For this reason, the regressions at the firm-year level remain our preferred specifications. Still, it is reassuring that at least the results in the *Opaqueness*-specifications remain statistically significant at the 5 percent level.

Another reason contributing to these findings being weaker may be that firms with only one single banking relationship are "weighted" less in the regressions on the firm-bank-year level. In unreported regressions, we also find that the effects on the firm-year level are primarily driven by firms with a single banking relationship. This makes intuitive sense, as such firms have fewer easily available opportunities to shift lender when a relationship breaks. In addition, the computed interest rates on the firm-bank-year level are more noisy than the interest rates at the firm-year level, which again supports our choice of focusing on the regressions with observations at the firm-year level.

The only significant effects related to domestic mergers in Table 9 are found in column (5). Large firms are more likely than small firms to get a new loan following a domestic merger, conditional on keeping the relationship from year $t - 1$ to year t . This effect is not present in Table 5, suggesting that there is no overall difference between large and small firms in obtaining a new bank relationship. However, the

effects are only significant at the 5 percent level, and the significance disappears when we include firm fixed effects. These results should therefore be viewed with caution.

The results in columns (5) and (6) of Table 9 suggest that large firms were more likely than small firms to receive new loans after a domestic acquisition. Since such acquisitions are relatively few, and their occurrence was likely related to the target banks' borrower portfolio, these estimates have no implications related to our hypothesis. They are more likely to reflect that poorly performing banks are more restricted in lending to small firms after being taken over, and we may conjecture that these banks were too lenient in their lending policies prior to the takeover. In addition, the results in Table 8 are not consistent with this effect being related to lending relationships. Similarly, while the effects on the foreign acquisitions category are significant in columns (3) and (4) in Table 9., no such effects are found in columns (3) and (4) in Table 8.

4.4 Bank Loan Market Competition

One may be concerned that our results could be driven by changes in bank market competition that primarily affect small and opaque borrowers. If it is the case that competition is important, we would expect bank M&As in regional markets with high concentration prior to the event to have a smaller effect than bank M&As in regions with lower concentration. Regions where the bank loan market is already concentrated may have less room for further price increases due to banks' market power. To control for market power, we include interaction terms where the M&A category indicator variables are multiplied with the bank loan market's Herfindahl-Hirschman index (HHI) measure in the firm's local region¹⁷ prior to the event. In other words, we return to the firm-year observation level and add the following variables to our control variable vector, Z_{it-1} , while keeping the other variables used in the previous analyses:

$$Dommer_hhi_{it-1} = Dommer_topbank_{it-1} \times Regional\ bank\ loan\ market\ concentration\ (HHI)_{it-1},$$

$$Domacq_hhi_{it-1} = Domacq_topbank_{it-1} \times Regional\ bank\ loan\ market\ concentration\ (HHI)_{it-1},$$

$$Foracq_hhi_{it-1} = Foracq_topbank_{it-1} \times Regional\ bank\ loan\ market\ concentration\ (HHI)_{it-1}$$

If market competition is the primary reason behind our previous findings, the new interaction variables should "drive" out the significance of the coefficients on the main variables of interest, X_{it-1} , from Section 4.3. This is not what happens, however. The regression results are reported in Table 10 for the

¹⁷We use a definition of regions provided by Statistics Norway, which is intended to be a proxy for local labour markets. This definition divides Norway into 161 regions.

Opaqueness measure specification, and Table 11 for the *Size* measure specification. We report only the new interaction variables, in addition to our main variables of interest (X_{it-1}). The coefficients on $Dommer_topbank_{it-1} \times Opaqueness_{it-1}$ and $Dommer_topbank_{it-1} \times \text{Log}(\text{Firm's total assets})_{it-1}$ are effectively unchanged, and they remain significant. Interestingly, the coefficients on the new interaction term of the domestic merger category and bank loan market concentration, $Dommer_hhi$, are significantly negative both in Table 10 and Table 11. This suggests that domestic mergers increase interest rates more when they occur in markets which are not already characterised by a high level of bank loan market power.

We do not show the coefficient estimates on $Domacq_hhi$ and $Foracq_hhi$ due to confidentiality reasons, given the limited number of events in these categories.

