The Impact of Bank Consolidation on Commercial Borrower Welfare

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Abstract

We estimate the impact of bank merger announcements on borrowers' stock prices for publicly-traded Norwegian firms. In addition, we analyze how bank mergers influence borrower relationship termination behavior and relate changes in the propensity to terminate to borrower abnormal returns. We demonstrate that borrowers lose, on average, about 0.76 percent in equity value when their bank is announced as a merger target. Small borrowers of target banks are especially hurt in mergers involving two large banks, where they lose an average of about 1.8 percent. On the other hand, small borrowers of acquiring banks gain up to one percent when their bank acquires a small bank. These results suggest that the welfare of small borrowers may be influenced by a strategic focus at the merged bank that tends to favor the acquiring borrower. We also show that bank mergers lead to higher relationship exit rates among borrowers of target banks after a bank merger, and small bank mergers lead to larger increases in exit rates than large mergers. Finally, for borrowers of target and acquiring banks, larger merger-induced increases in relationship termination rates are associated with higher abnormal returns. This result is partially consistent with stories of relationship lock in.

JEL code: G21, C41

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1. Introduction

How do mergers affect the welfare of borrowers? Understanding the implications of industry consolidation activity on customer welfare has been one of the defining issues in the merger literature. The impact of mergers in the banking sector is particularly important because bank debt is a pervasive form of corporate financing across virtually every industry. Thus, shocks created by bank mergers have the potential to impact entire economies. Moreover, spurred by two decades of deregulation, banks around the world continue to consolidate through merger and acquisition activity. Although these developments are dramatically altering the global financial services landscape, little empirical evidence exists that directly measures how bank mergers influence the welfare of bank borrowers. In this paper, we help fill this void by estimating the impact of bank mergers on small but publicly-traded commercial bank customers in Norway.

Academics typically stress market power and efficiency as the two most important sources of gains to banks that merge. However, it is unclear whether these gains come at the expense of bank customers. Increases in market power could lead to higher prices, lower quality, and fewer financial products, but bank mergers that improve the efficiency of the banking sector could weed out poorly-operated banks, force down prices, and produce a more complete menu of financial products.[1] Thus, bank mergers have the potential to both help and harm borrowers.

We analyze the share price responses of commercial loan customers to announcements of bank mergers. Borrowers are separated according to whether they are affiliated with the acquiring, target, or

[1] For some firms, market power and efficiency improvements may have a counter-intuitive influence. Petersen and Rajan (1995) argue that banks require some form of market power to invest in the type of relationship lending important to small, informationally-opaque borrowers. They show that these borrowers can actually benefit from increases in market power. Moreover, efficiency enhancements could harm customers that previously benefited from underpriced loans made by inefficient banks.

a rival bank, and average abnormal returns are computed for each group of borrowing firms. The theory of banking relationships suggests that not all firms will be similarly affected by the loss or alteration of a banking relationship. Consequently, we examine the variation in abnormal returns across borrower and merger characteristics, including a measure of how bank relationship durability changes as a result of the merger. Using a time-series of bank relationship data and hazard function estimators, we calculate the propensity for a borrower to terminate a bank relationship. If bank mergers result in increases in bank market power, firms that can easily switch banks may be less susceptible to merger-induced reductions in borrower welfare.

Our analysis produces three main results. First, corporate borrowers of target banks experience an average abnormal return of –0.76 percent upon the merger announcement, while borrowers of acquiring and rival banks experience no significant decline. Small target borrowers perform worse, particularly when the merger involves two large banks, where these borrowers lose an average of 1.8 percent of their equity value. Meanwhile, small borrowers of acquiring banks earn positive abnormal returns of up to one percent when their bank announces its intention to acquire a small bank. These results suggest that the welfare of small borrowers may be influenced by a strategic focus at the merged bank that favors acquiring borrowers. Second, bank mergers cause relationship exit rates of target borrowers to increase, but most of this increase is due to the influence of small bank mergers. For borrowers of acquiring banks, relationship exit rates are not significantly altered by the bank merger. Third, for all borrowers, there is a positive relationship between abnormal returns and the merger-induced increase in relationship termination rates. That is, borrowers that can more easily leave a relationship after a merger earn higher abnormal returns when their banks announce a merger. This suggests that lower switching costs and the availability of substitute forms of financing shield

some target borrowers from the adverse impact of bank mergers.

Previous studies of the impact of mergers on industry competitiveness have utilized three different proxies for customer welfare. The first is the stock price reaction of rival firms to merger announcements within an industry. This measure assumes that positive (negative) stock price reactions by rivals indicate a post-merger decline (increase) in the competitiveness of the industry.[2] Emphasizing the impact on rivals of a merger is problematic because the relationship between rival banks and their customers is not necessarily a zero-sum game. For example, Jayaratne and Strahan (1997) and Calomiris and Karceski (2000) argue that large efficiency gains within the banking industry partially accrue to customers so that zero or positive abnormal returns to rival banks need not imply that customers are worse off. The second proxy is the change in product prices after a merger.[3] Using a data set of small Italian firms, Sapienza (2002) finds that loan rates fall after small in-market bank mergers but rise after large bank mergers. Although changes in product prices provide clearer signals about customer welfare, price is not the only product attribute that consumers care about. Service, quality, selection, and availability are additional product dimensions that influence customer satisfaction. The third proxy is the frequency that customers switch products. Post-merger increases in product switching may indicate reduced customer satisfaction or that merged firms effectively drive out customers. For example, Sapienza (2002) finds that exit rates for borrowers of target banks increase after a bank merger. Her interpretation is that management of newly-merged banks effectively kick out some small borrowers. On the other hand, higher post-merger relationship

[2] Eckbo (1983, 1985), Stillman (1983), and Eckbo and Wier (1985) generally conclude that rivals do not benefit from mergers and interpret this as evidence that mergers do not facilitate monopoly rents. James and Wier (1987) document a similar result for the banking industry.

[3] Kim and Singal (1993) and Chevalier (1995) show that mergers in the airline and supermarket industries lead to price increases and argue that increased market power dominates efficiency gains in these two sectors. Moreover, Prager and Hannan (1998) show that deposit rates fall as a result of U.S. bank mergers that occasion substantial increases in local market concentration.

termination rates need not imply that customers are adversely affected. For example, the U.S. Department of Justice interprets a high switching rate by customers as a signal of a competitive market or the presence of close product substitutes (see Section 1.0 of U.S. Department of Justice *Merger Guidelines* (1992)).

By utilizing borrowing firm abnormal returns and exit rates, we attempt to address the shortcomings of each of these three proxies. If markets are efficient, then abnormal returns provide direct signals about whether bank mergers help or hurt shareholders of borrowing firms. These abnormal returns also capture the net welfare impact of the bank merger on the borrower, including the influence of all expected changes in price, quality, service, and availability. Moreover, by relating borrower stock price responses to merger-induced changes in switching behavior, we can establish whether increased exit rates enhance or reduce borrower value.

To conduct our analysis, we collect data on Norwegian bank mergers from 1983 to 2000. Data from Norway offer several distinct advantages. First, we can easily observe the identities of a set of firm-bank relationships through time. In the United States and many other countries, such information is either confidential or difficult to obtain. Second, because the relationship information is for exchange-listed firms, we can measure stock price changes around bank merger announcements. Studies using relationship data from privately-held firms cannot estimate abnormal returns. Third, firms in Norway obtain most of their debt financing from banks and many borrow exclusively from one bank. This means that we isolate the impact of a merger on the borrower's primary source of credit. Fourth, Norway's financial system is similar in many ways to the United States. For example, deregulation in the 1980s led to the removal of interest rate restrictions, relaxation of restrictions on interstate and international banking, and expansion of banks into non-traditional businesses.

Moreover, like U.S. banks, banks in Norway are forbidden from taking large equity positions in non-financial firms. Banks in Norway have minimal ability to control firms through board membership, supernormal voting rights, or pyramidal ownership. This contrasts with the dominant role banks play in the corporate control of firms in countries like Japan and Germany. Overall, Norway offers a setting where bank relationships should be important to firms in ways that are comparable to the United States.

The rest of the paper proceeds as follows. Section 2 describes the data sources and provides some background about bank merger activity in Norway. Section 3 examines the stock price impact of bank merger announcements on borrowers of merging and rival banks. Section 4 models the termination behavior of borrowing firms and relates the propensity to terminate to borrower abnormal returns. Section 5 concludes.

2. Background and Data

Over the last two decades, the Norwegian banking system has evolved along a path similar to many other countries including the U.S. Between 1983 and 1987, Norwegian regulatory authorities lifted interest rate and loan quantity controls, relaxed branching restrictions, allowed for more flexible forms of bank capital, and opened Norway to competition from foreign and newly-created domestic banks.[4] Deregulation resulted in heated competition among Norway's banks and led to expansionary lending policies. In an effort to grow, banks began to merge. Bank mergers continued through the late 1980s and early 1990s, fueled in part by rescue efforts during a four-year financial crisis that began in

[4] In 1984, regulatory officials allowed foreign banks to establish wholly-owned subsidiary banks in Norway. Seven international banks responded (1994 Annual Report for the Banking, Insurance, and Securities Commission of Norway). Authorities also approved the creation of a new domestic commercial bank for the first time since 1961. Between 1984 and 1986, a total of four new domestic commercial banks were created in Norway (1995 Annual Report for the Banking, Insurance, and Securities Commission of Norway).