4.5 Other Robustness Tests

We do several robustness checks, which we do not report here for brevity reasons. First, we look at how long-run effects of mergers affect firm borrowing. Our hypothesis is that the negative effect on relationship-dependent firms is strongest during the merger process. As the merged entity is reorganised, loan officers are again able to focus on core lending activities and lending relationships are rebuilt through renewed interaction between loan officers and the firm. We therefore do not expect mergers to have long-lasting effects on lending relationships. To study this, we include an extra lag of the M&A variables in our regressions. The lagged domestic merger variable coefficients are generally smaller in magnitude and less statistically significant than the current M&A variable coefficient. This supports our hypothesis, since we expect that lending relationships are only temporarily affected by a domestic merger.

Our *Opaqueness* measure uses non-current fixed assets and non-current financial assets as a percentage of total assets as a measure of firm transparency or ability to post collateral. It is possible that non-current financial assets are relatively non-transparent. We therefore re-run the *Opaqueness*-regressions with a measure that uses only non-current fixed assets as a percentage of total assets as our *Opaqueness*-measure. Again, the results remain similar.

Finally, we exclude firms with intragroup borrowing, i.e., firms who borrow from related firms within the same group. Firms who can borrow from related firms are likely to have different financing policies, relative to single entities. A firm that can borrow from its parent- or sister company is probably not likely to be dependent on a bank lending relationship as other firms in order to get access to credit. The main results still hold after we exclude these firms.

5 Conclusion

We study whether banking relationships are on average beneficial or detrimental to firm borrowers by looking at how bank mergers and acquisitions in Norway during 1998-2009 affected relationship-dependent firm borrowers' access to credit. Since the bank M&A events, in particular the domestic mergers, in this period were for the most cases not related to the quality of the involved banks' lending portfolios, these events constitute exogenous events that may have caused a change in the bank's relationships with its borrowers. By studying the differential impact of these events on the availability and terms of credit for firms that differ in their levels of information asymmetries, we can infer whether firms benefit from lending relationships. If relationship-dependent firms are more negatively affected by mergers, this indicates that they benefited from a lending relationship prior to the merger, and vice versa.

We find evidence that domestic bank mergers during the sample period reduced loan availability and increased interest rate margins for borrowers expected to suffer from asymmetric information problems. The analysis includes firm-, year-, and bank M&A event fixed effects. The findings are consistent with opaque firms benefiting from bank lending relationships, and subsequently suffering from a weakening of their ties to the banks during domestic bank mergers. We interpret the severed ties to a loss of soft information in the bank during the merger process.

However, the magnitude of the estimated coefficients are relatively small, which suggests that the effects are at best quite modest. The reason for this may be due to a low power of the test, since we include both firm-, year-, and bank M&A event fixed effects to reduce omitted variables problems. Still, the direction in our findings suggests that benefits of lending relationships on average outweigh the costs for firm borrowers.

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Table 1: **Overview Norwegian bank events 1998-2009.** Sources: www.fnh.no, www.sparebankforeningen.no, annual reports and news articles.

| Event | (Year) |
|--|---------------|
| <i>Domestic bank mergers</i> | |
| Postbanken and Den norske Bank | 1999 |
| Gjensidige Bank and Sparebanken NOR | 1999 |
| Birkenes Sparebank and Vegusdal Sparebank | 1999 |
| Sparebank 1 Hallingdal and Hemsedal Sparebank | 1999 |
| Tingvoll Sparebank and Gjemnes Sparebank | 1999 |
| Tingvoll Sparebank and Øksedal Sparebank | 2001 |
| Surnadal Sparebank and Stangvik Sparebank | 2001 |
| Finansbanken and Storebrand Bank | 2002 |
| Enebakk Sparebank and Lillestrøm Sparebank | 2003 |
| Sparebanken Sogn og Fjordane and Sparebanken Flora Bremanger | 2003 |
| Den norske Bank and Gjensidige NOR Sparebank | 2004 |
| Holla Sparebank and Lunde Sparebank | 2004 |
| Romsdal Fellesbank and Sparebank 1 Midt-Norge | 2005 |
| Sparebanken Rana and Helgeland Sparebank | 2005 |
| Ofoten Sparebank and Tjeldsund Sparebank | 2006 |
| Grong Sparebank and Verran Sparebank | 2006 |
| Ankenes Sparebank and Narvik Sparebank | 2007 |
| Sparebanken Telemark and Sparebanken Grenland | 2008 |
| Sandsvær Sparebank and Sparebanken Vestfold | 2008 |
| Tingvoll Sparebank and Sparebanken Møre | 2009 |
| Sauda Sparebank and Sparebanken Vest | 2009 |
| <i>Domestic acquisitions</i> | |
| Sparebank 1-alliance buys Vår Bank | 2000 |
| Den norske Bank buys Nordlandsbanken | 2003 |
| Sandnes Sparebank buys Acta Bank | 2003 |
| <i>Foreign-bank mergers and acquisitions</i> | |
| Svenska Handelsbanken buys Bergensbanken | 1999 |
| Danske Bank buys Fokus Bank | 1999 |
| Merita-Nordbanken buys Christiania Bank og Kreditkasse | 2001 |
| Santander buys Bankia Bank | 2005 |
| Islandsbanki buys Kredittbanken | 2005 |
| Islandsbanki buys BN Bank | 2005 |
| SEB buys Privatbanken | 2005 |
| SG and Santander buy Elcon Finans | 2005 |