1988.[5] During the crisis period, bank merger activity accelerated as healthy banks sought to capitalize on the weak financial condition of other banks. By 1993, the crisis had subsided, but new regulations under the European Union (EU) and European Economic Area (EEA) enabled banks to expand across borders. Such liberalization measures continued to pressure Norwegian banks to increase their scale through consolidation. In 1999, bank regulatory authorities dropped their resistance to foreign takeovers of large Norwegian banks. Norway is now one of a very small handful of European countries that has allowed foreign acquisitions of their largest banks.[6]

Our data set includes a set of bank merger announcements, a historical record of bank relationships for firms listed on the Oslo Stock Exchange (OSE), and financial and stock price information on OSE-listed banks and firms. We collect all merger announcements made from 1983 to 2000 involving a bank headquartered in Norway. Our sources for the announcements are two Norwegian newspapers, *Aftenposten* and *Dagens Næringsliv*, and various periodicals archived on the *Dow Jones Interactive* system. We match the announcements with annual information on firm-bank relationships. Firms listed on the OSE are required each year to report their primary bank relationships in the publication *Kierulf's Handbook*. We use the time series of these relationships compiled by Ongena and Smith (2001). *Kierulf's Handbook* and OSE databases provide all accounting and stock price information on sample firms and banks.

Table 1 provides an annual overview of the total number of banks and OSE-listed firms, bank consolidation activity, the number of relationship terminations, and bank industry concentration in our sample. The Appendix lists the identity of the merging banks, the announcement dates, the number of borrowers associated with the acquirer and target, and other merger attributes. Each year we track an

[5] See Ongena, Smith, and Michalsen (2003) for a detailed description of the Norwegian banking crisis.

average of 22 banks and 125 OSE firms that have relationships with at least one bank (each firm maintains a relationship with an average of 1.3 banks). The banks include all Norwegian commercial banks, large Norwegian savings banks, international banks operating in Norway, and international banks operating outside of Norway that have reported relationships with our sample firms. Our borrowing firms represent 95 percent of all non-bank OSE-listed firms and account for an even larger fraction of total market capitalization. We collect information on 48 bank merger announcements, 22 of which were eventually completed. Across the 48 mergers, we obtain 643 acquirer borrower observations, 210 target borrower observations, and 3,389 rival borrower observations. On average, 7 percent of existing bank relationships are terminated annually, but slightly more than that amount is added as new relationships each year.

By U.S. standards, bank relationships in Norway are concentrated, but not relative to other Nordic countries.[7] To formally measure industry concentration, we calculate a Herfindahl-Hirschman Index (HHI) based on the proportion of total relationships maintained by each sample bank. During our sample period, the level of HHI ranges from 1,961 to 3,262, with the highest level of concentration occurring at the end of the crisis period. Note that the U.S. Department of Justice *Merger Guidelines* considers any HHI above 1,800 as signifying a highly concentrated market.

Summary statistics for acquiring and target banks and their OSE-listed borrowing firms are presented in Table 2. The median-sized acquiring bank has assets of 104 billion Kroner (in 1999 prices), equivalent to $13 billion using 1999 year-end exchange rates (1 Norwegian Kroner = $0.125).

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[6] Although the directives under the EU single market program eliminate explicit barriers to cross-border mergers, regulatory authorities in most European countries have found ways to prevent such mergers (see Beitel and Schiereck, 2001).

[7] On average, 75 percent of sample firms maintain a relationship with at least one of Norway's two largest commercial banks, Christiana Bank og Kreditkasse or Den norske Bank. Measured in 1997 assets, the four-firm bank concentration ratio in Norway is 45 percent, compared with 85 percent in Sweden, 71 percent in Finland, and 90 percent in Denmark (*Kredittilsynets tilraadning til Finansdepartementet,* 3/18/99).

The median-sized acquiring bank is more than five times as large as the median-sized target bank (20 billion Kroner or $2.5 billion) and is just large enough to meet the common U.S. cutoff for a "large" bank of $10 billion. The median-sized target bank falls into the U.S. category of a medium-sized bank. Compared to borrowers of target banks, the borrowers of acquiring banks are larger (median annual sales of 1.195 billion Kroner versus 703 million Kroner), more profitable (median operating income to book value of assets of 5.85 percent versus 4.76 percent), and more likely to maintain multiple bank relationships (the fraction with multiple bank relationships is 0.42 versus 0.34). The firms in our sample are small compared to U.S. stocks traded on the NYSE but much larger than the Italian firms studied by Sapienza (2002).[8] Since many Norwegian firms maintain only one bank relationship at a time, it is reasonable to expect that losing a Norwegian bank relationship due to a bank merger is a material event for a borrowing firm.[9]

3. The Wealth Impact of Bank Merger Announcements

In this section, we examine the stock price response of borrowers to announcements that their banks are merging, sorting these firms by borrower size, merger size, and bank affiliation (acquirer, target, or rival). Patterns in bank abnormal returns resulting from mergers are well documented in the literature.[10] Studies have found that bank abnormal returns vary according to whether the bank an acquirer, target, or a rival, as well as by the bank's size and strategic focus. There is good reason to

[8] Based on 1996 NYSE market capitalization breakpoints, 59 percent of our borrowing firms are in the smallest size decile, 33 percent are in the next four size deciles, and 8 percent are larger than the median-sized NYSE firm. Median sales for Sapienza's (2002) Italian borrowers are about $8 million compared with median sales of $58 million for borrowing firms in our Norwegian data set.

[9] On average, 74 percent of our sample firms maintain a relationship with only one bank, 17 percent maintain a relationship with two banks, 7 percent maintain three bank relationships, and only 2 percent maintain four or more bank relationships.

[10] For example, see James and Wier (1987), Cornett and De (1991), Houston and Ryngaert (1994), Becher (2000), DeLong (1999), Kane (2000), and Houston, James, and Ryngaert (2001). Berger, Demsetz, and Strahan (1999) provide a recent overview of the literature on the gains to banks in mergers and Cybo-Ottone and Murgia (2000) present recent event study evidence using European data.

believe that borrower abnormal returns may vary by these characteristics. For instance, efficiency considerations may dictate that merged banks take on the strategic focus of acquired banks (Peek and Rosengren (1998) and Walraven (1997)). Therefore, a merger can harm some target borrowers by simply altering the lending policies of the target bank. Moreover, Berger and Udell (1996), Peek and Rosengren (1996), and Strahan and Weston (1998), among others, show that bank financing often tends to be characterized by a "size effect in lending," where small banks cater to small borrowers and large banks cater to large borrowers. The extant literature is more ambiguous about the net impact of bank consolidation on small borrowers. Some studies argue that the size effect in lending extends to mergers and show that merged banks, as they become larger, tend to increase the price or reduce the supply of lending to smaller borrowers.[11] Others find that scale economies, or increased competitiveness, lead to more lending to small borrowers after a merger.[12]

3.1 Estimating individual security and portfolio abnormal returns

We estimate daily abnormal returns using market model regressions. We regress the daily returns for firm j, r_{jt}, on a measure of the market return, r_{mt}, and a set of daily event dummies, δ_{jkt}, that take the value of one when day t is inside the event window and zero otherwise,

$$r_{jt} = \alpha_j + \sum_{i=-3}^{3} \beta_{ij} r_{mt+i} + \sum_{k=-7}^{7} \gamma_{jk} \delta_{jkt} + \varepsilon_{jt}, \quad t = \text{-192, -169, ..., 72.} \qquad (1)$$

Dates inside the event window are indexed by k. We allow our event window to contain up to 15 trading days (three weeks). The coefficients γ_{jk} measure daily abnormal returns during the event period. The market model is estimated over a 265-day period starting 192 days before the event and ending 72 days after the event**.**

[11] See Berger and Udell (1996), Peek and Rosengren (1996) and Sapienza (2002). Berger, Demsetz, and Strahan (1999) provide a complete review of studies of the impact of bank consolidation.

We consider three proxies for the market return—a value-weighted index of all OSE stocks, an equally-weighted OSE index, and a world market index.[13] The main results in our paper are similar using each of these benchmarks, so we report statistics for only the value-weighted OSE index. Because non-traded stocks are fairly common on the OSE, we include three lead and three lagged market returns to correct for non-synchronous trading (see Scholes and Williams (1977)). Our returns data are based on transaction, as opposed to quoted, prices. However, for some of the smaller stocks in our sample, it is not unusual for them to go untraded for days at a time. Although we do not have a daily measure of trading volume for each stock, when a stock has no trades, its return is reported as exactly zero. To filter out cases where stocks are traded infrequently, we discard firms (1) that have a return exactly equal to zero in 100 or more days out of the 265-day estimation window or (2) that have a return exactly equal to zero in 5 or more days out of the 15-day event window (-7,+7).

For each firm, we calculate cumulative abnormal returns (CARs) by adding daily abnormal return estimates $\hat{\gamma}_{jk}$. To summarize CARs across a given set of firms, we calculate sample averages of the CARs across the firms and report t-statistics based on the standard deviation of the CARs across those firms. We report CARs for two different event windows, the announcement day by itself [AR(0)], and the four-day period up to and including the announcement day [CAR(-3,0)].[14]

Before analyzing the abnormal returns to borrowers, it is helpful to first consider the abnormal returns for banks around bank merger announcements. Following the methodology of much of the

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[12] See Strahan and Weston (1998), Berger, Saunders, Scalise, and Udell (1998) and Black and Strahan (2002).

[13] The world market index is a value-weighted portfolio of *Datastream* total return indices for the U.S., Japan, U.K., and Germany.

[14] To date, bank merger event studies have focused on the share responses of banks, but the literature has not come to a consensus agreement on which event window best captures the real economic effect. For example, James and Wier (1987) use AR(-1), AR(0), CAR(-1,0), CAR(-4,0), CAR(-15,0), and CAR(-15,+15); Cornett and De (1991) consider each day from –15 to +15; Houston and Ryngaert (1994) use an event window that starts four days prior to the first announcement of an intention to merger and ends on the merger agreement date; Becher (2000) uses CAR(-30,+5); and Kane (2000) uses AR(0).

literature on bank mergers, we focus on bank merger events that were eventually completed, but we also report results for all announced mergers, including those that were eventually abandoned. Table 3 presents average CARs for banks separated into target, acquirer, and rival groupings. Of the 22 bank merger announcements that were eventually completed, we are able to estimate CARs for 14 acquiring banks and 8 target banks. The other acquiring and target banks were not publicly traded at the time of the merger announcement. The abnormal returns for rival banks are based on average CARs for OSE-traded banks not involved in the announced merger. The abnormal return patterns in Table 3 are similar to those documented in the extant literature. The average CAR for target banks is a positive and statistically significant 10.84 percent on the announcement day and 24.89 percent over the four days up through and including the announcement date. Acquiring and rival banks both have average CARs very close to zero, and although not statistically significant, bank mergers may result in a negative share price reaction for acquiring banks.

Under each of the three bank type groupings, we also separate average bank abnormal returns by the size of the acquiring and target banks: Large-Large, Large-Small, and Small-Small. "Large" banks have assets at least as large as the fifth largest Norwegian bank (our sample includes foreign banks), measured in the year prior to the merger announcement. All other banks are considered "Small." Although the association is not exact, there is a close link between our three bank size categorizations and changes in market concentration as measured by the HHI of customer relationships. As shown in the appendix, Large-Large mergers typically correspond to large increases in market concentration, Large-Small mergers create medium changes in market concentration, while Small-Small mergers result in little, if any, change in concentration. Therefore, breaking the mergers into these three categories provides a rough idea of the impact of changes in market concentration on

bank and borrower stock prices.[15]

There appears to be substantial cross-sectional variation in target bank CARs when grouped by merger size. The average target bank CAR(-3,0) for Large-Large and Large-Small mergers is substantially higher than the average CAR(-3,0) for Small-Small mergers. However, we have valid target bank return data for only one completed and three aborted Small-Small bank mergers, so the abnormal return estimate for this segment of banks is imprecise.

3.2 Average share price reaction of borrowers

As illustrated in the appendix, many of the bank mergers in our sample involve few, if any, publicly-traded target borrowers because the target banks are often small. Moreover, although acquiring borrower observations are spread evenly throughout the data set, target borrowers are not. Out of the 78 completed target borrower observations, 66 are associated with three Large-Large merger events. The small sample of targets outside of Large-Large mergers limits the statistical power of some of the tests. However, our sample compares favorably to other studies of borrower stock price reactions to news concerning bank's durability. For example, in their study of borrowers' reactions to bank announcements of distress, Slovin, Sushka, and Polonchek (1993) establish their main result that corporate borrowers are bank stakeholders whose welfare is tied to their affiliated bank's durability using a sample of one bank and 29 borrowers. In addition, many of our results are robust when using all announced mergers, which contain substantially more observations.

[15] For highly concentrated industries, the U.S. Department of Justice considers any merger resulting in an increase of HHI larger than 100 as "likely to create or enhance market power or facilitate its exercise" (see Section 1.51(c), U.S. Department of Justice *Merger Guidelines* (1992)). In our sample, Large-Large mergers typically result in changes to HHI greater than 100, Large-Small mergers result in changes to HHI from 1 to 100, and Small-Small bank mergers typically result in changes to HHI between 0 and 1. Several Large-Large mergers do not result in a large change in our measure of HHI. For example, the Den norske Bank acquisition of Postbanken, announced on 3/23/99, resulted in no measured change in HHI because Postbanken, formerly Norway's postal bank, did not cater to exchange-listed firms. However, in terms of its total assets, Postbanken was one of the largest banks in Norway. Similarly, foreign acquiring banks, such as the Merita Nordbanken purchase of Christiania Bank (announced on 9/20/00), had little market presence prior to their takeover. Therefore, their impact on HHI was also minimal.

Table 4 reports the average event portfolio abnormal return for borrowing firms that maintain relationships with merging and rival banks for completed and all announced mergers separately. "Small" ("Large") borrowers are those ranked below (at or above) median sales in the year prior to the bank merger announcement. Announcement-day abnormal returns indicate that on average, borrowers of acquiring and rival banks experience little share price reaction, while target borrowers experience a statistically significant decline in value of 0.76 percent.

The average effect on target borrowers is driven primarily by the reaction of small target borrowers in Large-Large mergers. These borrowers experience an abnormal return of –1.77 percent on the day the merger is announced and have a CAR(-3,0) of -1.22 percent. Small target borrowers fare better in smaller mergers, earning an abnormal return that is typically positive but not statistically different from zero. Large target borrowers earn abnormal returns that are not consistently of one sign and are statistically insignificant, suggesting that these borrowers remain unaffected by the merger announcement.

While small target borrowers suffer in Large-Large mergers and earn zero abnormal returns in smaller mergers, small acquiring borrowers earn positive and statistically significant abnormal returns in smaller mergers and earn zero returns in Large-Large mergers. For example, acquiring borrowers earn an average CAR(-3,0) of 1.02 percent in Large-Small mergers, 5.09 percent in Small-Small bank mergers, and a statistically insignificant CAR(-3,0) of 0.34 percent in Large-Large mergers. Thus, like small target borrowers, small acquiring borrowers fare relatively better in smaller mergers. But unlike small target borrowers, small acquiring borrowers appear to actually benefit from the smaller mergers and remain unaffected by the larger mergers.

Borrowers of rival banks appear to earn positive and significant CARs over the (-3,0) window

in the sample of completed mergers. This effect is concentrated in the large rival firms. While the estimates could indicate that large rival firms gain in mergers, we are suspicious of these estimates. The rival firm results disappear when we move to the larger sample of all announced mergers. Moreover, though not reported, the rival firm results are also not robust to measuring abnormal returns against the equally-weighted OSE index.

These borrower abnormal returns around bank merger announcements provide a new twist to the size effect in lending stories that are common in the literature. On one hand, our estimates are consistent with the findings of Sapienza (2002) and Berger and Udell (1996) that show that small borrowers can be harmed in Large-Large bank mergers and helped in smaller bank mergers. On the other hand, our results are inconsistent with a simple size effect in lending explanation where all small borrowers are hurt by large mergers. We find that the borrower's association with the merging bank is an important determinant to the welfare effect on the borrower. Small acquiring borrowers appear not be harmed in Large-Large bank mergers, while small target borrowers experience significant reductions to their stock price in these mergers.

4. Borrower Welfare and the Propensity to Switch

Merger-induced changes in strategy, personnel, or location could impair valuable lending relationships that have been cultivated over time, but the damage done to a borrowing firm from relationship disruption ultimately depends on how easy (costly) it is for the firm to switch banking relationships. If bank mergers are damaging to firms, borrowers with low switching costs should experience higher merger-induced abnormal returns than borrowers with high switching costs. Fama (1985), Sharpe (1990), and Rajan (1992) argue that switching costs are lower for firms with alternative sources of financing or that can easily communicate their value to a new lender.

So far, we have sorted borrower abnormal returns by bank affiliation, borrower size and merger size—variables found to be relevant in the bank merger literature. In this section, we investigate the influence of switching behavior on borrower welfare. We first examine the termination behavior of borrowers by simply calculating the termination and delisting rates observed after a merger. We then model the termination behavior more formally using a hazard function specification that depends on the duration of a bank relationship and other firm- and relationship-specific characteristics. From this hazard model, we calculate a borrower's "termination propensity," which serves as a proxy for borrower switching costs. Abnormal returns are regressed on firm characteristics, merger characteristics, and termination propensity to analyze the influence of switching costs on borrower welfare.