Table 2: Description of control variables

Firm Characteristics

| | |
|------------------|--|
| Size | $\log(\text{Total assets}_{it-1})$ |
| Tangibles_assets | $\frac{\text{Fixed assets}_{it-1} + \text{Non-current financial assets}_{it-1}}{\text{Total assets}_{it-1}}$ |
| Ebitda_assets | $\frac{\text{EBITDA}_{it+1}}{\text{Total assets}_{it}}$ |
| Bkcyprob | Probability of bankruptcy ("Sebra" model) out-of-sample prediction. |
| Cash_assets | $\frac{\text{Cash}_{it-1}}{\text{Total assets}_{it-1}}$ |
| Logfirmage | $\log(\text{firmage})$ |

Firm-Bank Relationship Characteristics

| | |
|------------------|---|
| Multibank | Dummy variable equal to one if firm has multiple bank lenders |
| Rel_hhi_loan | Herfindahl-Hirschman Index for the firm's bank loans |
| Savbank_borrower | Dummy variable equal to one if firm borrows from a savings bank |

Bank and Bank Loan Market Characteristics

| | |
|--------------------|---|
| Bankreg...hhi_loan | Herfindahl-Hirschman Index for regional bank loan market |
| Induba...hhi_loan | Herfindahl-Hirschman Index for industrial bank loan market |
| Topbanksize | Firm top bank lender's national bank loan market share |
| Topbankindu | Firm top bank lender's NACE 2-digit industry bank loan market share |
| Topbankregion | Firm top bank lender's regional bank loan market share |

Table 3: **Summary statistics.** (*) means variable is winsorised at 1 percent- and 99 percent level.

| variable | N | mean | sd | min | p25 | median | p75 | max |
|--|---------|--------|-------|--------|--------|--------|-------|--------|
| <i>Dependent variables</i> | | | | | | | | |
| Interest rate margin(*) | 423,394 | 0.039 | 0.041 | -0.072 | 0.015 | 0.030 | 0.052 | 0.271 |
| Δ Bank loan | 423,394 | -0.001 | 0.224 | -1.004 | -0.073 | -0.026 | 0.041 | 2.669 |
| New bank relationship indicator | 423,394 | 0.060 | 0.238 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| New bank loan account indicator | 423,394 | 0.332 | 0.471 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
| <i>Firm Characteristics</i> | | | | | | | | |
| Size (Log(Total assets)) | 423,394 | 8.537 | 1.363 | 4.718 | 7.549 | 8.388 | 9.341 | 14.857 |
| Tangibles/assets | 423,394 | 0.458 | 0.334 | 0.000 | 0.141 | 0.415 | 0.781 | 1.000 |
| Ebitda/assets | 397,538 | 0.154 | 0.264 | -2.000 | 0.053 | 0.121 | 0.226 | 2.692 |
| Bankruptcy probability | 423,394 | 0.014 | 0.021 | 0.000 | 0.002 | 0.006 | 0.017 | 0.908 |
| Cash/assets | 423,394 | 0.109 | 0.134 | -0.802 | 0.017 | 0.053 | 0.154 | 1.000 |
| Log(firmage) | 417,919 | 2.168 | 0.928 | 0.000 | 1.609 | 2.303 | 2.833 | 4.920 |
| <i>Firm-Bank Relationship Characteristics</i> | | | | | | | | |
| Multiple bank lenders indicator | 423,394 | 0.176 | 0.381 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Firm's borrowing HHI | 423,394 | 0.950 | 0.133 | 0.180 | 1.000 | 1.000 | 1.000 | 1.000 |
| Savings bank indicator | 423,394 | 0.462 | 0.499 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
| <i>Bank and Bank Loan Market Characteristics</i> | | | | | | | | |
| Regional loan market HHI | 423,394 | 0.163 | 0.059 | 0.093 | 0.122 | 0.149 | 0.182 | 0.675 |
| Industry loan market HHI | 423,394 | 0.142 | 0.056 | 0.062 | 0.102 | 0.131 | 0.160 | 1.000 |
| National market share of top bank lender | 423,394 | 0.080 | 0.088 | 0.000 | 0.005 | 0.032 | 0.147 | 0.392 |
| Industry market share of top bank lender | 423,394 | 0.103 | 0.120 | 0.000 | 0.007 | 0.040 | 0.167 | 1.000 |
| Regional market share of top bank lender | 423,394 | 0.156 | 0.121 | 0.000 | 0.059 | 0.148 | 0.221 | 0.814 |