Our analysis is complicated by the fact that a bank merger itself can have a direct effect on relationship termination rates. Bank mergers may serve as a natural time to re-evaluate lending relationships, and the welfare consequences of merger-induced changes in termination behavior are unclear. For instance, as Sapienza (2002) argues, higher post-merger exit rates by borrowers could indicate that new bank management forces some borrowers out and that these borrowers are injured accordingly. Conversely, if the services at the merged bank decline or become more costly, exit rates could increase as firms with low switching costs leave for a more favorable alternative. In the former case, those forced to leave the bank are worse off than those firms that remain. In the latter case, borrowers that leave the bank are better off than those that stay. To address this issue empirically, we examine how a merger's influence on termination rates is related to borrower abnormal returns.

4.1 Simple termination rates

To generate a basic view of how borrowing firms are affected by completed bank mergers,

Table 5 presents simple termination and delisting rates over the four-year period beginning in the year of the merger, broken down by bank affiliation, merger type, and firm size.[16] Since bank relationships are reported on a calendar year basis, we cannot isolate the exact date that relationships terminate. If a bank merger occurs in year t, we count all terminations (and delistings) that occur in years t, t+1, t+2, and t+3 as potentially influenced by the merger. We estimate the "percentage terminated (delisted) over 4 years" as the total number of relationships terminating (delisting) in either the same calendar year as the merger or the subsequent three years, divided by the total number of relationships maintained by all borrowing firms in the year each merger was completed.[17] The number of borrowing firms reported in the fourth column of Table 5 is different from the number reported in the second column of Table 4 because in Table 5, firms are not required to have valid stock return data.

Borrowers of both acquiring and target banks have slightly lower termination rates (18.6 and 20.3 percent) than rival borrowers (23.2 percent), though this difference is quite small. Consistent with Ongena and Smith (2001), small borrowers have higher termination rates than large borrowers for each bank affiliation category. Small target borrowers have an unusually low termination rate of 11.3 percent in Large-Large mergers, and an unusually high termination rate of over 60 percent in Large-Small and Small-Small mergers, though these last two categories have fewer than ten relationships each. A muted but similar pattern is evident in the termination rates of small acquiring borrowers.

Finally, we can compare the termination rate for relationships with banks that are involved in the merger versus the termination rate for relationships that borrowing firms have with other banks not

[16] In this analysis, a borrowing firm is considered delisted in year t if the firm is included in year t-1's *Kierulf's Handbook* but not in year t's *Kierulf's Handbook*. A borrowing firm's bank relationship is considered terminated in year t if the relationship is reported in the year t-1's *Kierulf's Handbook,* the firm is included in year t's *Kierulf's Handbook,* but the bank relationship is not listed for the firm in year t.

[17] For bank mergers that are completed in 1998, 1999, and 2000, the relationship data ends before the four year period is over. We control for this right censoring problem by adding one to the numerator and denominator of the percentage

involved in the bank merger. This comparison may be useful to verify Sapienza's (2002) conjecture that small target borrowers are effectively kicked out by the merged bank. For small target borrowers in Small-Small mergers, relationships with merging banks are terminated more frequently than relationships with other banks (75 versus 50 percent). This supports Sapienza's (2002) conjecture, but the limited sample size of four relationships in each group makes the result only suggestive. For most of the other categories including small target borrowers in Large-Large bank mergers, relationships with other banks are terminated at a higher rate than relationships with merging banks.

4.2 Hazard model estimation of termination behavior

We model borrower termination behavior using time-varying, proportional hazard models.[18] The hazard model offers two distinct advantages over the simple termination rates. First, it allows us to control for variation in termination rates due to a variety of firm and merger-specific variables within a multiple regression framework. Second, it provides a convenient method for adjusting for the censoring bias induced by firms that delist during the sample period. We use hazard functions to estimate the probability that a firm will switch banks, conditional on the incumbent relationship surviving through some date t. Greenbaum, Kanatas, and Venezia (1989), Sharpe (1990), and Rajan (1992) argue that switching costs will be related to the amount of time a firm has spent in a bank relationship. The proportional hazard function conveniently summarizes the connection between relationship duration and the likelihood of terminating the relationship, and allows for other explanatory variables to independently influence the switching decision. Our specification assumes that the time spent in a bank relationship can be described by a Weibull distribution. The Weibull is

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when a firm terminates (delists). If a relationship remains intact but is censored after $x < 4$ years, then the denominator is increased by x/4.

[18] Kalbfleisch and Prentice (1980) and Lancaster (1990) provide a thorough introduction to hazard rate estimation.

common to hazard rate specifications because it allows for switching likelihood to depend monotonically on duration through a single parameter, α. When $\alpha > 1$ (< 1), the distribution is said to exhibit positive (negative) duration dependence, implying that the conditional likelihood of terminating a relationship increases (decreases) in relationship duration.

We measure the duration of a bank relationship as the number of consecutive years a firm lists a bank in *Kierulf's Handbook* between 1979 and 2000, and a switch to occur when the firm drops or replaces the bank on the list. In the absence of censored observations, the proportional hazard model is easily estimable using maximum likelihood methods. However, two types of censoring are present in our data, one due to the start and end points of our sample period, and the other due to listing and delisting of firms on the OSE. Bank relationships that begin before 1979 or before a firm is listed on the OSE introduce left censoring. Bank relationships that continue after 1995 or after a firm delists introduce right censoring. Without adjusting for censoring, maximum likelihood estimation of proportional hazard models produces biased and inconsistent estimates of model parameters. To account for right censoring, we estimate the log-likelihood function as a weighted average of the sample density of duration spells and the survivor function for uncompleted spells.[19]

4.3 Estimates of termination behavior

Table 6 reports four hazard rate regressions. The specifications trade off parsimony with completeness and emphasize the impact of bank mergers on the termination rate. We first include three borrower-specific control variables studied by Ongena and Smith (2001) that should be related to borrower switching costs. Each variable is measured at the end of the year prior to termination. *Ln*

[19] Directly controlling for left censoring is less straightforward. In economic duration analysis, it is common to ignore left censoring (see Kiefer (1988)). However, Heckman and Singer (1984) argue that biases induced by left censoring can be as severe as biases stemming from right censoring. Ongena and Smith (2001) find that the hazard rate specification of bank relationship duration that uses the same Norwegian data as this paper remains robust to left censoring.

Sales measures the size of the firm in terms of the natural logarithm of sales, adjusted to 1999 Norwegian Kroner. Because large firms are often followed by multiple analysts, covered by newspapers, and listed on foreign stock exchanges, these borrowers are less likely to have problems credibly communicating their value to potential new investors than small firms. *Profitability* is the ratio of firm earnings before interest and taxes to the book value of assets, included as a proxy for the level of internal cash flows. Firms with higher internal cash flows should be less dependent on any one bank's financing, making switching easier. *Multiple Relationships* is a dummy variable that equals one if a firm maintains more than one simultaneous bank relationship and zero otherwise. Firms with multiple bank relationships have more than one potential source of inside bank financing and therefore face lower switching costs.

Next, we include indicator variables relevant to the bank merger activity. *Merger* takes the value of one when a firm maintains a relationship with a bank that completes a merger, in the year of the merger and up to three years following the merger. Otherwise *Merger* takes the value of zero. Both researchers and practitioners have argued that four years is a reasonable gestation period for restructuring to occur following a bank merger (see Berger *et al.* (1998), pp. 196-197). Therefore, our model limits the impact that the merger can have on a borrower's termination behavior to four years. Though not reported in the tables, we have estimated hazard models that do not limit the gestation period of impact and the results are similar. We include three interaction variables that allow the impact of *Merger* to vary by the type and size of the merger, and by size of the borrower. *Target* equals one when the relationship is with the target bank. *Large-Large Bank* takes the value of one when both of the merging banks are as large – as measured by assets – as Norway's five largest banks. *Small Firm* equals one when a firm's sales is greater than or equal to the median-sized firm, measured

by sales in the year prior to termination. Finally, we include the indicator variable *Other Bank* that takes the value of one when an acquiring or target borrower also maintains a relationship with a bank not involved in the merger. In the spirit of Table 5, this variable allows us to benchmark the termination behavior of borrowers of merging banks against their non-merging relationships.

The estimates in Table 6 indicate that, holding duration constant, the likelihood of terminating a bank relationship decreases in firm size and is higher for multiple-bank firms. The estimate of α is greater than one, implying that the likelihood of ending a bank relationship increases in the duration of the relationship. Similar to Ongena and Smith (2001), these results suggest that the propensity to terminate is higher for small firms, firms with multiple bank relationships, and firms in relatively long-lived relationships.

Because *Merger* and *Merger*Target* are included together in all four specifications, the *Merger* variable estimates the effect of the merger on acquiring borrower termination rates, while the sum of the estimates on *Merger* and *Merger*Target* yields the impact of the merger on target borrower termination rates. The results across all models in Table 6 suggest that bank mergers do not influence the termination behavior of borrowers of acquiring banks. The estimates are small in magnitude and not statistically significant.

By contrast, bank mergers significantly increase the likelihood that target borrowers will terminate a relationship. For example, using Model (1), a borrower that is not involved in a bank merger, but is otherwise endowed with characteristics similar to the median target borrower (see Table 2), has a 6.7 percent chance of terminating a relationship in any given year. But a similar firm that is also involved as the borrower of a target bank has an 11.5 percent chance of terminating. That is, the occurrence of the merger doubles the probability that the borrower exits the relationship.[20] This

[20] The fitted probabilities are calculated as $\exp(\hat{\beta}' x)$, where x represents the right-hand side variables in the hazard model.

merger-induced increase in target borrower termination rates is not evident in the simple termination rates of Table 5, most likely because the simple rates do not adjust for the censoring bias created by firm delistings.[21] The results in Model (2) do support the finding in Table 5 that acquiring and target borrowers terminate other relationships about as often as their merging relationships. We cannot reject the hypothesis that the estimates on *Other Bank* and *Other Bank*Target* are different from their *Merger* counterparts.

Model (3) indicates that small and large firms are equally likely to terminate relationships. The estimates on *Merger* Small Firm* and *Merger*Target*Small Firm* are both statistically indistinguishable from zero. The estimates in Model (4) imply that most of the increase in target borrower terminations occurs in Large-Small and Small-Small mergers. In fact, the fitted estimates imply that the likelihood that a target borrower terminates a Large-Small or Small-Small merger is 26.9 percent compared with 10.3 percent for Large-Large mergers! Taken together with the event study results in Table 4, this suggests that merger-induced termination rates are highest in mergers where small borrowers experience the highest abnormal returns. We explore such possibilities more formally in the next section.

4.4 Borrower welfare and switching behavior

Table 7 reports regressions that investigate the cross-sectional variation in individual borrower abnormal returns. The cross-sectional regressions include explanatory variables that measure a firm's dependence on its incumbent bank's financing. The specifications also split forecasted hazard rates into a pre-merger component that includes the influence of firm, relationship, and market-wide

[21] The censoring imparts a negative bias in the simple termination rates that increases in magnitude as delisting rates increase.

variables on termination behavior, and a component that incorporates merger-induced changes to the hazard rate. For each regression, the dependent variable is the borrower CAR generated from the market model in equation (1) on a firm-by-firm basis. We include estimates using both AR(0) and CAR(-3,0) as measures of the dependent variable. Results are reported for both acquiring and target borrowers, and across both the completed merger and announced merger samples, reported in Panels A through D.

The regressions utilize seven explanatory variables, grouped into two categories. The first category contains three firm-specific control variables, *ln Sales*, *Profitability*, and *Multiple Relationships*, motivated in Section 4.3 as proxies for a firm's dependence on financing from its bank. The second category uses two variables based on Model (4) of Table 6 to generate firm-level forecasts of the hazard rate. *Termination Propensity* captures the estimated pre-merger switching rate and proxies for how easily a borrower can switch bank relationships. It is calculated as the fitted value of the conditional probability obtained from setting each variable (*ln Sales*, *Profitability*, *Multiple Relationships*) and relationship duration equal to the specific borrower's values in the year prior to the announcement and *Merger* equal to zero. *ΔTermination Propensity* captures the merger-induced change in switching rates and is estimated as the difference between *Termination Propensity* and the fitted post-merger hazard rate that sets *Merger* equal to one and includes the relevant values for *Target* and *Large-Large Bank*. Because the firm-specific and merger-specific control variables also appear in the forecast models for *Termination Propensity* and *ΔTermination Propensity*, their inclusion is meant to measure any additional impact that merger size has on borrower welfare that is unrelated to the propensity to terminate.

The results across the panels in Table 7 can be summarized as follows. First, the overall fit of

the cross-sectional models is relatively poor, with adjusted R^2s varying between –1.9 percent and 6.8 percent. Second, regressions involving acquiring borrowers produce cross-sectional results on the first three proxies for a firm's dependence on bank financing that are roughly consistent with intuition – firms that are profitable, and firms that have multiple bank relationships, earn higher announcement-period abnormal returns. However, these results do not extend to target borrowers. Third, in line with Table 4, acquiring and target borrowers perform more poorly in Large-Large mergers than in Large-Small and Small-Small mergers. Fourth, and perhaps most importantly, target borrower abnormal returns (and to a lesser extent, acquiring borrowers) are positively related to *ΔTermination Propensity*, the merger-induced change in the propensity for a borrower to terminate a relationship. In other words, borrower abnormal returns are highest when the borrower can easily terminate its bank relationship after a merger.

The last result has several implications. First, the result is consistent with theories that argue that high switching costs can be detrimental to a borrower's welfare. For instance, Sharpe (1990) and Rajan (1992) argue that high information costs can "lock in" some borrowers into bank relationships. Such borrowers may become more locked in as larger mergers increase the concentration of the market increases and the firm finds fewer banks to switch to. These borrowers are thus more likely to be harmed by the potential change in a relationship brought on by a merger. Second, the result is driven by the relative impact of Large-Large mergers on the performance and behavior of small borrowers. Both acquiring and target borrowers perform better in the smaller mergers than in the large mergers. They are also more likely to exit the smaller mergers. Third, our results are not completely consistent with a lock-in story because target borrowers actually exit *all* mergers more frequently than similar borrowers at non-merging banks, though their termination rate is relatively greater in smaller mergers.

A straightforward lock-in story would imply that termination rates of target borrowers (at least small target borrowers) actually decline after a merger.

5. Conclusion

We directly estimate the impact of bank mergers on borrower welfare by analyzing the share price reactions of corporate borrowers in Norway to the announcement that their banks are merging. We also analyze the influence of bank mergers on the switching behavior of borrowers and relate the borrower's propensity to terminate a bank relationship to its announcement-day abnormal return. The Norwegian firms in our study are small by U.S. standards (about 60 percent of them would be in the smallest size decile based on 1996 NYSE market capitalization breakpoints) but are large compared to the privately-held firms examined by Sapienza (2002). Like small- and medium-sized firms in the U.S., most Norwegian firms operate in an environment where bank credit is the predominant form of commercial debt finance, and most firms receive credit from only one bank. In this respect, Norway is a bank-dominated country. Yet, Norway has followed a similar deregulatory path to the U.S. Moreover, current regulatory and legal restrictions keep significant control rights out of the hands of banks. Therefore, the institutional setting in Norway is more similar to that in the United States than other "bank-centered" economies like Japan and Germany.

We find three main empirical results. First, target borrowers experience an average stock price decline of 0.76 percent on the announcement of bank mergers that are eventually completed. Small borrowers of target banks appear not to be harmed in mergers between two small banks, gaining a statistically insignificant 4.7 percent for CAR(-3,0). The relative welfare patterns appear similar for acquiring borrowers. Their performance is higher in small mergers, where they earn positive and statistically significant abnormal returns, than in large mergers, where they earn zero abnormal returns,

on average. The fact that small borrowers of acquiring banks do better, on average, than small borrowers of target banks suggests that borrowers are injured by a change in strategic focus of the newly-merged bank (see Peek and Rosengren (1996) and Walraven). The patterns in borrower abnormal returns are not consistent with a standard market power story of merger gains to banks. In particular, neither borrowers of acquiring banks nor rival banks appear to suffer upon the announcement of a large bank merger.

Second, borrowing firms of target banks tend to terminate relationships more often in the four-year period during and after a bank merger, especially when the merger is relatively small. When a bank merger occurs, both merging banks and borrowers may consider it an opportune time to re-evaluate and perhaps terminate their existing relationships.

Third, target and acquiring borrowers that experience larger merger-induced increases in termination rates enjoy higher announcement abnormal returns, suggesting that relationship disruption caused by bank mergers has less of an adverse effect on firms that switch banks more frequently. This is suggestive of lock-in explanations where firms that cannot switch relationships are harmed more. Why do some small firms choose to borrow from large banks while others select small banks? Answering this question may help us understand why small target borrowers are hurt in Large-Large mergers but not in Large-Small or Small-Small mergers.

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Table 1

Annual overview of sample consolidation activity and relationship turnover, 1983-2000.

The total number of sample banks includes all banks with connections to firms listed on the Oslo Stock Exchange (OSE). Announced bank mergers include all announced intentions by sample banks to merge, while completed bank mergers are those that are successfully completed. Data sources include newspaper articles from *Dagens Næringsliv*, *Aftenposten*, and those compiled through *Dow Jones Interactive,* annual reports of the Banking, Insurance, and Securities Commission (BISC) of Norway, and *Kierulf's Handbook*. Firms reporting bank relationships includes all OSE firms that report at least one bank relationship in *Kierulf's Handbook*. The Herfindahl-Hirschman Index (HHI) is based on the number of relationships each bank maintains with sample firms at the end of the year.