Table 4: **Effect of Opaqueness.** Reported coefficients on cross-term of M&A category dummy and opaqueness measure. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | Δ <i>Loan Amount</i> | | <i>I(New bank loan)</i> | | <i>I(New bank relationship)</i> | |
|-------------------------------------|-----------------------------|-----------------------|-----------------------------|----------------------|-------------------------|---------------------|---------------------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dommer_opaq | 0.0053*** (0.0007) | 0.0024*** (0.0006) | 0.0099* (0.0044) | 0.0015 (0.0046) | -0.0058 (0.0046) | -0.0081 (0.0050) | 0.0063 (0.0091) | -0.0008 (0.0096) |
| Domacq_opaq | 0.0045 (0.0029) | 0.0007 (0.0024) | -0.0305 (0.0203) | -0.0525* (0.0206) | -0.0213 (0.0203) | -0.0265 (0.0222) | -0.0319 (0.0399) | -0.0514 (0.0423) |
| Foracq_opaq | -0.0013 (0.0014) | -0.0004 (0.0012) | 0.0074 (0.0076) | 0.0008 (0.0082) | 0.0036 (0.0089) | 0.0177 (0.0096) | 0.0227 (0.0162) | 0.0440** (0.0169) |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 |
| <i>r</i> ² | 0.2273 | 0.0693 | 0.0063 | 0.0375 | 0.0105 | 0.0178 | 0.0487 | 0.0119 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: **Effect of Firm Size.** Reported coefficients on cross-term of M&A category dummy and firm size. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | Δ <i>Loan Amount</i> | | <i>I(New bank loan)</i> | | <i>I(New bank relationship)</i> | |
|-------------------------------------|-----------------------------|------------------------|-----------------------------|----------------------|-------------------------|---------------------|---------------------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dommer_size | -0.0014*** (0.0002) | -0.0009*** (0.0002) | -0.0004 (0.0011) | -0.0012 (0.0012) | -0.0003 (0.0012) | 0.0011 (0.0013) | -0.0018 (0.0023) | -0.0019 (0.0024) |
| Domacq_size | -0.0018* (0.0007) | -0.0001 (0.0006) | 0.0132* (0.0052) | 0.0159** (0.0055) | -0.0002 (0.0052) | 0.0005 (0.0057) | 0.0239* (0.0100) | 0.0209* (0.0104) |
| Foracq_size | 0.0009** (0.0003) | 0.0001 (0.0003) | 0.0023 (0.0017) | 0.0023 (0.0019) | -0.0011 (0.0020) | -0.0023 (0.0022) | -0.0021 (0.0037) | -0.0016 (0.0039) |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 |
| <i>r</i> ² | 0.2273 | 0.0694 | 0.0063 | 0.0375 | 0.0105 | 0.0178 | 0.0487 | 0.0119 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: **Effect of bank M&As for targets and acquirers. Opaqueness.** Reported coefficients on cross-term of M&A category dummy and opaqueness measure. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | Δ <i>Loan Amount</i> | | <i>I(New bank loan)</i> | | <i>I(New bank relationship)</i> | |
|-------------------------------------|-----------------------------|----------------------|-----------------------------|----------------------|-------------------------|-----------------------|---------------------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dommer_acqopaq | 0.0047*** (0.0009) | 0.0025** (0.0008) | 0.0135* (0.0055) | 0.0078 (0.0058) | 0.0011 (0.0056) | 0.0019 (0.0062) | 0.0245* (0.0116) | 0.0159 (0.0123) |
| Dommer_targopaq | 0.0060*** (0.0012) | 0.0022* (0.0010) | 0.0037 (0.0069) | -0.0081 (0.0073) | -0.0167* (0.0077) | -0.0223** (0.0083) | -0.0226 (0.0141) | -0.0277 (0.0147) |
| Domacq_opaq | 0.0045 (0.0029) | 0.0007 (0.0024) | -0.0304 (0.0203) | -0.0520* (0.0207) | -0.0213 (0.0203) | -0.0257 (0.0223) | -0.0319 (0.0399) | -0.0500 (0.0423) |
| Foracq_opaq | -0.0013 (0.0014) | -0.0004 (0.0012) | 0.0074 (0.0076) | 0.0007 (0.0082) | 0.0036 (0.0089) | 0.0176 (0.0096) | 0.0228 (0.0162) | 0.0438** (0.0169) |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 |
| r2 | 0.2273 | 0.0694 | 0.0063 | 0.0375 | 0.0106 | 0.0179 | 0.0488 | 0.0120 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: **Effect of bank M&As for targets and acquirers. Firm Size.** Reported coefficients on cross-term of M&A category dummy and firm size. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | Δ <i>Loan Amount</i> | | <i>I(New bank loan)</i> | | <i>I(New bank relationship)</i> | |
|-------------------------------------|-----------------------------|------------------------|-----------------------------|----------------------|-------------------------|---------------------|---------------------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dommer_acqsize | -0.0015*** (0.0002) | -0.0010*** (0.0002) | 0.0007 (0.0014) | -0.0006 (0.0015) | -0.0017 (0.0015) | -0.0005 (0.0016) | -0.0025 (0.0029) | -0.0053 (0.0031) |
| Dommer_targsize | -0.0013*** (0.0003) | -0.0007* (0.0003) | -0.0020 (0.0016) | -0.0022 (0.0018) | 0.0016 (0.0020) | 0.0037 (0.0021) | 0.0006 (0.0035) | 0.0035 (0.0037) |
| Domacq_size | -0.0017* (0.0007) | -0.0001 (0.0006) | 0.0132* (0.0052) | 0.0160** (0.0055) | -0.0001 (0.0052) | 0.0004 (0.0057) | 0.0238* (0.0100) | 0.0205* (0.0104) |
| Foracq_size | 0.0010** (0.0003) | 0.0002 (0.0003) | 0.0023 (0.0017) | 0.0024 (0.0019) | -0.0011 (0.0020) | -0.0023 (0.0022) | -0.0022 (0.0037) | -0.0014 (0.0039) |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 |
| <i>r</i> ² | 0.2222 | 0.0690 | 0.0063 | 0.0376 | 0.0106 | 0.0177 | 0.0490 | 0.0116 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: **Effect on individual lending relationships. Opaqueness** Reported coefficients on cross-term of M&A category dummy and opaqueness measure. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | Δ <i>Loan Amount</i> | | <i>I(New bank loan)</i> | |
|-------------------------------------|-----------------------------|---------------------|-----------------------------|----------------------|-------------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Dommer_opaq | 0.0038*** (0.0006) | 0.0010* (0.0005) | 0.0028 (0.0019) | -0.0003 (0.0020) | 0.0073 (0.0077) | -0.0067 (0.0081) |
| Domacq_opaq | 0.0047* (0.0019) | 0.0005 (0.0016) | -0.0091 (0.0061) | -0.0151* (0.0064) | 0.0788** (0.0268) | 0.0498 (0.0280) |
| Foracq_opaq | 0.0007 (0.0011) | 0.0021* (0.0010) | 0.0041 (0.0032) | 0.0019 (0.0034) | 0.0202 (0.0125) | 0.0235 (0.0131) |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 434421 | 434421 | 460881 | 460881 | 460881 | 460881 |
| <i>r</i> ² | 0.2665 | 0.0982 | 0.0198 | 0.0209 | 0.0384 | 0.0216 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: **Effect on individual lending relationships. Firm size.** Reported coefficients on cross-term of M&A category dummy and firm size. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | <i>ΔLoan Amount</i> | | <i>I(New bank loan)</i> | |
|-------------------------------------|-----------------------------|---------------------|-----------------------|-----------------------|-------------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Dommer_size | -0.0000 (0.0001) | 0.0001 (0.0001) | 0.0001 (0.0004) | -0.0001 (0.0004) | 0.0041* (0.0017) | 0.0030 (0.0017) |
| Domacq_size | 0.0001 (0.0002) | -0.0000 (0.0001) | -0.0003 (0.0005) | -0.0003 (0.0005) | 0.0117*** (0.0025) | 0.0090*** (0.0026) |
| Foracq_size | 0.0005* (0.0002) | -0.0001 (0.0002) | 0.0045*** (0.0007) | 0.0049*** (0.0008) | -0.0053 (0.0028) | -0.0036 (0.0029) |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 434421 | 434421 | 460881 | 460881 | 460881 | 460881 |
| <i>r</i> ² | 0.2664 | 0.0982 | 0.0198 | 0.0210 | 0.0385 | 0.0216 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: **Effect of Opaqueness and Market Concentration.** Reported coefficients on cross-term of M&A category dummy and opaqueness measure and cross-term of M&A category dummy and regional bank loan market concentration. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | <i>ΔLoan Amount</i> | | <i>I(New bank loan)</i> | | <i>I(New bank relationship)</i> | |
|-------------------------------------|-----------------------------|-----------------------|---------------------|-----------------------|-------------------------|---------------------|---------------------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dommer_opaq | 0.0052*** (0.0007) | 0.0023*** (0.0006) | 0.0097* (0.0044) | 0.0013 (0.0046) | -0.0056 (0.0046) | -0.0081 (0.0050) | 0.0064 (0.0091) | -0.0010 (0.0096) |
| Domacq_opaq | 0.0044 (0.0029) | 0.0008 (0.0024) | -0.0319 (0.0204) | -0.0551** (0.0207) | -0.0209 (0.0203) | -0.0263 (0.0222) | -0.0409 (0.0395) | -0.0620 (0.0419) |
| Foracq_opaq | -0.0013 (0.0014) | -0.0004 (0.0012) | 0.0072 (0.0076) | 0.0005 (0.0082) | 0.0035 (0.0089) | 0.0173 (0.0096) | 0.0221 (0.0162) | 0.0436* (0.0169) |
| Dommer_hhi | -0.0173*** (0.0042) | -0.0056 (0.0037) | -0.0453 (0.0271) | -0.0265 (0.0289) | 0.0344 (0.0293) | -0.0076 (0.0319) | 0.0165 (0.0596) | -0.0327 (0.0608) |
| Domacq_hhi | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Foracq_hhi | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 |
| <i>r2</i> | 0.2273 | 0.0693 | 0.0063 | 0.0375 | 0.0105 | 0.0178 | 0.0488 | 0.0119 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: **Effect of Firm Size and Market Concentration.** Reported coefficients on cross-term of M&A category dummy and firm size, and cross-term of M&A category dummy and regional bank loan market concentration. Other explanatory variables are explained in Table 2. Control variables and year-, M&A event-, and firm fixed effects are not reported. The sample period is 1998-2009. Standard errors are clustered at the firm level.