Year	Total number of sample banks	Announced bank mergers	Completed bank mergers	Firms reporting bank relationships	Total number of relationships	Number of new relationships	Number of relationships terminated	Industry concentration as measured by HHI
1983		1	1	100		3	5	
1984	24	1	1	115	166	5	5	2,050
1985	27	0	0	140	189	7	9	2,003
1986	26	0	0	138	185	5	19	1,998
1987	26	2	2	133	177	16	15	1,961
1988	23	1	1	125	167	11	14	2,029
1989	19	4	2	113	156	15	16	2,267
1990	18	7	5	110	143	10	10	3,258
1991	17	0	0	100	134	13	7	3,230
1992	17	4	2	105	140	12	19	2,903
1993	17	3	1	101	133	9	11	3,262
1994	18	1	0	106	138	3	5	3,135
1995	20	4	1	113	150	14	10	2,984
1996	18	6	1	99	131	6	6	2,903
1997	23	4	0	129	168	13	3	2,837
1998	25	5	2	160	205	20	26	2,625
1999	29	4	3	172	216	37	18	2,636
2000	34	1	0	158	203	34	5	2,388
Average								

Table 2

Summary statistics for merging banks and borrowing firms maintaining relationships with merging banks.

Reports summary statistics for merging banks and customers listed on the OSE. All variables are calculated at the end of the year prior to the merger announcement and are collected from *Kierulf's Handbook,* OSE databases, or company annual reports. Complete financial accounting information is available for 39 acquiring banks, 24 target banks, 643 customers of acquiring banks, and 210 customers of target banks. Market values, sales, and asset values are stated 1999 Norwegian Kroner (kr). Kr 1 ≅ $0.125 in 1999. *Profitability* is the ratio of operating income to book value of assets, stated in percentage terms. *Multiple Bank Relationships* equals one when a firm maintains more than one bank relationship and zero otherwise. *Termination Propensity* is the estimated likelihood that a firm leaves a bank relationship in the year prior to the bank merger. *ΔTermination Propensity* is the estimated change to *Termination Propensity* due to merger of the borrowing firm's bank. Estimated values of *Termination Propensity* and *ΔTermination Propensity* are calculated using Model (4) of Table 6.

	Acquirers				**Targets**			
	Mean	Median	25th Percentile	75th Percentile	Mean	Median	25th Percentile	75th Percentile
Banks								
Market Value of Equity (millions kr)	2,129	1,414	864	2,412	574	350	209	528
Book Value of Assets (millions kr)	164,246	103,787	35,119	165,472	32,930	19,775	7,247	37,918
Borrowing Firms								
Sales (millions kr)	4,085	1,195	292	4,046	3,996	703	233	3,655
Profitability (%)	4.29	5.85	0.60	10.43	2.48	4.76	0.16	9.73
Multiple Bank Relationships	0.42	0.00	0.00	1.00	0.34	0.00	0.00	1.00
Termination Propensity (%)	6.11	5.90	4.87	7.08	5.98	6.86	4.76	6.82
ΔTermination Propensity (%)	-0.66	0.10	-1.58	0.14	2.97	0.96	0.76	1.16

Table 3

Cumulative abnormal returns for banks by merger type.

Percentage cumulative abnormal returns (CARs) for OSE-listed borrowing firms are estimated around the announcement of bank mergers using the value-weighted OSE index in the market model. To be included in the sample, banks must have non-zero returns in at least 150 out of the 265-day market model estimation window (-192, +72), and in at least 10 out of 15 days in the event window (-7, +7). "Large" banks have assets at least as large as the fifth largest Norwegian bank in the year before the merger announcement, and all other banks are designated as "Small."

		Completed mergers			Announced mergers		
Category		Number of events	AR(0)	CAR (-3,0)	Number of events	AR(0)	CAR (-3,0)
Acquiring banks		14	-0.59	-1.24	33	-0.11	0.34
	Large-Large Bank	3	-1.47 *	-2.70	8	-0.85	-0.18
	Large-Small Bank	9	-0.88	-1.62	18	-0.55	-0.39
	Small-Small Bank	2	2.00	2.65	7	1.85	2.70
Target banks		8	10.84 *	24.89 **	27	7.11 ***	14.38 ***
	Large-Large Bank	3	9.19	16.89	10	7.48 **	12.14 ***
	Large-Small Bank	4	13.44	35.69 *	13	8.81 ***	19.84 ***
	Small-Small Bank	1	5.31	5.67	4	0.64	2.25
Rival banks		22	0.06	0.29	48	0.15	0.35 *
	Large-Large Bank	4	-0.07	1.40	14	0.18	0.89 **
	Large-Small Bank	13	0.35	0.36	22	0.40	0.38
	Small-Small Bank	5	-0.58	-0.78	12	-0.34	-0.22

*** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Table 4

Cumulative abnormal returns for borrowing firms by merger type.

Percentage cumulative abnormal returns (CARs) for OSE-listed borrowing firms are estimated around the announcement of bank mergers using the value-weighted OSE index in the market model. To be included in the sample, firms must have non-zero returns in at least 150 out of the 265-day market model estimation window (-192, +72), and in at least 10 out of 15 days in the event window (-7, +7). "Large" banks have assets at least as large as the fifth largest Norwegian bank in the year before the merger announcement, and all other banks are designated as "Small." Borrowing firms are split into "Large" and "Small" categories using median sales in the year prior to the merger announcement as the breakpoint.

	Completed mergers				Announced mergers			
Category	Number of events	Number of firms	AR(0)	CAR (-3,0)	Number of events	Number of firms	AR(0)	CAR (-3,0)
Borrowers of acquiring banks	18	342	0.29	0.36	39	643	0.17	0.29
Large firms	16	217	0.19	0.03	35	409	0.13	0.15
Large-Large Bank	3	57	0.53	-0.09	12	170	0.17	0.09
Large-Small Bank	11	157	0.06	0.10	20	235	0.10	0.21
Small-Small Bank	2	3	0.49	-1.43	3	4	0.18	-0.78
Small firms	15	125	0.47	0.94 **	33	234	0.23	0.54
Large-Large Bank	2	44	-0.46	0.34	9	107	-0.76	-0.49
Large-Small Bank	11	76	1.00 *	1.02 *	20	119	0.82 *	1.03 *
Small-Small Bank	2	5	0.53	5.09 **	4	8	4.76	7.04 **
Borrowers of target banks	12	78	-0.76 **	-0.09	24	210	-0.45 **	-0.02
Large firms	6	44	-0.39	0.12	17	120	-0.30	0.03
Large-Large Bank	3	41	-0.12	0.04	12	115	-0.22	-0.04
Large-Small Bank	2	2	-0.51	2.47	3	3	0.75	0.93
Small-Small Bank	1	1	-11.3	-1.02	2	2	-5.94	2.49
Small firms	10	34	-1.24 **	-0.36	21	90	-0.64	-0.07
Large-Large Bank	3	25	-1.77 ***	-1.22 *	12	79	-0.87 **	-0.34
Large-Small Bank	4	5	0.36	-0.11	4	5	0.36	-0.11
Small-Small Bank	3	4	0.06	4.75	5	6	1.54	3.41
Borrowers of rival banks	22	1,515	0.06	0.30 **	48	3,389	-0.02	0.04
Large firms	22	821	0.04	0.54 ***	48	1,828	-0.02	0.13
Large-Large Bank	4	121	0.22	0.32	14	429	-0.04	0.00
Large-Small Bank	13	460	-0.16	0.53 **	22	844	-0.14	0.24 *
Small-Small Bank	5	240	0.33 *	0.66 ***	12	555	0.18 *	0.07
Small firms	22	694	0.09	0.02	48	1,561	-0.02	-0.07
Large-Large Bank	4	131	0.62	0.99	14	446	-0.06	0.04
Large-Small Bank	13	393	-0.13	-0.34	22	716	-0.15	-0.36 **
Small-Small Bank	5	170	0.19	0.08	12	399	0.25	0.34

*** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Table 5

Unconditional four-year termination and delisting rates by borrowing firms.

The percentage of all borrowing firms terminating and delisting over the four years following completed mergers are calculated. These percentages are estimated as the total number of relationships terminating (delisting) in either the same calendar year of the merger or the subsequent three years, divided by the total number of relationships maintained by all borrowing firms in the year of the merger. We adjust for right censoring created by the end of the sample period (i.e, for firms that are not observed for an entire four-year period because the data ends in 2000) by adding one to the numerator and denominator of the percentage when a firm terminates (delists). If a relationship remains intact but is censored after $x < 4$ years, then the denominator is increased by $x/4$. "Large" banks have assets at least as large as the fifth largest Norwegian bank in the year before the merger announcement, and all other banks are designated as "Small." Borrowing firms are split into "Large" and "Small" categories using median sales in the year prior to the merger announcement as the breakpoint.