| | <i>Interest rate margin</i> | | <i>ΔLoan Amount</i> | | <i>I(New bank loan)</i> | | <i>I(New bank relationship)</i> | |
|-------------------------------------|-----------------------------|------------------------|---------------------|----------------------|-------------------------|---------------------|---------------------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dommer_size | -0.0014*** (0.0002) | -0.0009*** (0.0002) | -0.0005 (0.0011) | -0.0013 (0.0012) | -0.0003 (0.0012) | 0.0011 (0.0013) | -0.0018 (0.0023) | -0.0019 (0.0024) |
| Domacq_size | -0.0018* (0.0007) | -0.0000 (0.0006) | 0.0130* (0.0052) | 0.0155** (0.0055) | -0.0001 (0.0052) | 0.0006 (0.0057) | 0.0220* (0.0099) | 0.0191 (0.0102) |
| Foracq_size | 0.0009** (0.0003) | 0.0001 (0.0003) | 0.0023 (0.0017) | 0.0022 (0.0019) | -0.0012 (0.0020) | -0.0025 (0.0022) | -0.0024 (0.0037) | -0.0019 (0.0039) |
| Dommer_hhi | -0.0199*** (0.0042) | -0.0070 (0.0037) | -0.0478 (0.0271) | -0.0281 (0.0289) | 0.0354 (0.0293) | -0.0046 (0.0319) | 0.0133 (0.0596) | -0.0345 (0.0607) |
| Domacq_hhi | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Foracq_hhi | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | No | Yes | No | Yes | No | Yes |
| Firm industry and geography dummies | Yes | No | Yes | No | Yes | No | Yes | No |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank M&A event fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| <i>N</i> | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 | 393092 | 394080 |
| <i>r2</i> | 0.2273 | 0.0694 | 0.0063 | 0.0375 | 0.0105 | 0.0178 | 0.0488 | 0.0119 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$