Category Average	Number of Relationships	Percentage terminated over 4 years	Percentage delisted over 4 years	Number of relationships with merging banks	Percentage terminated over 4 years	Number of relationships with other banks	Percentage terminated over 4 years
Borrowers of acquiring banks	670	18.6	22.4	446	18.1	224	19.7
Large firms	431	17.2	22.9	243	16.0	188	18.6
Large-Large Bank	93	14.6	42.3	61	13.0	32	17.4
Large-Small Bank	328	17.9	18.9	178	17.0	150	18.9
Small-Small Bank	10	10.0	20.0	4	0.0	6	16.7
Small firms	239	21.3	21.4	203	20.6	36	25.8
Large-Large Bank	68	9.6	29.1	57	8.4	11	16.7
Large-Small Bank	163	24.2	20.3	133	24.0	24	25.0
Small-Small Bank	8	25.0	0.0	7	14.3	1	100
Borrowers of target banks	193	20.3	29.0	120	20.1	73	20.6
Large firms	127	18.1	27.8	70	17.1	57	19.2
Large–Large Bank	114	17.3	25.1	65	14.8	49	20.5
Large–Small Bank	7	28.6	42.9	3	33.3	4	25.0
Small–Small Bank	6	16.7	50.0	2	50.0	4	0.0
Small firms	66	24.9	31.2	50	24.3	16	26.7
Large-Large Bank	53	11.3	33.6	41	10.6	12	13.8
Large-Small Bank	5	63.2	22.2	5	63.2	0	NA
Small-Small Bank	8	62.5	25.0	4	75.0	4	50.0
Borrowers of rival banks	2,753	22.9	23.2				
Large firms	1,476	20.2	24.0				
Large-Large Bank	231	22.3	29.9				
Large-Small Bank	827	19.3	23.3				
Small-Small Bank	418	21.1	22.7				
Small firms	1,277	26.0	22.4				
Large-Large Bank	234	25.2	24.1				
Large-Small Bank	713	25.7	23.8				
Small-Small Bank	330	27.0	20.6				

Table 6

Weibull specifications of bank relationship termination rate by borrowing firms.

Estimates of a time-varying, proportional hazard Weibull model of relationship termination. *Ln Sales* is the log of end-of-year sales, deflated by the Norwegian CPI. *Profitability* is the ratio of earnings before interest and taxes to the book value of assets. *Multiple Relationships* takes the value of one when a firm maintains multiple bank relationships, and zero otherwise. *Merger* takes the value of one when a firm maintains a relationship with a bank that completes a merger, in the year of the merger and up to three years following the merger; otherwise *Merger* takes the value of zero. *Small Firm* equals one when a firm is smaller than the median firm, ranked annually by sales. *Large-Large Bank* equals one if the merger involves two large banks. A bank is "Large" if it is one of Norway's five largest banks, measured by assets in the year prior to the event. *Target* takes the value of one if the relationship is with the target bank. *Other Bank* takes the value of one when *Merger* = 1 and the borrower also maintains a relationship a non-merging bank. The estimate $\hat{\alpha}$ measures duration dependence, i.e., the relation between relationship duration and the conditional probability of terminating. Standard errors are reported in parentheses. The sample consists of 3132 relationship years (598 relationships).

Dependent Variable	(1)	(2)	(3)	(4)
Intercept	-2.213 ***	-2.173 ***	-2.133 ***	-2.272 ***
	(0.211)	(0.220)	(0.235)	(0.208)
Ln Sales	-0.083 ***	-0.088 ***	-0.093 ***	-0.070 ***
	(0.027)	(0.028)	(0.031)	(0.027)
Profitability	-0.176	-0.167	-0.170	-0.187
	(0.292)	(0.296)	(0.285)	(0.281)
Multiple Relationships	0.226 *	0.117	0.216 *	0.191
	(0.130)	(0.165)	(0.130)	(0.127)
Merger	-0.035	-0.051	0.034	0.019
	(0.134)	(0.136)	(0.168)	(0.140)
Merger*Target	0.581 ***	0.571 ***	0.581 **	1.358 ***
	(0.206)	(0.209)	(0.279)	(0.294)
Merger*Large-Large Bank				-0.295
				(0.235)
Merger*Target*Large-Large Bank				-0.962 **
				(0.429)
Merger*Small Firm			-0.145	
			(0.222)	
Merger*Target*Small Firm			-0.002	
			(0.407)	
Other Bank		0.213		
`		(0.192)		
Other Bank*Target		0.033		
		(0.315)		
$\hat{\alpha}$	1.212 †	1.207 †	1.212 †	1.237 †
	(0.087)	(0.088)	(0.087)	(0.088)
Median Duration	10.534	10.434	10.505	11.161
	(0.764)	(0.764)	(0.761)	(0.883)

† α=1 can be rejected at 1%. *** Significant at 1%. ** Significant at 5%. * Significant at 10%.

Table 7

Cross sectional estimation of cumulative abnormal returns: borrowing firms of acquiring and target banks.

The dependent variable is the percentage cumulative abnormal return (CAR) for individual borrowing firms measured around the merger announcement. *Ln Sales* is the log of end-of-year sales, deflated by the Norwegian CPI. *Profitability* is the ratio of earnings before interest and taxes to the book value of assets. *Multiple Relationships* takes the value of one when a firm maintains multiple bank relationships, and zero when a firm maintains a relationship with a single bank. *Large Firm* takes the value of one when the firm belongs to the top 50 of firms, ranked by sales, in the year before the event, and zero otherwise. *Termination Propensity* is the forecasted conditional termination rate in the year prior to the merger announcement calculated using the estimates from Model (4) in Table 6, the values of the variables from the year prior to the merger, and with *Merger* set to zero. *ΔTermination Propensity* measures the change in the conditional termination rate by setting *Merger* equal to one and incorporating the merger-specific information from Model (4) of Table 6. The completed mergers sample consists of 341 borrowers of acquiring banks and 78 borrowers of target banks, the announced mergers sample consists of 642 borrowers of acquiring banks and 210 borrowers of target banks. Standard errors are reported in parentheses.

Panel A: Borrowers of acquiring banks, completed mergers.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	AR (0)	AR (0)	AR (0)	AR (0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)
Intercept	0.654	2.494	0.713	1.197	0.133	3.410*	0.193	1.423
	(0.633)	(1.576)	(0.648)	(0.804)	(0.801)	(2.008)	(0.820)	(1.014)
Ln Sales		-0.207*				-0.270*		
		(0.122)				(0.155)		
Profitability		3.587***				0.467		
		(1.280)				(1.631)		
Multiple Relationships		0.243				-0.019		
		(0.462)				(0.588)		
Large Firm				-0.440				-1.046**
				(0.403)				(0.507)
Large-Large Bank			-0.284				-0.366	
			(0.395)				(0.500)	
Termination Propensity	-0.050	-0.123	-0.055	-0.090	0.052	-0.130	0.045	-0.045
	(0.097)	(0.140)	(0.097)	(0.104)	(0.123)	(0.178)	(0.123)	(0.131)
ΔTermination Propensity	0.140	0.043		0.170	0.223	0.216		0.294
	(0.202)	(0.204)		(0.204)	(0.256)	(0.259)		(0.257)
Adjusted-R^2	-0.004	0.015	-0.004	-0.003	-0.003	0.002	-0.004	0.006

Table 7 (continued)

Panel B: Borrowers of target banks, completed mergers.

Model	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Dependent Variable	AR (0)	AR (0)	AR (0)	AR (0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)
Intercept	0.047	-0.696	-0.071	1.197	-0.083	-2.609	2.149	-1.437
	(1.175)	(2.444)	(1.317)	(1.423)	(1.429)	(2.968)	(1.620)	(1.728)
Ln Sales		0.015				0.171		
		(0.175)				(0.212)		
Profitability		2.539				2.191		
		(2.269)				(2.756)		
Multiple Relationships		-0.190				-0.236		
		(0.769)				(0.935)		
Large Firm				0.868				1.129
				(0.675)				(0.820)
Large-Large Bank			0.171				-2.279**	
			(0.850)				(1.047)	
Termination Propensity	-0.131	-0.034	-0.135	-0.053	-0.082	0.110	-0.050	0.020
	(0.181)	(0.247)	(0.182)	(0.190)	(0.220)	(0.300)	(0.224)	(0.231)
ΔTermination Propensity	0.001	0.004		0.014	0.103**	0.113***		0.120***
	(0.033)	(0.034)		(0.034)	(0.040)	(0.042)		(0.042)
Adjusted-R^2	-0.019	-0.043	-0.019	-0.011	0.058	0.039	0.036	0.069

Table 7 (continued)

Panel C: Borrowers of acquiring banks, all mergers.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	AR (0)	AR (0)	AR (0)	AR (0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)
Intercept	0.449	2.468**	0.654	0.653	0.633	4.859***	0.855	1.218
	(0.532)	(1.206)	(0.551)	(0.647)	(0.699)	(1.593)	(0.725)	(0.849)
Ln Sales		-0.227**				-0.392***		
		(0.094)				(0.125)		
Profitability		2.442***				1.252		
		(0.851)				(1.123)		
Multiple Relationships		0.971**				0.880*		
		(0.377)				(0.497)		
Large Firm				-0.180				-0.518
				(0.325)				(0.427)
Large-Large Bank			-0.632**				-0.753*	
			(0.301)				(0.397)	
Termination Propensity	-0.008	-0.123	-0.035	-0.022	-0.003	-0.257*	-0.039	-0.043
	(0.084)	(0.112)	(0.083)	(0.087)	(0.110)	(0.148)	(0.110)	(0.115)
ΔTermination Propensity	0.348**	0.043		0.352**	0.486**	0.400**		0.498**
	(0.152)	(0.153)		(0.153)	(0.200	(0.202)		(0.201)
Adjusted-R^2	0.005	0.025	0.004	0.004	0.004	0.018	0.003	0.007

Table 7 (continued)

Panel D: Borrowers of target banks, all mergers.

Model	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Dependent Variable	AR (0)	AR (0)	AR (0)	AR (0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)	CAR (-3,0)
Intercept	-0.360	-2.806	0.079	-0.859	-0.819	-3.519	2.149	-1.304
	(0.882)	(1.741)	(1.201)	(1.042)	(1.100)	(2.161)	(1.498)	(1.300)
Ln Sales		0.190				0.275*		
		(0.126)				(0.156)		
Profitability		0.702				-2.277		
		(1.347)				(1.672)		
Multiple Relationships		-0.749				-0.615		
		(0.584)				(0.725)		
Large Firm				0.438				0.427
				(0.487)				(0.608)
Large-Large Bank			-0.453				-1.862*	
			(0.858)				(1.070)	
Termination Propensity	-0.030	0.167	-0.018	0.010	0.097	0.232	0.122	0.135
	(0.143)	(0.185)	(0.143)	(0.150)	(0.178)	(0.230)	(0.178)	(0.187)
ΔTermination Propensity	0.030	0.041		0.035	0.074*	0.082**		0.078 *
	(0.032)	(0.032)		(0.032)	(0.040)	(0.040)		(0.040)
Adjusted-R^2	-0.005	-0.006	-0.008	-0.006	0.010	0.019	0.007	0.007

Appendix

Acquiring and target bank identity, merger event dates, merger characteristics, the number of firms with relationships to merging banks in the year of the announcement, and changes in measures of market concentration as a result of proposed merger.

Event dates correspond to the earliest day of speculation about the merger or, in the case of undetected speculation, the day a public announcement was made. The table contains only those merger announcements involving banks with connections to firms listed on the Oslo Stock Exchange between 1979 and July 2000. Banks for which we have stock price data are indicated in boldface. "SpB" refers to *Sparebanken*, or savings bank. ΔHHI measures the increase in the concentration of OSE firm bank relationships assuming the merger is completed, measured by the change in the Herfindahl-Hirschman Index. "Large" banks are larger than the sixth-ranked Norwegian bank according to total Norwegian banking assets in the year before the event. All other banks are Small. LL is a Large-Large merger, or merger between a Large acquirer and Large target, LS is a Large-Small merger, and SS is a Small-Small merger. The number of acquiring and target bank borrowers refers to the number of OSE-listed firms maintaining a relationship with each bank in the year of the merger announcement. Firms are listed as target bank borrowers only if they do not simultaneously maintain a relationship with the acquiring bank.

#	Acquiring Bank *(New Bank Name)*	Target Bank	Event Date	Merger Size	ΔHHI	Merger Completed ?	Number of Acquiring Bank Borrowers	Number of Target Bank Borrowers
1	**Christiania Bank og Kreditkasse**	Fiskernes Bank	11/11/83	LS	0	Yes	41	0
2	Fellesbanken *(SpB ABC)*	SpB Oslo-Akershus	11/05/84	SS	1	Yes	1	1
3	**Forretningsbanken** *(Fokus Bank)*	**Vestlandsbanken** and **Bøndernes Bank**	01/22/87	SS	6	Yes	8	0
4	Fokus Bank	**Buskerudbanken**	03/12/87	LS	7	Yes	8	1
5	SpB Nord *(SpB Nord-Norge)*	Tromsø Sparebank	09/28/88	SS	1	Yes	1	0
6	**Bergen Bank**	**Rogalandsbanken**	05/24/89	LS	28	No	32	1
7	**Bergen Bank** *(Den norske Bank)*	**Den norske Creditbank**	10/05/89	LL	1006	Yes	32	23
8	Finansbanken	Kjøbmandsbanken	10/24/89	SS	0	No	1	0
9	SpB ABC *(SpB NOR)*	SpB Østlandet	12/18/89	LS	5	Yes	4	1
10	**Christiania Bank og Kreditkasse**	Sunnmørsbanken	01/19/90	LS	52	Yes	48	1
11	**Fokus Bank**	**Tromsbanken**	01/25/90	LS	0	Yes	9	0
12	**Christiania Bank og Kreditkasse**	**Sørlandsbanken**	04/05/90	LS	0	Yes	48	0
13	**Fokus Bank**	**Sørlandsbanken**	04/06/90	LS	0	No	9	0
14	**Fokus Bank**	**Rogalandsbanken**	04/21/90	LS	10	Yes	9	1
15	**Oslobanken**	Finansbanken	05/09/90	SS	0	No	0	1
16	SpB NOR	Finansbanken	08/23/90	LS	0	Yes	0	1
17	**Oslobanken**	Den Norske Hypotekforening	09/10/92	SS	0	No	2	0

18	**SpB NOR**	Den Norske Hypotekforening	10/01/92	LS	0	Yes	2	0
19	Christiania Bank og Kreditkasse	Fokus Bank	10/06/92	LL	614	No	40	11
20	**Bergens Skillingsbank**	**Norges Hypotek Institutt**	10/08/92	SS	0	Yes	0	2
21	**Den norske Bank**	**Oslobanken**	04/23/93	LS	72	Yes	57	0
22	**SpB NOR**	Fokus Bank	11/09/93	LL	38	No	3	9
23	Christiania Bank og Kreditkasse	Fokus Bank	11/10/93	LL	485	No	37	8
24	Oslo Handelsbanken	Finansbanken	09/07/94	SS	0	No	0	1
25	**Christiania Bank og Kreditkasse**	**Norgeskreditt**	05/19/95	LS	0	Yes	46	0
26	**SpB NOR**	**Norgeskreditt**	06/14/95	LS	0	No	6	0
27	**SpB Nord-Norge**	**Nordlandsbanken**	06/26/95	SS	0	No	0	1
28	**Fokus Bank**	**Industri & SkipsBanken**	11/21/95	LS	0	No	6	0
29	**Fokus Bank**	**Bolig & Næringsbank**	01/29/96	LS	0	No	6	0
30	**Industri & Skipsbanken**	Finansbanken	03/21/96	SS	0	Yes	0	2
31	**Fokus Bank**	**Bergens Skillingsbank**	04/24/96	LS	0	No	6	0
32	**SpB Nord-Norge** *(Sparebankgruppen)*	**SpB Rogaland**, **SpB Vest**, and **SpB Midt-Norge**	06/04/96	SS	1	No	0	2
33	**SpB Vest**	**Bergens Skillingsbank**	06/07/96	SS	0	No	1	0
34	**Sparebankgruppen**	**Bolig & Næringsbank**	09/31/96	LS	0	No	2	0
35	**Fokus Bank**	**Bolig & Næringsbank**	03/18/97	LS	0	No	6	0
36	**Den norske Bank**	**Bolig & Næringsbank**	03/21/97	LS	0	No	70	0
37	**Sparebankgruppen**	**Fokus Bank**	04/14/97	LL	11	No	2	5
38	**SpB NOR**	**Fokus Bank**	11/06/97	LL	55	No	6	6
39	**Fokus Bank**	**Bolig & Næringsbank**	03/03/98	LS	0	No	8	0
40	**SpB NOR**	Gjensidige Bank	04/24/98	LS	13	Yes	8	2
41	**Christiania Bank og Kreditkasse**	**Fokus Bank** and Postbanken	09/15/98	LL	262	No	57	7
42	Svenska Handelsbanken	**Fokus Bank**	10/30/98	LL	30	No	7	8
43	Den Danske Bank	**Fokus Bank**	11/12/98	LL	4	Yes	1	8
44	**Den norske Bank**	Postbanken	03/23/99	LL	0	Yes	80	0
45	Svenska Handelsbanken	**Bergensbanken**	05/03/99	LS	3	Yes	6	1
46	MeritaNordbanken	**Christiania Bank og Kreditkasse**	09/20/99	LL	26	Yes	1	56
47	Svenska Handelsbanken	**Den norske Bank or**	10/01/99	LL	273	No	6	125
		Christiania Bank og Kreditkasse		LL	183	No		
48	**Den norske Bank**	**Christiania Bank og Kreditkasse**	02/24/00	LL	2162	No	75	40